

Archives in transit: From the world of libraries to artificial intelligence

Digital teaching materials for
Secondary Education teachers

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Onassis Stegi Onassis Stegi (www.onassis.org) is a cultural venue in Athens, which hosts events and activities across the entire artistic spectrum, from theatre, dance, music and film to visual arts, poetry and literature. It emphasizes contemporary artistic expression, and supports Greek artists, alongside developing international collaborations and offering education opportunities for people of all ages, through continuing education programs. Every year, the Onassis Stegi organizes and coordinates international tour and exchange programs for its own productions, and promotes awareness and synergies across science, innovation and the arts. Stegi is a department of the Onassis Foundation and was officially established in December 2010.

Education Programs Onassis Stegi Education Programs are addressed to school groups, families, teens, adults; educators, artists, people with disabilities, adults 18-40 years old, people over 65 years. Their main goal is to bring contemporary art closer to people's everyday lives. Each year our education programs revolve around a different theme. They cover all the fields that are included in the Onassis Stegi program, such as theater, dance, music, visual arts, and new media, and many of them are interdisciplinary. They are associated with the Onassis Stegi artistic program and draw connections with other units of the Education Pillar (Onassis Library, Special Education, Cavafy Archive).

European ARTificial Intelligence Lab The European ARTificial Intelligence Lab brings AI-related scientific and technological topics to general citizens and art audiences, in order to contribute to a critical and reflective society.

The project focuses on aspects beyond the technological and economic horizon to scrutinise cultural, psychological, philosophical and spiritual aspects. As part of Europe's cultural institutions related to art, technology and society, the European ARTificial Intelligence Lab centers visions, expectations and fears that we associate with the conception of a future, all-encompassing artificial intelligence.

An extensive cultural and educational activity programme in the form of exhibitions, labs, workshops, conferences, talks, performances, concerts, mentorings and residencies will foster interdisciplinary work, transnational mobility and intercultural exchange.

Archives in transit: From the world of libraries to artificial intelligence

Digital teaching materials for Primary and Secondary Education teachers

“Archives in Transit: From the world of libraries to artificial intelligence” is an educational toolkit containing theory, examples and ideas for educators, related to digital cultural heritage, art, technology and archiving practices. The edition presents in detail archive-related concepts, from traditional formats up to their digital transformation, discussing the meaning of information, its analog and digital formation, and documenting foundational changes, from the algorithmic organisation of information up to the impact of artificial intelligence. By foregrounding an interdisciplinary approach, the educational toolkit creatively combines in-school study fields and empowers students to develop critical skills for the future.

The teacher kit will be available on onassis.org in December 2020. Teachers and students are not required to have prior knowledge in technology or archiving practices.

Target Audience: Primary & Secondary Education teachers

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1. Introduction



Img. 1: Making collages with the students from printed documents in the Onassis Library. CC BY-NC-SA 4.0. Derivative work from a photograph by Penelope Gerasimou

This edition was created as part of the **Archives in Transit programme: From the world of libraries to artificial intelligence**. In particular, it was based on ideas and information gathered from designing and implementing the programme as well as from participants' feedback. We thought it might be valuable to share our experience and research through the development of a toolkit, a publication-toolkit where ideas, project sketches, theory and practices are conceived as tools, all set in the core of educational design.

Through the toolkit **Archives in Transit** we aim:

- a) to familiarise educators with the field of digital cultural heritage, to raise awareness around the intersection of art, technology and archiving practices as well as around the critical need for the creative reuse of digital collections as cultural heritage ephemera.
- b) to provide project ideas for educational activities and applied cases for contributing to the design of interdisciplinary educational programmes, focusing on the critical and creative use of digital tools and archival/library collections.
- c) to upgrade the digital skills of educators and students towards up to date practices of archiving, documentation, research and creativity, introducing artistic and technological approaches, softwares and methods.

If you are an educator in secondary education, teaching history, art, computer science, or even literature and science, we hope you can find here ideas and new information that you can apply effectively in your work. Likewise, if you are teaching in the last grades of elementary school, in a museum, library or archive, we think you may as well find the suggested activities interesting. They are especially designed for the school environment, its curriculum and classroom. This, however, should not discourage their application in a museum, archive or library setting, through an interdisciplinary approach.

1a. Toolkit description

In section 1 **Introduction**, you'll find a description of the toolkit and the educational programme, an introduction to the topic, as well as a compact glossary with relevant terms from the fields of art, technology and archival science.

The main content is organised in thematic sections according to the workshop modules we've implemented for secondary school students. We look into the organisation of information, its history and further connections, in a nonlinear albeit narrative structure. In section 2 **Archival concepts**, we present the traditional archiving and document formats, laying the ground for the project's core concepts. Next, in section 3 **From word to keyword**, we focus on the organisation of information, the web user as cataloguer, on thesauri and keywords, to get a handle on the basic principles of documentary organisation and its transition to digital practices. In the following section 4, **From library to database**, we outline the transition from physical to digital archives and introduce new archival formats. In section 5 **From database to datasets** we move to the algorithmic organisation of information and the ways it affects and interacts with the archive. We explore how digital archives are utilised in machine learning processes.

Every section contains thematic sub-sections, each ordered in two parts. First, we include references that form a general theoretical and practical framework (we briefly present the current developments including art, technology, science and archiving examples, reflecting also on everyday life cases), together with ideas for activities, which we hope can become a starting point for new explorations. The activity proposals are structured as learning scenarios, i.e. teacher-friendly structures.

The last section 6 **Appendix**, contains a suggested bibliography for further reading/research as well as more lists, where you can find indexed all the referred artworks and tools throughout the text. You'll also see the glossary of terms with reference to the pages they appear in-text.

We would like to note here that the presented resources and tools are aimed at educators and some of them may contain adult content (e.g. Mouchette.org, Syrian Archive). They are offered as a research material for the educator. Approved resources for students --particularly for younger ages- , can always be found in the learning scenarios, which the educator can use without any restrictions.

1b. Programme outline



Img. 2: Printed documents "through the lens" of digital tools in the Onassis Library. CC BY-NC-SA 4.0. Derivative work from a photograph by Stavros Petropoulos.

The educational programme **Archives in Transit: From the world of libraries to artificial intelligence**, took place in 2019/20 as part of the Onassis' Foundation educational programmes. It was addressed to students of secondary schools in Athens. In addition, a workshop was designed for teachers, museologists, museum educators and related disciplines.

The programme has been developed based on two core concepts and related questions:

- The World Wide Web offers countless databases and digitised or born-digital archived material. How are archives being transformed in the digital age and how can we integrate new archival formats into the creative and educational process?
- After two decades of digitisation and digital media evolution, an increasingly fragile cultural heritage is being created of archives, works and websites, which disappear or become obsolete in a much faster pace than print media. How can we critically and creatively uplift digital documentary cultural heritage?

The programme's main scope has been to raise an archival awareness among students, to change the everyday culture around archives, as well as to understand the interaction of art, technology and information management in an increasingly complex technological and information age. At the same time, we were interested in bringing students in contact with the world of digital art, remix, the internet with its multiple archival aspects and with current technologies, such as software that is trained to recognise e.g. images and emotion through datasets utilised for training.

1c. Introduction to the topic

We organised an interdisciplinary team specialising in digital culture, digital archives, cultural heritage and education, using as case studies three heritage collections of the Onassis Foundation: the Cavafy Archive, the Onassis Library and the digital collection travelogues.gr, in collaboration with the Laskaridis Foundation. At the same time, we made use of many artistic methods, based on a number of artworks that are part of Onassis' Stegi exhibition programme. Through creative appropriation of works within these collections and beyond, including digital and traditional material, we collaboratively explored its potential usages for the creation of an artwork, a narrative about the archive itself, its nature and transformations.



Img. 3: Searching the shelves of a library or archive. CC BY-NC-SA 4.0. Derivative work from a photograph by Matthew Feeny.

Archival transformation constitutes a history and theory of information that differs from what we imagine or debate within the culture of everydayness, which is not at all boring or flat as the archival experience may often be perceived and which affects our impressions of the archive.

In the last decades the concepts of archive, preservation, document and organisation, have been expanded on a theoretical and practical level. On the one hand, the archive is no longer locked in a temporality of obsolescence, nor in the power of the collector or cataloguer. The archive is now also created by digital media users who document artefacts, while archives and libraries collaborate with artists and technologists for creating alternative presentations of their collections in digital space, focusing on emotion, experience, and conviviality. On the other hand, new challenges arise related to the preservation of digital or digitised artefacts. These are no longer endangered solely by traditional threats, such as damages from extensive use, fire or flood. Digital artefacts (as works of art, websites, social network profiles, digital file collections, etc.) are dependent on technical protocols, contracts with Internet service providers, softwares and browsers, and the list goes on. The average lifespan of a digital document is infinitesimal compared to a traditional printed document. An essential way to use them, then, is through their creative appropriation. The use of archives in educational or artistic processes forms a practice of creative preservation!

According to French philosopher Jacques Derrida, technology has not only changed the archiving process, but also what is being archived. At the same time, it profoundly changed what a document can mean or do, what it includes, how it is being organised, manifested and preserved. What it means for the archivist, the user, the citizen, and the society and community in general.

1d. Glossary of terms

Shifting from the archive to the database, our world has reached a point where it archives almost everything. We archive our everyday lives and ourselves on social media, citizens are archived in corporate and government databases, and all this somehow leads to the big data explosion. Vast volumes of information collected through mobile phones form archives through which software is often being trained, so it can grasp the meaning of our archived world as well. Through the use of digital archives and collections, scientists build algorithms and software which they connect to cameras, achieving image, speech or emotion recognition in people. And all this without digital documents in databases would not be possible.

On the other hand, technologists and designers are using software machine learning to organise large-scale digital archives in libraries and research centers. They design 3D navigation environments for archives, web pages with automated archiving processes, etc. In this context, the key factor of archival transformation lies in the convergence of art, technology and information/archival science, which sets the challenge for a new understanding and expansion of our archival consciousness.

What does this convergence practically mean for an educator? First of all, it opens the ground for interdisciplinary approaches, as it is itself an interdisciplinary development of otherwise distinct scientific fields. Thus, cooperation between specialisations as well as the participation of the educator in fields that go beyond their discipline, are great ways for inspiring students to get involved and gain a deeper understanding in this topic. Additionally, it also foregrounds a great pool of available resources, digital collections, tools and artworks via the web, that await the educator to discover and have fun with them, to use them in dynamic and freestanding ways, aligned with the scope and ideas of their course.

Nikos Voyiatzis.

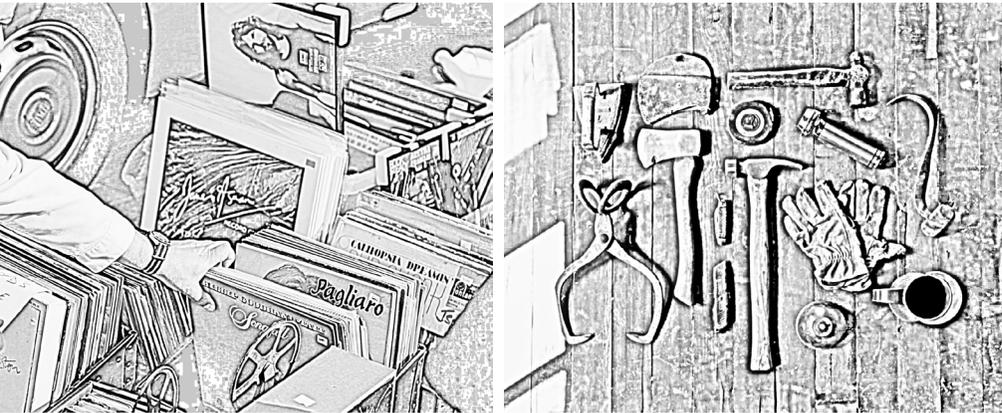
Curator and coordinator of workshop and educational material groups.

Algorithm	Algorithms represent methods used for solving problems in computer systems, consisting of a sequence of commands that execute specific programmed instructions.
Appropriation	As an artistic practice it includes the discovery and utilisation/reuse of readymade materials, images, objects, items, etc., in order to create a new "recipe" with older materials.
Artificial Intelligence	Artificial Intelligence or AI transforms machines into intelligent systems, able to perceive the environment and react accordingly.
Artificial neural network	A type of machine learning that consists of interconnected units (such as neurons). The term is inspired by biology.
Bot	The bot is an abbreviation of the word robot and has applications in the physical world and on the internet. In its web applications it is a software programme that executes automated or semi-automated commands and processes.
Collaborative tags / Folksonomy	Indexing (defining the subject of an item through keywords) often performed by users on a digital collection's website. Sometimes it includes the selection of specific word lists (libraries and archives mainly), other times it goes more freely (on social media etc.).
Computer vision	Part of the artificial intelligence field focusing on the use of algorithms and imaging devices (such as cameras), in order to create "vision" for machines.
Database	A collection of documents or records that refer to artefacts that are organised, stored, described, catalogued and indexed in a digital environment.
Data visualisation	The processing of data information or metadata, in order to create a work of art or an alternative presentation of a database collection.
Digital document	Digital documents are divided into digitised and born-digital. An example of a digitised document is a poem by Cavafy in his digital archive, which is the scanned version of the printed/manuscript work. An example of a born-digital item is a digital photo or website.
Digital preservation	The preservation of digital documents and collections. Preservation is conceived as a set of perceptions, actions, methods and processes, provisioning for the life extension of a document or object.

Interface	A software, device or environment that is in between two objects, in order to communicate between the two parties. Interface examples include Google search, the Graphical User Interface (GUI), Photoshop or Open Office.
Licenses	Whether for a book, website, or software, licenses are being applied for defining terms of use and reuse. There are closed licenses, such as copyright, but also open licenses such as creative commons (CC), which regulate content sharing in connection to rights and constraints.
Machine learning	The creation of intelligent algorithms that can be trained out of input data, make predictions and serve users by offering them potential solutions.
Machine learning art	Digital algorithmic systems that are trained to recognise images, videos, audio and text, while being able to create their own new images, music, novels, movies, etc., through experimentation and correlating input data.
Metadata	Metadata is information that describes other data, such as an object, a concept or a fictional character. They can take the form of texts, numbers and symbols. A book's metadata may include for example its title, author, subject in keywords, etc.
Open knowledge	The use and reuse of information and content without constraints, with the aim to make knowledge a public good for all.
Remix	The practice (artistic or not) of reorganising excerpts of information into new forms/narratives. A term also related to music culture, it clearly becomes widespread with the emergence of digital technologies.
Software art	Art form where programming is used as an artistic practice. Software art focuses on the creative use of code or commands within digital operating systems and graphic environments.
Thesaurus	An approved and formal set of terms used by libraries and archives, enabling the connection of concepts, in order to create a descriptive framework for documents. Thesauri enhance the development of thematic indexes with official terms, ultimately contributing to the effective retrieval of information and documents.

2. Archival concepts

In this section, traditional forms of archives and archiving practices will be presented and made fit for use in school environments through the suggested activities at the end of the section.



Img. 4 and 5: Different collection types. CC BY-NC-SA 4.0. Derivative works by photographs of Clem Onojeghuo and Todd Quackenbush.

Collection

Humans are collectors by nature and -either individually or together with others- they collect, organise and preserve objects, information and experiences. In this edition, we will be focusing on organised collections of archives, libraries, and other memory organisations. These collections, as we will see, emerge out of systematic acquisitions and organisation, embodying social meaning as their core feature. They are organised through classification systems, indexes and special terms. In addition, we will examine novel archival and collection formats, created by users, communities or artists, beyond the archival/museum context.

In any case, collections, whether belonging to institutions or individuals, contain objects that we call documents.

i. Creating a personal collection at the Onassis Library

An application of the library in the online environment: Collect documents and organise your own collection!

<http://www.onassislibrary.gr/el/sylloges/i-syllogi-mou/>

ii. Personal collections and subjective archiving

Think about your own collector's traits! What objects do you collect? What do you think they represent? In what ways do you organise them?

Document

A document can be a file, an artwork or an object, that includes information about a specific event, a situation, an action, a topic. Through the provided information, we are able to validate or recognise, research or reshape a viewpoint or concept. For librarians, the document is the carrier of information and knowledge. The main difference in documents is between those carrying information in a physical written format (book) and those carrying information in all other formats: digital, electronic, audiovisual, oral. Through this toolkit, we would like to reflect together -and you in turn with your students- on an expanded understanding of the document as a concept. What is a document nowadays, and what it is not, will be addressed in the following pages. In any case, the collections of archives and libraries are composed of all kinds of documents. We often consider documents as files and as carriers of specific information, validated and objective. But is this so? How does the document change along with an archive in transit?

i. Document from the Onassis Library

Aratus. Ἀράτου Σολέως Φαινόμενα μετὰ σχολίων, Venice, Aldus Manutius [17] October 1499.

It is actually a digital record that represents and carries the specific digitised document.

http://www.onassislibrary.gr/en/collection/items/37110_en

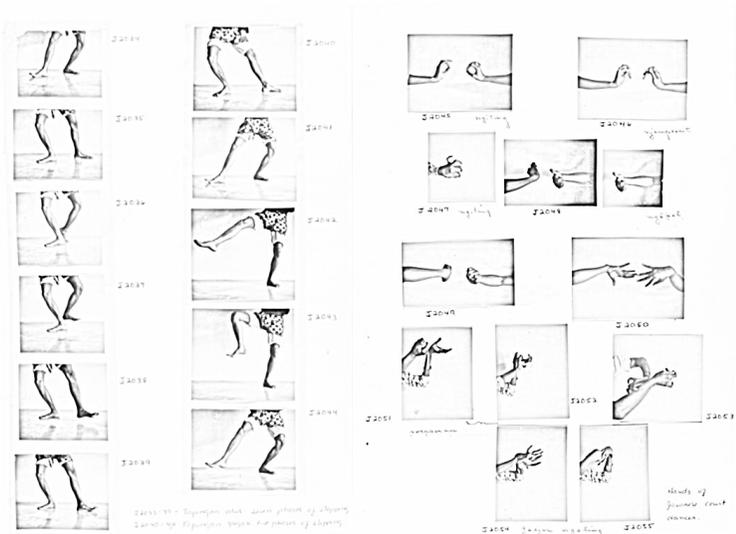
ii. The Library's website itself as a document

Imagine the value of the website as a document: It documents the institution's activity in the fields of library science and culture; it documents a moment in time when the collection and the Library, as well as its documents, are in a specific condition. Some documents are partially digitised, and some are fully-fledged. It is interesting to look at digital objects that are not traditional documents and perceive them as documents. At the same time, there are collections of documents consisting of websites, such as the Web Design Museum.

<http://www.onassislibrary.gr/en>

iii. Non-textual documents as documentary heritage

In addition to texts (manuscripts, books, letters, etc.), documents can be recordings of artistic practices, such as dance. In the following two documents the steps and hand movements of Indonesian dances are being recorded. The documents are part of the Jerome Robbins archive, the largest dance archive in the world, owned by the New York Public Library.



Img 6 and 7: Recording of dance practices (without known rights). Derivative works from the Jerome Robbins Collection, New York Public Library.

Archive

We should see the archive not only as a body of knowledge about the past, nor as a custodian of specific knowledge fields. Let us try to approach the archive together, as a field of research, creativity and innovation. We will try to change our archival consciousness and use the idea of the archive in situations that we wouldn't expect and that may surprise us. Making use of specific archives located in the Greek geographical area, we will focus on how we can integrate them in the educational design, not for supporting a historical continuum, but for equipping our students with new information or new connections for the future. It is important to recognise the archive as an agency of power. Consider the etymology of the word 'archive' and how it refers to authority and the exercise of power. On the one hand we have to recognise this aspect of the archive, on the other hand we will try to deconstruct it in order to popularise its power in the fields of education and creativity.

i. The Cavafy Archive

According to its website, the archive "was acquired by the Onassis Foundation at the end of 2012, thus safeguarding the archive's continued presence in Greece and preventing a potential fragmentation. The mission of the Cavafy Archive has been to provide free and open access to researchers as well as the wider public, and to promote the international character of the Alexandrian poet's poetry, through the digitisation and complete re-documentation of the archive's materials."

<https://cavafy.onassis.org>

Library

Accordingly, we will try to see the library not just as a memory organisation, but as a social laboratory bringing together technology, education and citizens' creativity. We will try to reflect not only on the content of a library, but also on its infrastructures. We will further focus on global languages and codes, the groundwork of librarianship, such as classification systems which often become global languages, affecting the organisation, reception and usage of information, sometimes in unexpected ways. What we must bear in mind is that libraries, archives and museums not only contribute to the organisation, but also to the preservation of the collected information and artefacts. At the same time, they implement programmes aimed at enhancing the information education of users.

i. Onassis Library

According to its website, the Onassis Library "is housed in a neoclassical building in Plaka (Amalias Avenue 56) and accumulates the Cavafy Archive and two large collections of books: the Hellenic Library (former K. Staikos' book collection) and the Travel Accounts book collection.

"The Hellenic Library accumulates books representing the intellectual activity of the Greeks, whether of the secular world or of the Church, from the period of the Italian Renaissance until the late years of Neo-Hellenic Enlightenment, that is to say the period from the outset of the fifteenth to the first decades of the nineteenth centuries."

<http://www.onassislibrary.gr/en>

ii. Dewey Decimal Classification (DDC)

An international standard designed by the American librarian Melvin Dewey in 1876, which divides knowledge into 10 basic categories, each category into 10 divisions and each division into 10 sections. It represents subjects by assigning classification numbers. These numbers guide the document arrangement as well as its discovery on the shelves. It is probably the most popular classification system used by libraries in Greece and abroad. See more about the Greek version by the National Documentation Center here: <http://www.ekt.gr/en/node/22770>.

iii. Universal Decimal Classification (UDC)

An international standard designed by Belgian bibliographers and information scientists Paul Otlet and Henri La Fontaine, a few years after the DDC. This system differed from DDC in that it used algebra symbols, such as plus (+) and minus (-), in order to be able to include more complex or varied topics in a document description. From the outset, its designers intended to establish their system as a universal language, which is why it was named Universal.

Preservation

Through this toolkit we will understand how concepts and practices of memory preservation/conservation are being transformed, as particularly evident in the chapter "New archival formats" in section 4. We will see how these concepts form the basis of creativity and educational design. In particular, the more we process documents and collections, the more their life is extended, leading consequently to their preservation. Thus, creativity applied in documents can in fact extend their lives and reinterpret them, as is the case with archival art. We often approach digitisation as a preservation practice, which of course it is, bringing forth the concept of preservation as access and the notion of digital documents as new versions of prints.

i. Preservation in the Cavafy Archive

According to its website, "The digital reproduction of the archive guarantees the safety and long-term preservation of the original items. It makes the most of the material, as it renders the same document accessible to many users at the same time."

ii. Personal collections and subjective preservation

Preservation can be a creative and subjective act. Think again about your personal collections! Do you follow any preservation method? Would this be interesting to you? What is the current state of these objects? How long have they been in your collection and how long do you think they will "live"?

Archival art

Archival art is a field of action and expression for artists, designers and curators, who are interested in archival structures, the archive or the museum as an agency of knowledge and power, the organisation of information and its impact on everyday life and culture. Often, in archival works we encounter methods of appropriating materials and items that are generally available, stored and organised, in order to design new narratives with pre-existing materials. The artistic outcome can take the form of a film, a spatial art installation, an exhibition of archival objects, a collection organisation, a digital work of art, etc. It is not necessary to use documents from official institutions and archives, although this is often the case. In this toolkit, archival art will be one of our core concepts, as it offers creative and critical insights, as well as applications that can illuminate the connections between technology, archive and cultural heritage. A well-established practice in archival art is the remix, known best from music culture, which creates new versions of original or non-original works.

i. Marc Dion, Tate Thames Dig

Archival art installation, in which the artist collects, organises and presents artefacts, in order to redefine the museum's history and to critique the archival institutional policy.

<https://www.tate.org.uk/art/artworks/dion-tate-thames-dig-t07669>

ii. Johan Grimonprez, Dial H-I-S-T-O-R-Y

Film on the history of hijacking and its representation in mainstream media, such as television, blending in a mixture of archival material, findings from the artist's personal archive and footage from science fiction films, etc.

<https://vimeo.com/231411671>

2a. Suggestions for Activities

Scenario 1:

Getting familiar with archival and library collections

Title	Exploring the Archive
Connection to Curriculum	Informatics, modern Greek language and literature, history, anthology of literary texts
Age group	12-15
Duration	1-2 class periods (45-90 minutes)
Objectives	<ul style="list-style-type: none"> • To get acquainted with archival collections. • To experience the concept of navigating in digital spaces. • To enhance digital literacy by connecting collections to their interfaces. • To dedicate quality time for critically engaging with the websites of archives • To let students reflect on the views and interpretations of their classmates on the same topics. • To become aware of information representation cases and variations among archives. • To understand the correlations of physical and digital/digitised documents.
Required equipment	Pencils, post-it, markers/pens, large paper roll, A4 sheets, tablet / laptop / computer, internet connection.
Steps	<p>1. Introduction to the topic: The educator tries to inspire students about the topic and draw their attention in a variety of ways. For instance: Students may watch a video about the archive as a concept or watch someone presenting an archive. Students create, with the use of geometric shapes, their interpretations of the archive. Each student presents an organised archival format they have created (photos, music, objects, etc.). We discuss how they created it and why.</p> <p>2. Groups are being formed, assigning each a collection or archive as a means to encourage collective reflection and discussion. For example, group A may take on the Onassis Library and group B the Laskaridis Foundation's Library. Or, each group may choose a specific collection of the Onassis</p>

	<p>Library, e.g. one the Hellenic Library and the other the Travel Accounts book collection.</p> <p>3. Each student on their own writes down their thoughts about the collection/library they were assigned to, using paper (post-it, notebook, etc.). After that, they place their thoughts in public view inside the classroom, where everyone can see and read them.</p> <p>4. A selection of students present their thoughts. Feedback and discussion. The educator forms a thoughtful conversation around the initial questions. How did the students' perception/ ideas about the archive, archiving techniques and personal collections change?</p>
Keywords	Archive, collection, library, document
Tips	The act of visible thinking through thinking routines is an excellent tool for creative thinking. Time to look at archival collections from a different angle! More about these techniques can be found here: http://www.pz.harvard.edu/projects/visible-thinking . See the following images which capture the visible thinking of students during the workshop.
	Img. 8 and 9: CC BY-NC-SA 4.0

Scenario 2: Getting familiar with the Dewey classification system

Title	Learning how libraries organise their massive collections
Connection to Curriculum	History, (informatics), language, modern Greek language
Age group	9-13
Duration	1-2 class periods (45-90 minutes)
Objectives	<ul style="list-style-type: none"> • To learn what a classification system is. • To understand that it is a representation of information. • To understand that classification systems are designed to organise in subjects even new knowledge. • To attain an essential principle of information education: the understanding of the structural thematic organisation of resources.
Required equipment	<p>Pencils, post-it, markers/pens, A4 sheets, large print of Dewey classification</p> <p>ΟΙ 10 ΘΕΜΑΤΙΚΕΣ ΚΑΤΗΓΟΡΙΕΣ</p>  <p>000 ΕΡΓΑ ΓΕΝΙΚΗΣ ΦΥΣΕΩΣ 100 ΦΙΛΟΣΟΦΙΑ ΚΑΙ ΨΥΧΟΛΟΓΙΑ 200 ΘΡΗΣΚΕΙΑ 300 ΚΟΙΝΩΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ 400 ΓΛΩΣΣΑ 500 ΦΥΣΙΚΕΣ ΕΠΙΣΤΗΜΕΣ ΚΑΙ ΜΑΘΗΜΑΤΙΚΑ 600 ΕΦΑΡΜΟΣΜΕΝΕΣ ΕΠΙΣΤΗΜΕΣ-ΙΑΤΡΙΚΗ ΤΕΧΝΟΛΟΓΙΑ 700 ΚΑΛΕΣ ΤΕΧΝΕΣ / ΨΥΧΑΓΟΓΙΑ 800 ΛΟΓΟΤΕΧΝΙΑ ΚΑΙ ΡΗΤΟΡΙΚΗ 900 ΓΕΟΓΡΑΦΙΑ / ΒΙΟΓΡΑΦΙΑ / ΙΣΤΟΡΙΑ</p>
Steps	<p><i>Img. 10: CC BY-NC-SA 4.0</i></p> <ol style="list-style-type: none"> 1. Introductory debate: Split students in 2 groups and ask them to imagine how a library organises its material. What do they know? What do they imagine? Give them time to discuss and present at the end. 2. Hand to all students a blank sheet of paper and ask them to write down a book title they know. Draw lines/arrows below and ask them to fill in words that describe the book as a subject, as an object, as a publication. Choose some students for a presentation.

	<p>3. Show them an image of the Dewey classification system. Select some of the books from step 2 to sort into the major categories of the classification system.</p> <p>4. Discuss how their initial thinking about the question changed: How do libraries organise their material? You can also apply the visual thinking method on post-it papers, based on the routine: "What I was thinking ... What I am thinking now".</p>
Keywords	Collection, document, classification system
Tips	<p>For children of younger age, you can play the following game: Tell them a story about an alien landing on Earth and asking people how things are on their planet.</p> <p>Give to the child who plays the role of the alien a picture with the main Dewey classes. As students start their descriptions, the alien locates the information of its classmates on the image (class). e.g. in the description "the earth has trees", the alien must point to the class 500 NATURAL SCIENCES.</p>

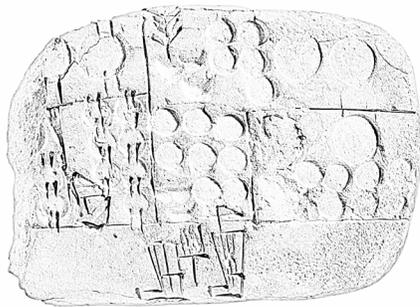
With an insight into how archives are organised, let's move on to how information is organised in the digital environment.

3. From word to keyword

This section covers the organisation of information, how internet users form catalogues, thesauri and keywords. The aim is to understand the basic principles of content organisation as well as the transition to digital practices.

Information representation

Information in libraries and archives is represented through applied classification systems with distinct categories, thesauri/indexes from which keywords and codes (such as numbers, symbols, letters) are being derived, that indicate relations and agency between documents of a collection. Thus, traditionally, librarians do not represent information subjectively (i.e. by adding a new book into the library's software), instead they apply explicitly stated formal rules and strive to organise new knowledge as a whole.



Img. 11: Administration list on a clay tablet. CC0 1.0 Derivative work from a public domain image.

Alphabetical order

Lists, directories, and indexes used by libraries and archives follow an alphabetical or thematic/relational order arrangement, which is never based on chance or random decisions, significantly impacting content organisation. This is why we want to address it as an information technology that not only represents, but constructs categories, collections, search environments and, thereby, is critical in the formation of a distinct organised self of archivists and users.

Thesaurus and keyword

Thesauri always accompanied librarians in classification processes. They are official publications of global or national library associations and what they essentially do is they include approved terms attached to documents.

Classification systems such as Dewey, used in most libraries in the Western world, provide main classes by which documents are organised by means of their description. In any case, critical views on language and representation linked to contemporary philosophy, motivate us to think: What do librarians organise? Is it the book, the concepts it contains or just the words that describe them?

i. Art & Architecture Thesaurus

The Getty Research Institute's art and architecture thesaurus contains thousands of concepts, sources, and notes related to artistic and architectural movements, object descriptions, time periods, and more. The thesaurus is enriched over time, which means that newly reified concepts can be added as well. One can experiment by looking for terms (for example, impressionism) and see in a tree-like, hierarchical structure where the terms fit geographically, in what time periods, with what other terms they relate, etc. (by clicking on the small graph with the three joined nodes in front of each concept).

<https://www.getty.edu/research/tools/vocabularies/aat>

Collaborative tags

Words certainly have power in them and, in our case, have always expressed the power of the library community and tradition on its users. In the last twenty years, however, the power of words to describe the world has passed into the hands of users. Today's practice of content tagging by users -you can think of a user who uploads videos on YouTube and adds tags of their choice- has its roots in the early librarianship practices of collaborative indexing. Shortly after 2000, and in the midst of a decade of intense digitisation, libraries started allowing users of their digital collections to apply tags on artefacts. Within digital space, users are starting to become co-creators in the field of organisation. The involvement of users in keyword tagging for describing documents, marked a turning point in archival culture and practice and, subsequently, contributed to the development of a distinct form of artistic practice.

Users as cataloguers and co-creators

We identify the transition from professional cataloguers to amateur users who contribute to broader cataloguing processes, along digitisation and online content dissemination. This is why we attempt to acknowledge users as something more than mere contributors in archival operations, namely as active agents that redefine the meaning of archives and collections. With users taking up the role of librarians, information organisation is filled massively with subjectivity, which moves away from thesauri and classification systems. Take into account keywords that users apply to their uploaded videos shared on social media.

Through digital media, their interactive and participatory features, it has become more evident than ever that whether we are talking about books, movies, works of art or archival documents, the user is not a simple passive recipient of information. Is the 'death of the author' as a philosophical concept meaningful in this context? As the author "dies", along with their imposed authority over content, the reader is being "born". This became particularly evident through remix practices, collaborative archiving and indexing, as well as through mechanical and digital reproduction. Thus, especially in the post-web 2.0 digital environment, i.e. in the era of social media, users are not just readers, but co-creators of content, information and meaning.

i. Example of a user embedding keywords on YouTube content.

Watch how thematic keywords are liberated from controlled, approved vocabulary terms!



Img. 12: Highly...subjective keywords by a user! CC BY-NC-SA 4.0.

ii. Example of a user embedding 17 keywords in an image uploaded to flickr, under the "Tags" section.

The image contains more metadata, such as technical details of the photographic settings.

<https://www.flickr.com/photos/126164815@N04/40036085443/>

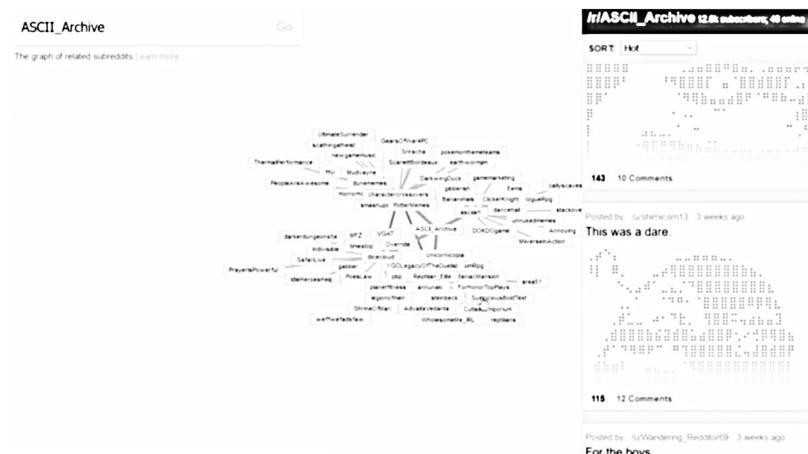


Img. 13: Creating an educational archive of images. CC BY-NC 2.0. Derivative work from a photograph by the Milwaukee Teachers' Education Association (MTEA).

iii. Digital communities and collaborative tagging on Reddit

A data visualisation and organisation experiment in the form of an interactive graph of the collaborative tagging carried out on reddit by special-interest digital communities (e.g. communities of historians, specific music genres, literature).

<https://anvaka.github.io/sayit/?query=>



Img. 14: Data visualisation. CC BY 4.0.

Screenshot of the demo software created by Anvaka.

Art with metadata

Specialised field of archival art. Artists focusing on archival concepts, in particular keywords, are processing, appropriating and reinterpreting tags and content on digital media. This is a critical practice, enhancing the role and value of metadata, from being conceived in merely technical terms to becoming a creative material. In the context of digital data visualisation, special programmes are powered by digital metadata that are organised and modeled in machine-readable file formats (CSV, JSON, Turtle). As an artistic practice, digital data visualisation explores the critical, aesthetic, and interdisciplinary perspectives of digital metadata.

i. Thomson and Craighead, A Short film about War

In their work, the two artists present a narrative documentary based on images taken from the online platform Flickr, which contains digital images uploaded by users. The video shows a sequence of images including their metadata (e.g. which user uploaded each image and when, which keywords were applied). It is, therefore, a work of art that, in addition to its thematic axis (war and photographic coverage), utilises collaborative user tags as narrative elements and not just as complementary

information. The work helps us understand the concept of folksonomy (social indexing), while suggesting ways of its creative and critical use.

<http://www.thomson-craighead.net/warfilm.html>

ii. Introduction to intangible cultural heritage: UNESCO

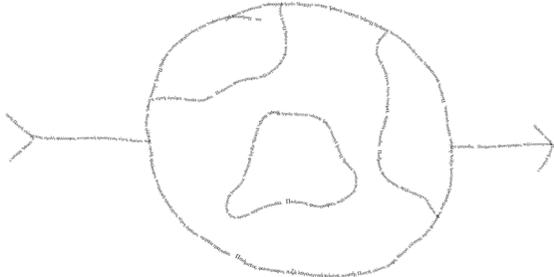
A creative data visualisation of UNESCO's digital archive and index, for the serendipitous exploration of various categories and concepts linked to the domain of intangible cultural heritage. The interactive graph encourages users to examine the field, inviting them to an exploration based on aesthetic terms.

<https://ich.unesco.org/en/dive&display=constellation#tabs>

3a. Suggestions for Activities

Scenario 3: Visual poetry with metadata

Title	Designing visual poetry works with keywords
Connection to Curriculum	Modern Greek language and literature, art, informatics
Age group	15-17
Duration	1-2 class periods (45-90 minutes)
Objectives	<ul style="list-style-type: none"> • To learn how keywords are being used and applied on collections' documents. • To contemplate creatively on the power of linguistic representation through keywords. • To understand that technical metadata are not just technical terms, but can be a starting point for creative expression.
Required equipment	Internet connection, web tool http://www.languageisavirus.com/visual-poetry/index.php#.XuYs6kUzZEY , Chrome / Mozilla browser, computer / laptop, printer. (Best to take place in the computer lab!)
Steps	<ol style="list-style-type: none"> 1. Show examples of visual poetry in order to create a common frame of reference among the students. For example the poem "Mirror" by Guillaume Apollinaire (source: here). How are the words organised? What do I see, what am I reading? What is the relation between form and content? 2. Split the group into pairs. Out of an archive's website, give them time to choose whatever tags they want and as many as they like, let it be over 20 so they can spend time on them. You can ask questions, such as why they chose these tags, what are these tags useful for, if we can use them elsewhere. 3. The students write down the tags in a doc format on the laptop and, through the application, they copy-paste the tags and ... paint with them! 4. Print or present their works on screens and start a conversation about their choices. Why was this shape used?

Keywords	Why this color? How did they feel doing visual poetry with keywords from the archive? Keyword, remix, information representation, alphabetical order
Tips	In the meantime, you can ask students to alphabetically order the tags on their list, in order to highlight the distinctive features of a visual poem as a form of information organisation. Also, you may reinforce the idea of expressing oneself in familiar shapes and representations and not just by drawing random lines. An example from our workshop with students: The planet of tags.  <i>Img. 15: CC BY-NC-SA 4.0.</i>

In this section we approached information organisation within digital space. It's time to focus on databases!

4. From library to database

In this section we outline databases and their development in digital archival spaces.



Img. 16: Digitised newspaper document from the Cavafy Archive. CC BY-NC-SA 4.0.

Digital documents

Clearly more ephemeral than their analog counterparts; their materiality is based on information technologies, codes, programming languages, software applications and technical protocols. Consider, for example, the digitised version of a book. This book has been scanned or photographed with specific devices that generate a specific format. Our book is thereby converted into a file (e.g. PDF), which is a machine-readable document, accessible through specific interfaces, such as a document preview window or a browser. In the world of computers, it is clear so far that no format can be maintained forever. At the same time, in order to properly render the use and reuse of digital archives and artefacts, the Creative Commons licenses were created, which extend the concept of copyright management to more open standards. Creative Commons licenses are considered good practices, providing a set of solutions for the digital distribution and usage of digital files, provisioning also for more "closed" formats, as mandatory attribution to the creator along with banning the creation of derivative works and not allowing use for commercial purposes. On the other side, the licenses also allow works to enter the public domain, contributing to public knowledge. According to the definition of the Open Knowledge Foundation "Open data is data that can be freely used, shared and built-on by anyone, anywhere, for any purpose". It is precisely this new materiality which allows remote access, multiple reproductions of the document as well as its integration in digital collections.

Digital collections

They include either digitised or born-digital files, or a combination of both. We should not confuse them with online digital collections, as typical digital collections are not necessarily accessible online. However, digital collections of memory institutions tend increasingly to become web-accessible, hosted on the official institutions' websites. Their ephemeral nature is here corroborated: digital web files depend on contracts with internet service providers (ISPs) and their compatibility with new browsers.

Databases

Transitioning from analog to digital collections, we move from organised materials on the shelves to organising content within databases, including new possibilities for data, artefact or document retrieval. Nowadays, we constantly talk about digital databases, however, library organisation systems have a long history in organising files based on powerful, multiple relationships.

Automatically creating and recognising these relationships has been made possible through the use of software technologies within databases. This comes along with further design possibilities for search and interface environments, which are often the focus of artistic and technical programming.

For instance, the database of a large library and its digital collection may be one and the same, however, the representation of its organised artefacts can take many different forms (lists/catalogues, gamified or creative environments, 3D, etc.).

To understand the database, it may help to think of it as the digital counterpart of shelves and books. In this context shelves represent the basic framework, which is built in programming environments, while books represent digital artefacts. Moreover, relational databases enable conceptual relationships between objects. This means they can interlink artefacts based on specific criteria, such as the author, the title or a keyword. It is important to understand that the database is a digital collection that is accessible through the website.

Websites and their digital collections can be considered monuments of contemporary cultural heritage, nevertheless, we should not forget that an average website lifespan is usually 2-3 years. Therefore, it is urgent to understand and make use of these new archives, uplifting their impact.

i. Onassis Digital Library

The Onassis Library has 100,000 digitised records and has developed two digital applications for web / tablet / smartphone that are freely available through this website. Some records are partially digitised and some are fully-fledged. Notice the records and tools provided to users, such as for saving records, for collection creation, etc. <http://www.onassislibrary.gr>

ii. Cavafy Digital

The digital collection of the Cavafy Archive includes manuscripts of Cavafy poems, hand-compiled printed editions, prose literary works, articles, studies and notes by the poet. It may be interesting to spot similarities and differences with the Onassis Digital Library. For example, this up-to-date website presents its records in different ways from the library, providing also access to a selected set of documents on its frontpage.

<https://cavafy.onassis.org>

iii. Travelogues

According to the website, Travelogues “aims to present, for the first time the near totality of graphic material from travel editions, accompanied by thorough documentation. The preambles describing each region -along with their documentation (text and images) by travelers throughout their travels-, the texts presenting each travel edition, the critical reviews of their content, the geographical mapping of the graphic material, the multiple search possibilities, together with various interactive applications, render this website a panorama of travel illustrations of the broader space in which Greeks and other ethnicities, lived, moved and acted in the past five centuries.” Notice here the different navigation environments in the collection, such as e.g. the map and subjects.

<http://el.travelogues.gr>

iv. Harvard Museum Digital Collection

An interactive visualisation of the Harvard Museum collection, listing the chronological and thematic sections of the digital collection in an expanding tree diagram.

<http://apps.harvardartmuseums.org/museum-explorer>

Software art

Software can serve as a tool for creating a work of art. However, the term, which was theorised in the 2000s, is mainly used to describe software itself as a work of art. In this sense, software art as a term encompasses programmes and their creators (artist-programmers) as a whole. The term also describes a cultural practice, where developers and users actively participate in an aesthetic experience mediated through software. This often includes making use of database materials or organising subjective local databases for the recording, interaction and publication, partially or in whole, of the artwork.

i. Jodi, OSS

Software artists and their work, OSS. Follow the link to see the project and examine how it works, what exactly it does and how it mixes software with art, playing or hacking with functions.

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New archival formats

The archive as a concept has been expanded in the digital age, especially through web technologies. The archive nowadays can stand as a process, going beyond a fixed set of information. We find therefore novel archival formats such as user-generated archives; living archives that often contain, apart from records, direct human experiences; algorithmically operating archives that are being reorganised over and over again through trained software; liquid and collaborative archives that do not contain static collections.

Traditionally, documents within archives and libraries were at risk from extensive use, poor storage, humidity, a potential flood or fire. Digital documents are considered ephemeral in relation to printed ones, as they depend on both, softwares with short life cycles which eventually become obsolete, as well as hardware devices, monitors, technical protocols, and contracts with companies that serve as internet software providers. Digital artefacts are therefore threatened by even more risks, such as the above, which is why the concept and the various preservation practices have been largely expanding nowadays.

New trends in the preservation and maintenance of digital media and artefacts, that go beyond storage and care, include: migration, i.e. the conversion to a new digital format (think here of websites and files based on Flash that are no longer compatible with browsers and are converted, for example, to HTML5); emulation, which represents the entire original environment of a digital file; reinterpretation, which subjectively re-approaches the digital object; and generative preservation (a concept by Martine Neddham, <http://about.mouchette.org/generative-preservation>), which is based on the creative use and production of new works out of the original archive. In our email communication with the artist, she informed us that this approach is not solely about her own work, but also about the preservation of online art in general, emphasising the real, interactive and participatory dimensions of the World Wide Web.

i. Mouchette.org

Online artwork by Martine Neddham, presented as a diary of a 13-year-old girl. Through various interactive games, Mouchette collects user replies to questions / quizzes into an early database driven artwork. Since the project's inception in 1996, the archive is still actively aggregating user-generated content, a rare gem of online archival culture. The project, apart from embodying a new archival format, is also a very interesting example of how a digital archive that keeps records of user-generated content in a database, can be kept alive.

ii. Wayback Machine

A web service of the Internet Archive, the digital archive that aspires to archive the World Wide Web. Visit the site and enter URLs from websites of your choice: you'll be able to access past editions of these websites, as they used to be at different

points in time. It stands as an archive that records changes, raising many issues regarding access and digital preservation. Many of the links we provide in this version will be outdated and not available at some point. In this case, try to find them on the Wayback Machine!

<https://archive.org/web>

iii. **Morehshin Allahyari, Material Speculation: ISIS**

Artwork of the Iranian artist that was presented at Onassis Stegi, in the context of the “Hybrids” exhibition. It consists of miniature statues that replicate physical artefacts destroyed by ISIS in cities such as Palmyra. The artist relied on archival research to reconstruct the ancient statues, while including a USB stick inside each statue which performs two functions: storing records from the artist’s research, which we as audience can also receive, as well as opening a space where the audience is welcome to contribute their own information. Thus, apart from embodying a new archival format (with transient, user-generated content), the artwork is also an exceptional example of creative preservation

<http://www.morehshin.com/material-speculation-isis>

iv. **3D Warehouse**

Archive with 3D user-generated content. It used to be linked to Google Earth for designing and publishing buildings, monuments, etc. by users.

<https://3dwarehouse.sketchup.com>

v. **Martine Neddham, I Love Mouchette**

Reconstruction of a damaged work of net art through digital archives, parts of her memories and creative imagination, by Nikos Voyiatzis.

<http://ilovemouchette.virtualperson.org>

vi. **Nikos Voyiatzis. I Love Mouchette remix**

New remix version of the reconstructed artwork.

<http://thereisamajorprobleminaustralia.com/ilovemouchette/index.html>

vii. **Syrian Archive**

The project focuses on documenting human rights issues in Syria, offering also new methodologies for classification, preservation and use of visual documentation, as well as open tools and new research methods.

<https://syrianarchive.org>

viii. **SimEarth - The Living Planet**

Digital preservation of a videogame from 1990 through simulation. It is possible to play games -or try other software applications- that are decades old, in full operation, through the Internet Archive.

https://archive.org/details/msdos_SimEarth_-_The_Living_Planet_1990

4a. Suggestions for Activities

Scenario 4:

Exploring an archive in transit: The Wayback Machine of the Internet Archive

Title	Media archeology through digital archives
Connection to Curriculum	History, modern Greek language and literature, informatics
Age group	14-17
Duration	1 class period (45 minutes)
Objectives	<ul style="list-style-type: none"> • To gain an understanding of an algorithmic archiving system that is available online. • To discover the Internet Archive and one of its services. • To understand that digital records, such as e.g. websites, are transient elements, prone to change and not accessible forever. • To reflect on the history of specific digital media. • To become mindful of the fact that archiving practices within web environments are linked to other concepts, requirements and scope, that go beyond the traditional issues of storage and access.
Required equipment	Computer / laptop / tablet, internet connection, https://archive.org/web
Steps	<p>1. Start the discussion by exploring the group's personal interests, let them talk about their favorite websites or sites they used to visit that don't exist anymore. It would be useful to introduce them to the concept of "media archeology". Next, present the Internet Archive and the Wayback Machine through archive.org.</p> <p>2. Following the cooperative learning model, split students into groups and assign each group to explore webpages of their choice in the Wayback Machine. Ask them to write down their observations. Which page did they search for? What interesting things did they discover? What did they find that they did not expect to find?</p> <p>3. Finally, ask them to present the "changes" they've</p>

Keywords	encountered as well as express more general views and outcome remarks. Open a discussion based on the students' different interpretations on this topic. Digital archive, algorithm, database, preservation, interface, artefact
Tips	The educator can familiarise themselves in advance with online web archiving practices, finding useful information here about how this software works. In short, it keeps snapshots across time, at specific dates, often keeping multiple snapshots of each webpage. Moreover, it could be particularly interesting for students to look into webpages they already know and are familiar with their changes over time. e.g. How was Facebook in the past and what changes do we observe?

Scenario 5:

Create an artwork with a USB archive and a sculpture with play-dough/clay, etc.

Title	Making an artwork that keeps... secrets
Connection to Curriculum	Art, informatics, history, music, robotics
Age group	13-16
Duration	2-3 class periods (90-135 minutes)
Objectives	<ul style="list-style-type: none">• To create small digital collections.• To think creatively and critically about archiving as information storage.• To understand the practice of collective archiving.
Required equipment	USB stick (one for each group), clay / cement / paints / spray, laptop / tablet / computer / digital camera
Steps	<ol style="list-style-type: none">1. Preliminary activity: Students watch a video about the work of Iranian artist Morehshin Allahyari, Material speculation: ISIS, available here. Open a discussion by raising the question: What is the social value of the archive in the artist's artwork? Next, present the work of Aram Bartholl, USB Dead Drops, available here. Discuss the value of digital storage in public space and the aesthetics of storage, from simple shelves or file boxes to more innovative formats.2. Form groups and let students work on a computer / laptop in order to create a digital collection with objects of their choice, including born-digital content as well, e.g. web images or files. The question addressed here is: "Which things would I choose to archive?".3. After creating their collection as a group, they store it in a medium, such as a USB stick.4. Finally, they make sculptures -with plasticine, clay or even cement- integrating the USB in their creation, leaving its connection point free! Consequently, a small exhibition with archival sculptures can be set up in the classroom or in another

Keywords	place, which carries information that can be shared with anyone interested. Digital art, digital archive, digital record, preservation
Tips	Focus mainly on the cooperative creation of the collection and help out students with questions such as "Why do you choose these artefacts?". Sculptures may be simple or complex compositions, after all the activity does not only foster creative expression, but, first and foremost, creative archiving. You can also ask each student group to create a folder on the computer, name it with a title and then find ways to save digital files, either by simply saving it, through a screenshot, or by other means of their choice.

Scenario 6:

Engaging with novel archival formats through art

Title	Archive and net art: Research and fun
Connection to Curriculum	Art, informatics, modern Greek language and literature
Age group	15-17
Duration	2 class periods (90 minutes)
Objectives	<ul style="list-style-type: none"> • To interact with online, digital artworks. • To experience and enjoy the aesthetics of the artworks. • To get familiar with different aspects of digital art, such as audiovisual, database art and digital archive art. • To recognise different forms of archiving in various artworks. • To reflect on creative archiving.
Required equipment	Internet connection, computer / laptop, speakers, projection screen (if available), A4 sheet or notebooks, pens
Steps	<p>1. Start the course with a video or a presentation about digital art in general. An example from Onassis Stegi's programme and the "Digital Revolution" exhibition may lead the path here: What is digital art for you? Do you know any digital artists and, if so, what are they doing in their work?</p> <p>2. Next, split students into groups and assign each to closely examine an artwork, trying to find clues about the artwork's theme and its organisation. You can further motivate them with the question: If you see this artwork as an archive, what artefacts does it contain and how are they organised? See the following suggested artworks:</p> <p>* Constant Dullaart, https://therevolvinginternet.com/ (remixed version of Google's search engine interface)</p> <p>* Morehshin Allahyari, http://www.morehshin.com/material-speculation-isis/ (reconstruction of destroyed monuments and their disposal through micro sculptures with USBs)</p>

	<p>* Oliver Laric, https://vimeo.com/17805188 (visual narrative about the concept of digital reproduction of archives and their different versions)</p> <p>* Alex Galloway, Mark Tribe & Martin Watteberg, https://anthology.rhizome.org/starrynight (web interface for mailing list content).</p> <p>3. Presentation of works and reflection on whether they can be considered an artwork, if so why, how it is organised and what is its relationship with the archive.</p>
Keywords	Database, archive, algorithm, new archival formats, software art, archive art, remix, digital and digitised artefact
Tips	Many intriguing connections between informatics and art can be found here. We recommend an interdisciplinary collaboration and participation of educators from different disciplines, and if possible, a joint presence in the computer lab. In any case, the proposed projects are indicative for continuing the exploration and use of archives. They can be replaced with other relevant ones, however, it is critical for educators to explore this field in advance.

Scenario 7:
Introduction to open source licenses

Title	Remix and GIF art: Designing new artworks based on Creative Commons
Connection to Curriculum	Social and political education, art, informatics, history
Age group	14-17
Duration	1-2 class periods (45-90 minutes)
Objectives	<ul style="list-style-type: none"> • To be introduced to the Creative Commons licenses. • To be introduced to the concept of open content. • To experiment creatively with open content. • To get acquainted with cultural heritage platforms. • To create new, collective, open-content archives / artworks. • To design artworks based on remix practices. • To distribute these new files / artworks by applying open licenses applying good practices. • To know the meaning of "public domain" and its social value.
Required equipment	Laptop / computer, browser, https://gifitup.net , projection screen (if any)
Steps	<p>1. Start by presenting to students digital collections and archives through the European digital heritage platform Europeana and the international platform for open-access Creative Commons. Encourage students to explore the collections and select 2-3 images (they will convert these images to GIFs afterwards). Ask students various questions: Where do you find content online? Who owns the content you are downloading or saving? Are there any copyrights? If so, how can we identify them?</p> <p>Do you know what copyright is? The following links are recommended, where students can find digital images from galleries, libraries, archives and museums (GLAMs): https://www.europeana.eu/en/galleries?page=1 https://www.europeana.eu/en/collection https://search.creativecommons.org/collections</p>

	<p>2. Next, introduce the concepts of open content and Creative Commons licenses, showing the graph that depicts different licensing types and marks, noting that only images and files that are published with licenses in the green spectrum allow their open use and remix: https://en.wikipedia.org/wiki/File:Creative_commons_license_spectrum.svg</p> <p>Ask questions such as: Do you see on the pages of your images any of these licensing marks? Encourage students to select images and media that allow their free use and adaptation, based on the right permissions. For more information about Creative Commons licenses, follow the following links: https://creativecommons.ellak.gr/fylladio/ https://creativecommons.org/licenses</p> <p>3. Students are asked to download 2-3 images of their choice (without closing the original pages that contain the images!). Next, they need to upload each image to the GIPHY platform: https://giphy.com/create/gifmaker</p> <p>They can start modifying the original image freely. Once they have completed their remix work, they can publish it on the platform, adding as a reference the link to the original file ("Source URL") and filling in tags ("Add Tags") with e.g. the name of the museum or library where the original work is located, the name of the platform where they found the artwork, the license under which their GIF will be distributed (e.g. CC BY), etc. They can also add other relevant tags, such as subject, author, country of origin or date.</p>
Keywords	Remix, open knowledge, digital file, Creative Commons open licenses
Tips	Creating a GIF on the GIPHY platform requires creating an account with email and password. It is recommended that the educator creates an account in advance.

Section 4 gave us a good idea of databases and their digital ecosystem. In the last section we delve into the digital space with artificial intelligence.

5. From database to datasets

The last section presents the algorithmic organisation of information and how it affects the archive.

Algorithms, instructions and organisation

The history of the archive relates also to the history of technology, whereas their intersection illuminates the epistemology of organisation. It is therefore critical to understand, for example, what algorithms are and how they affect our lives to such an extent -and archives may help us with that. In informatics, algorithms are simply sets of instructions, written by humans and addressed to software, which in turn interacts with humans again. There are many algorithmic categories and types. For us, it is more important to understand that these instruction sets are automated and, while created by humans, they are made to work "independently". A well-known application based on the concept of automated instructions in art and design are bots, which include creative applications where bots interact and combine information from different platforms and datasets. In digital art with bots, the main application is combining randomly selected images, based on specific rules. In electronic literature with bots, the main application is the creation of poetic lyrics and short stories (flash fiction), with a random compilation of words or sentences based on specific rules. Digital art and electronic literature with bots have found many applications on social networking platforms, where it is possible to automate the date and time publication of their produced content (e.g. every two hours or once a day).

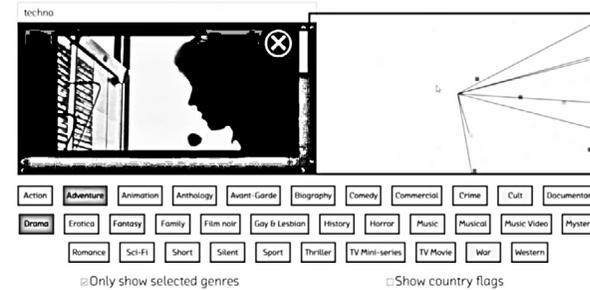
i. AC Gillette, A Softer Space

A webcomic created with a bot on the Twitter social media platform, which randomly combines a sequence of three images in a row, each with a short text caption. The artwork has been created by AC Gillette and is inspired by the well-known webcomic A Softer World by writer Joey Comeau and artist Emily Horne. As can be seen from the code that its creators have published as open source software, the texts from which the bot draws each of the three captions that appear in the triptych strips, come respectively from poems by Rainer Maria Rilke, Sappho, as well as a short story by RM Ballantyne.
<https://botwiki.org/bot/a-softer-space>

ii. Algorithmic metadata visualisation of a cinephile community

Using the t-sne algorithm, an interactive scatter diagram has been created listing all the movies evaluated by the cinephile community in a graphic framework. Movies grouped to the right side tend to have the largest vote number and the most positive ratings, while movies sorted to the left have the lowest number of ratings and the most negative ones. The t-sne algorithm is used to create comprehensible, two-dimensional representations of complex multidimensional data. The movie file database has been created by users (user-generated), through human-computer interaction (users fill out forms, answer questions and interact with the platform software). The films are depicted as square shapes in clusters of different colors,

representing different film genres (comedy, drama, thriller, etc.).
http://fastforwardlabs.github.io/cinephile_tsne



Img. 17: Algorithms and metadata. CC-BY 4.0. Moving image via screen capture, Fast Forward Labs visualisation.

Algorithms and artificial intelligence

Algorithms are used in artificial intelligence because they can be trained based on data they receive from humans, interacting accordingly. The more complex the problem, the more likely it is to be approached by many different ways. Algorithms gain experience through self-training and manage to solve assigned problems following a set of finite steps (clear data entry point, processing and output with at least one data value as a result). An example where an algorithm will need to collect data and come to a conclusion, is finding a place of cultural interest for children of a certain age. Contemplate here on the potential data that will be used for such an application!

Artificial intelligence: Machine learning

The main scope of machine learning is to continuously improve the performance of machines by utilising past knowledge and experience, so that they become more efficient. In this context, algorithms improve their behavior, as they deploy statistical methods, neural networks (see below), operations research and search for latent knowledge based on input data. Common examples are speech and image recognition, virtual assistants of smart devices, self-driving cars, etc.

During the 2010s, advanced machine learning systems have been developed (such as deep learning and convolutional neural networks, which is one of the most popular algorithms), with the ability for automatic learning through the input of massive volumes of fitting data. These systems require a lot of computing power, making their training lasting for hours, even days. Eventually, they are able to recognise and

organise static and moving images, sound and text, as well as produce their own, new creations (images, music, novels, movies, etc.), following correlations based on their input data.

The rapid evolution of algorithms, combined with the availability of vast amounts of digital data that we produce as users (big data), enabled an old-age concept to come into fruition: self-learning technology. Although conceptualisations of robots and the automaton have their roots in antiquity, they needed databases and digital archives to become a reality. For example, a technologist or scientist can utilise specific digital collections and design algorithms that draw new knowledge from content. Nowadays, there are three main applications of machine learning and - not coincidentally - they are intrinsically related to the archive: (1) Image recognition and classification, (2) face and emotion recognition, and (3) archival automation and navigation.

i. Auto Categorisation demo - Imagga

A web tool that allows (a) image upload and metadata export, and (b) metadata language selection for export. Visit the site, upload images (ideally not your faces, as images are being stored on remote servers), and analyse the automatically generated categories applied to each image based on their subject. A simple functional tool that can serve as a smooth introduction to the world of machine learning. Think together with your students about how a software can be able to recognise any image. Which were its training archives?

<https://imagga.com/auto-categorization-demo>

ii. Eric Rosenbaum, Yotam Mann et al., Giorgio Cam

Web application for image analysis and metadata extraction, in a more creative and fun format than the above. Hint: be careful with uploading faces here as well. Turn up the volume of your speakers, analyse images and experience the world of computer vision through the voice and musical expression of Giorgio Moroder.

<https://experiments.withgoogle.com/ai/giorgio-cam/view>

iii. Ruben van de Ven, Choose How You Feel

As stated by the author: "What does it mean to feel 82% happy? What does it mean to feel 93% happy?". A research with a critical view on emotion recognition by machines.

<https://rubenvandeven.com/article/choose-how-you-feel-you-have-seven-options>

iv. Refik Anadol, Archive Dreaming

Through machine learning processes, the artist organises, reorganises and creates access points for the Salt digital archive. The work employs a number of algorithmic techniques, in combination with 3D imaging, focusing on the power of artificial intelligence in navigating very large archives.

<http://refikanadol.com/works/archive-dreaming>

Neural networks and training datasets

Neural network nodes are able to process information from external data inputs, in order to share this information between each network node. The process requires multiple traverses, in order to find connections and extract meaning from unspecified data. Data is archived and organised in digital collections, named datasets. These are distinct and specific information sections that contain whatever the person / software trainer might decide. For example, in order for a software to learn to recognise paintings over photographs, there must be paintings and photographs in the training datasets, especially in large quantities.

Machines keep learning, as they are constantly receiving new data from human behaviour. Learning involves the collection of data, the processing by algorithms and the prediction that is finally made or the conclusion that is drawn. It is often difficult to detect where algorithms are used and what their impact is on people's lives. Artificial intelligence applications are embedded in our everyday lives. Common examples are speech and image recognition, intelligent personal assistants on devices, personalised information on social networks, automated translation, self-driving cars, computers that play chess, etc.

i. Arthur Boer, Boris Smeenk, Epoch AI

Research-based artwork that examines classification practices in machine learning through a creative approach. How do machines view our structured -through datasets and terminologies- world? This research is a very useful tool for creatively understanding the aesthetic and social parameters of keywords.

<https://epoch.megatrends.dev>

ii. Max Dovey, How to be More or Less Human

Art installation and performance that explores how computer vision sees gender, class and stereotypes.

<https://maxdovey.hashbase.io/howtobemoreorless>

iii. Photographers' Gallery, Unthinking Photography

Research blog that explores the increasing automation in photography. It shares insights about machine learning and vision, datasets, and more.

<https://unthinking.photography>

iv. Zhen Zhen Qi, Quarantine Diary AI

An online diary that is being written by an artist and a neural network trained on articles about COVID-19.

<https://www.onassis.org/enter/quarantinediaryai-zhenzhen-qi>

Art with machine learning: The illusion of the machine and the human factor



Img. 18: Darknet - Object Recognition Difficulties [remix]. CC BY-NC-SA 4.0.
Derived from a [work](#) by Boris Smeenk.

So, do machines and software see the world as we humans do? They are, of course, trained by humans, implying that, just like us, they are affected by the knowledge, principles, desires and perceptions of their trainers. However, it is critical to understand that machines learn from specific, finite information and, although they are accessing and processing thousands of files, this does not mean they possess imagination, critical thinking and cognitive skills like ours. Artists and designers working in the field of art with artificial intelligence, offer critical views from a cultural perspective, while technologists and scientists offer practical, development-oriented views on machine learning technologies. Thus, art that lies at the intersection of information technology and science, of archives and artefacts, takes us often one step further in understanding what is really going on, inquiring its ethical, aesthetic and social dimensions. This critical approach allows us not only to understand, but also perceive in alternative ways the complex relationships between man and information, machine, media, archival technologies, image technologies and the user, focusing on the human factor.

What does this all mean for us?

i. Memo Akten, Learning to See

Audiovisual artwork in video format. The artist created an uncanny and idiosyncratic software training system with a camera. In the video you see the software response

or, in other words, its illusion. The screen is split in two parts. On the one hand we see objects such as keys, pencils, etc., while on the other hand we see what the software recognises and how it is interpreting this information. As it displays a distinct aesthetic, it makes us wonder what kind of files were used by the artist in order to train his system.

<http://www.memo.tv/works/learning-to-see>

ii. Boris Smeenk, Darknet - Object Recognition Difficulties

Graphic work showing how the Darknet neural network framework is able to recognise dogs, but not dog-like muffins!

<https://epoch.megatrends.dev>

iii. Tate Recognition

Tate Museum's artificial intelligence programme, that has been comparing two archives: the museum archive containing artworks, along with Reuters' live photojournalism archive. The programme, based on a set of well-trained algorithms, combined over 7,000 pairs of images, finding thematic and visual similarities between artworks and photojournalistic images.

<http://recognition.tate.org.uk>

Here, the neural network has learned to recognise laptops, but what happens when it has to recognise a book within a 17th century painting?

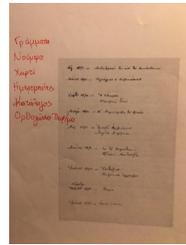
<http://recognition.tate.org.uk/#perspectives1>

5a. Suggestions for Activities

Scenario 8:

Have fun in the classroom with computer vision

Title	Artificial intelligence and disco!
Connection to Curriculum	Informatics, art, modern Greek language and literature, music
Age group	13-16
Duration	1 class period (45 minutes)
Objectives	<ul style="list-style-type: none"> • To understand the value of the index, of metadata and the archive in computer vision. • To get acquainted with an image recognition software, with its multiple creative and organisational aspects. • To apply creative thinking and reflect on the relation between classification and automated classification. • To understand how a pre-designed system recognises images with real-time feedback. • To think collectively about image, transmission and archiving technologies on the web.
Required equipment	Internet connection, projection screen or computer / laptop screen, computer / laptop, printed or digital images (the software analyses images, most likely from the educator's mobile phone), speakers (the application has sounds), Giorgio Cam app available here .
Steps	1. Start discussing the topic based on two components. First introduce the automaton as a concept. You can encourage students to contemplate on the form of the automaton, e.g. if they think it is humanlike, if they realise the human labour behind the automaton. As a next step, it would be meaningful to let everyone listen to the song available here . This is a song released in 2013 by Daft Punk, a band belonging to the pop electronic scene. The song includes (appropriates) a monologue by Giorgio Moroder, whom many call the spiritual father of disco in Europe. The Giorgio Cam application is another appropriation of the voice of this particular musician, which lends its sound to the voice of the automaton.

	<p>2. Next, following the cooperative learning model, share printed documents (or display them on screen) and ask the groups to provide keywords that describe the content of the images, e.g. ask them to fill it in next to / on the images. Thus, a social index is being created through this activity, which leads to the next step.</p> <p>3. Compare the index to that of the Giorgio Cam application. In this context, you may reflect together with the students on the images, which can be projected on the automaton through a laptop / computer webcam. The outcome is produced live, in realtime!</p> <p>4. Finally, it is a good opportunity to bring together what we've learned so far in this course and think further: In what ways can the application generate keywords? Through imagining them? Fabricating them? Or are they drawn from indexes created by specific people? And if so, what does that mean for us?</p>
Keywords	Algorithm, archive, computer vision, machine learning, datasets, collaborative tags
Tips	It would be meaningful to save the outcome of the automatic analysis through screenshots, in order to use it in other activities, to share it with students, to organise a small exhibition with the students' index compared to that of the automaton. Here is an example on the thematic analysis of artefacts based on the Cavafy Archive, as part of our workshops.
	 <p><i>Img. 19: CC BY-NC-SA 4.0.</i></p>

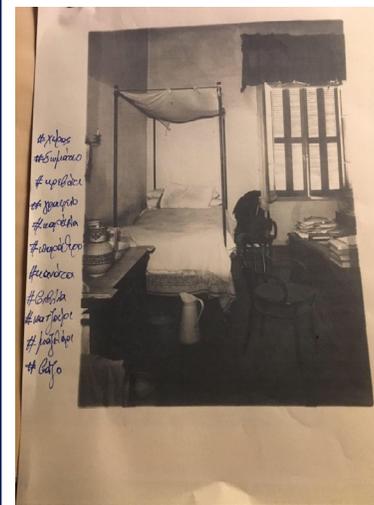
Section 4 gave us a good idea of databases and their digital ecosystem. In the last section we delve into the digital space with artificial intelligence.

Scenario 9:

Man vs. machine: keywords, understanding, imagination

Title	Classification: From imagination to automation
Connection to Curriculum	Informatics, language, history, modern Greek language and literature
Age group	15-17
Duration	1 class period (45 minutes)
Objectives	<ul style="list-style-type: none">• To get familiar with machine learning software and, in particular, with keyword extraction.• To see in an applied context the value of imagination and the human factor in the classification of concepts.• To understand important elements of algorithmic organisation.
Required equipment	Internet connection, web tool https://imaggga.com/auto-categorization-demo , browser, computer / laptop, printer, prints or screen projection of archival records, markers, A4 sheets (best to take place in the computer lab!)
Steps	<ol style="list-style-type: none">1. Divide the group into pairs or triplets and hand them a number of selected images in printed format or by displaying them on screen. Ask students to come up with keywords in order to describe the subject of each image and let them explain their choices. Allow different interpretations and different keywords to be heard.2. Put a screen in public view and examine each image (its digital surrogate) through the image recognition software. Encourage commenting on the keywords. What surprised us and what was expected?3. Foster an open discussion and let students reflect on similarities, differences and other interesting aspects such as: vocabulary and range, imagination and subjectivity, logic and knowledge.
Keywords	Alphabetical order, archive, thesaurus, keyword, information representation, training datasets, machine learning

Tips



Img. 20: CC BY-NC-SA 4.0.

Prepare simple prints of archival artefacts and share them with students; prefer images that spark the interest and bring in a wide range of possibilities in search of their subjects! You can see here a photo from our workshop with students. This could be an activity to take place as part of an educational excursion to a library.

Our journey into the digital world of the archive concludes with these activities in section 5. The following appendix will be helpful to those who wish to further examine the topics developed in the toolkit.

6. Appendix

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6e. Index of terms

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7. Licenses

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