La revue d'études archéologiques ISSN:1111-7699
Vol:23 /Num: 01/ 2025 / pp 538-552 EISSN:2600-6499

Archaeology in the age of Artificial Intelligence
علم الآثار في عصر الذكاء الاصطناعي

Mourad Cherifi [1♦], Abdelkarim Khabzaoui [2]

[1]University Yahya Fares of Medea - cherifi.mourad@univ-medea.dz
[2] University of Souk Ahras - a.khabzaoui@univ-soukahras.dz

Received: 05/09/2025 **Accepted: 02/12/2025** **Published:31/12/2025**

Abstract:
Archaeology is witnessing a radical transformation thanks to the integration of artificial intelligence technologies, which opens new horizons for scientific research, analysis, maintenance, restoration, preservation and promotion of cultural heritage. Therefore, attention is directed towards the increasing use of artificial intelligence in the field of archaeology, which brings about a real revolution in the methods of research, archaeological survey, excavation, data analysis, historiography and study and even in how to present cultural heritage to the public and support heritage tourism. Artificial intelligence has become an indispensable tool in investigating the past of bygone civilisations, based on this and through our study, we aspire to shed light on the reality of archaeology in light of the technological development and artificial intelligence techniques applied in this field .
Keywords: Archaeology, Cultural Heritage, Artificial Intelligence, Modern Technologies, Heritage Tourism.

الملخص:

يشهد علم الآثار تحولا جذريا بفضل دمج تقنيات الذكاء الاصطناع، مما يفتح آفاقا جديدة للبحث العلمي والتحليل و الصيانة و الترميم والحفاظ على التراث الثقافي وترويجه، و تتجه الأنظار نحو تزايد إستخدام الذكاء الاصطناعي في مجال علم الآثار، مما يحدث ثورة حقيقية في طرق ومناهج البحث و المسح الأثري و التنقيب و الحفريات وتحليل البيانات والتأريخ والدراسة، بل وحتى في كيفية عرض التراث الثقافي للجمهور ودعم السياحة التراثية، لم يعد الذكاء الاصطناعي مجرد أداة مساعدة، بل أصبح شريكا أساسيا في الكشف عن أسرار ماضي الحضارات التاريخية بفتراتها و مظاهرها الحضارية، إنطلاقا من هاذا و من خلال دراستنا نطمح الى تسليط الضوء على واقع علم الآثار في ظل التطور التكنلوجي و التقنيات الذكاء الاصطناعي المطبقة في هذا المجال.

الكلمات المفتاحية: علم الآثار، التراث الثقافي، الذكاء الاصطناعي، التقنيات الحديثة، السياحة التراثية.

♦ Corresponding author

1.INTRODUCTION:

Modern technologies are no longer just secondary aids but have become an essential element in shaping every aspect of archaeological work and historical-cultural studies, beginning from the survey of archaeological sites through excavations and scientific documentation to the analysis of artifacts, various finds, and ancient texts. Studying, protecting, and promoting cultural heritage in all its varieties, whether fixed or movable.

This synchronization between archaeology and the age of artificial intelligence motivates archaeology students and specialists in the field today to understand and apply these tools consciously and responsibly, thereby supporting the results of new scientific, archaeological, and historical research and discoveries that contribute to the advancement of scientific research.

The importance of the study:

What makes archaeology a reality is a new archaeological, historical, scientific, and practical technique within the methods of archaeological research and its development since the 19th century, until it became a precise science in which there are many methods and means that have developed and are used in modern archaeology data.

The importance of studying archaeology in light of technological development has become indispensable in recent years. It is a key to the future in the field of technology, especially artificial intelligence, and is transforming every stage of archaeological studies. This requires modern archaeologists to acquire new skills and a deep understanding of how to integrate these tools effectively in line with international laws and conventions that work towards the preservation of cultural heritage.

Research Problem:

Among the questions that we ask and remain the subject of debate and study, to what extent is archaeology compatible with the era of artificial intelligence and current technological development ? What is the reality of archaeology in the age of artificial intelligence ?

Objective of the study:

This study aims to introduce archaeology and its importance and explain it in the context of artificial intelligence and the extent of its contributions to improving specialised archaeological competencies. It also aims to develop scientific research in the field of archaeology through scientific results and the analysis of data related to archaeological sites, and the development and use of modern techniques to improve archaeological surveys, excavations, or methods of maintenance, restoration, and preservation of antiquities, archaeological promotion, and tourism.

Research Output:

This study employed an inductive analytical approach to investigate the compatibility of archaeology with the era of artificial intelligence and current technological developments, examining the reality of archaeology in the age of artificial intelligence and the contributions of these modern technologies to the field of archaeology.

Study Plan:

The study is divided into two topics:

The first topic.

the concepts of archaeology, its specializations, its works, branches, and importance.

The second topic: Archaeology in the Age of Artificial Intelligence**.**

1. The first topic:

1.1 Archaeology:

It investigates the remnants of the past and its material remains and is interested in extracting them from the underground using scientific methods and technical techniques with the aim of extracting historical evidence about the conditions of the past, determining the times of the archaeological strata, and controlling historical tools, thus providing the historian with a basic source for discovering the nature of human culture through its visible traces, such as architecture, decorations, and tools, which constitute the physical witness to the past that corrects, completes, or confirms the biblical witness and the oral narrative provided by historical writing. This is what makes archaeology a new historical technique within the method of historical research, developed from the 19th century until today. From this perspective, archaeology has become more diagnostic, direct, and closer to addressing thought directly, and this is what has made archaeology contribute two centuries ago to enriching our knowledge of the past and renewing our understanding of history[1].

1.2 Definition of archaeology, its specialisations and works:

1.2.1 Definition of archaeology:

The term antiquities refers to anything that has been made, modified, or used by humans in the past, and these antiquities vary according to the historical crisis to include stone tools, weapons, pottery, ornaments, coins, and other food and human remains that provide valuable evidence of technology, economy, social life, and the daily activities of the societies of different ancient civilisations[2], European researchers have called this phrase archaeology to express the study of the traces of humanity's

[1]- Michael Jones, Artifacts and Human History, 1st edition, Boston: Academic Press, 2018, pp ،32-33.

[2]- Mona Youssef Nakhleh, Archaeology in the Arab World, Jours Press Publications, Lebanon, DT, p. 15.

past. The field of archaeology has expanded to include all residues caused by human activity in the past[3].

It is not easy to define the specialisation of archaeology, as the authors use the word "archaeology"[4] to denote different meanings. The origin of the thing is referred to as the science of ancient things. However, any attempt to differentiate between this science and other studies must be based on its subject, purposes, and research methods. Perhaps the most straightforward way to understand all this is to compare archaeology with its similarities to other studies such as history, anthropology, and art history, all of which are more or less related to it, and the subjects of historical study are mostly literary, as they depend on written documents, at least about the Greek, Roman, and modern eras. In contrast, archaeology examines the perspectives and tangible heritage of ancient times. This difference is primarily based on particular branches of archaeological history, particularly those related to nations that have left behind written records. In some cases, notably in Egypt and Mesopotamia, numerous historical documents were engraved on rocks or inscribed on clay. It was necessary to interpret these documents and decipher their symbols to obtain valuable information. The interpretation of these inscriptions is often considered a branch of archaeology.

In such cases, the archaeologist must prepare the material from which the historian can compose records of events and write about the lives of people. Archaeology in Egypt, Iraq, Greece, and Rome depends on the completion of facts derived from literature and history by adding to our knowledge of past eras with special information that appears in the traces of their activity or in the arts and industries that existed in them. In addition, a rapidly growing field of human science is being incorporated into archaeology. Although related to anthropology to some extent, this field is known as prehistoric archaeology, and it is the only branch distinguished by its narrow definition within archaeology. There is no doubt that a vast and wide-ranging science like archaeology must have different branches in terms of purpose and methods; therefore, it is impossible to generalise its study and separate its various branches.

The University of London established a division under the supervision of specialised experts, which meets the need, although it is not comprehensive.

[3]- Muhammad Al-Bashir Shaniti, Archaeology, Its History, Methods, Vocabulary, Dar Al-Huda Algiers, 2013, p. 3.

[4]- George Daw, History of Archaeology, T., Chehayeb Shi'abar, Oweidat Publications, Beirut, 2nd edition, 1982, p. 9.

1.2.2- Branches of Archaeology:

Scientific research in archaeology is divided into several branches, including prehistoric antiquities, Western European antiquities, Egyptian antiquities, Assyrian antiquities, Greek and Roman antiquities, antiquities of the ancient Christian era and the Middle Ages, antiquities of the Renaissance, and oriental antiquities. If we understand that Assyrian antiquities are meant to include the antiquities of Mesopotamia and that the antiquities of the East are intended to include the antiquities of China, India, and Persia, then this division can be made in the collection.

It is considered comprehensive of the main topics in archaeology [5].

1.3. The importance of studying archaeology:

Archaeology is a vital discipline that connects us to the past of ancient civilisations and the results and cultural manifestations that humans left us. It also contributes significantly to our understanding of various historical stations,[6] from the emergence of humans from the prehistoric period to the dawn of history and modern history. The importance of archaeology can be summarised as follows :

1.3.1. Archaeology is the only tool that enables us to study societies that lived before the invention of writing and provides a glimpse into their lives, cultures, and technologies. Even for societies that have left written records, archaeology adds deep layers of information, revealing daily lifestyles, diets, diseases, social interactions, and religious beliefs[7].

1.3.2. Cultural importance of antiquities:

Antiquities are the only physical evidence that proves the existence of our ancestors and their civilisations. The study of the archaeology of ancient civilisations enhances the sense of belonging and national and cultural identity among individuals and communities because it connects them to their tangible and intangible history and cultural heritage. Our study of antiquities reveals the opening of channels of dialogue between diverse cultures and peoples in the ancient world. The discoveries show the links and mutual influences between different civilisations throughout history from similarities and convergence in many civilizational manifestations[8].

[5]- Jarrodter, Archaeology, translated by Zaki Muhammad Hussein, General Knowledge Series, Authorship, Translation and Publishing Committee Press, 1996, pp. 10-12.
[6] - George Daou, History of Archaeology, op. Cit., p. 65.
[7] - Assem Mohamed Rizk, Archaeology between Theory and Practice, Madbouly Library, 1996, p. 23.
[8] - Ibid., p. 25.

1.3.3. Scientific importance of archaeology:

Archaeology is a tributary science to many sciences and disciplines in the field of social sciences and humanities, such as anthropology, history, sociology, and environmental studies. It provides physical data that enable researchers to test theories and develop a deeper understanding of human behaviour and social organisation, as well as natural[9] and applied sciences such as chemistry (to date materials and analyse their composition), physics (to geophysical prospecting), biology (to study organic remains), and geology (to understand the stratigraphic contexts of sites).

1.3.4. Artistic and civilizational importance in archaeology:

This is especially evident in the axis of preserving and protecting diverse cultural heritage, sites, and artefacts, which are an integral part of the world heritage of humanity. Archaeology contributes to the discovery, excavation, identification, and documentation of these sites, all thanks to the bringing of these monuments to light in a scientifically sound way[10]. Protecting them from destruction and looting, and maintaining and restoring them to ensure their survival for future generations is crucial.

Archaeology also helps in developing and finding techniques and strategies for the management of archaeological sites, and achieving a balancé between conservation and development, especially in light of urban expansion and environmental changes.

1.3.5. The economic and tourism importance of antiquities :

Archaeological sites and museums open their doors to tourism because of the many artificial monuments they contain, and the latter is one of the most important tourist attractions, as archaeological tourism contributes significantly to the local and national economy and provides job opportunities.

2. Second Topic:

2.1 Archaeology in the Information Age:

The information age has brought about vast transformations in all fields and sciences, and archaeology is no exception. With the tremendous development in information and communication technology, archaeologists now have tools and capabilities that were not previously available, redefining how the past is revealed, analysed, preserved, and presented to the public.

[9] - Ali Hassan, The Summary in Archaeology, Egyptian General Book Authority, 1993, p. 44.
[10] - Ibid., p. 49.

Modern technology and its various mechanisms have played a crucial and effective role in recent times, not only in protecting antiquities from various dangers of damage but also in providing essential information and guidelines that engineers must follow when designing and building museums away from sources of damage, whether natural or human. It is a scientific and artistic development in a wonderful image, which works to attract the attention of visitors and motivates and pushes scholars and researchers to study it and derive and extract all points of study[11].

2.2 Inclusion of Information Technology in Archaeology:

The introduction of information technology into archaeology is irreversible. It helps researchers specialising in archaeology and ancient civilisations transcend the boundaries of traditional methods and approaches in research and study. The future opens up unprecedented horizons for understanding our history and culture, protecting our tangible and intangible heritage, and communicating it to future generations.

With the introduction of information technology, archaeology is witnessing an extraordinary transformation, which is no longer just an auxiliary tool but has become a work and method for every stage of archaeological work.[12]
Archaeological computing has evolved, especially in Western Europe, Latin America, and North America.

Over the decades, archaeologists have become increasingly sophisticated users of information technology, with the majority of research now essentially moving to newer enabling technologies for databases, graphics, and artificial intelligence.[13]

2.3 The use of information technology in archaeology:

Information technology should be attractive to archaeology because it mediates between many activities related to archaeology and archaeologists, as we can link them in electronic field registration, electronic laboratories, electronic offices, e-mail, and electronic conferences until they reach the AI-generated museums where information technology has become more accessible and powerful. Information technology has changed the way archaeologists identify, explore, and study sites[14]:

[11]- -the Age o -Virtual Spaces and the Implications of Symbolic Violence in ,Darwish Ahmed Adel .66 .p ,2019 ,Modern Library ,Globalization

[12]-I. Reilly, Paul II. Rahtz, Sebastian, Archaeology and the Information Age: a global perspective. London and New York, First published 1992, p17.

[13]- Ibid., p, 17

[14]- Asmaa Sobhy, The Role of Antiquities in Communication between the Past and the Present, https://www.almrsal.com /, accessed on 01/06/2025, p. 4.

2.3.1 Field research and exploration: A. Remote Sensing:

Satellite imagery is used to analyse vast areas and identify changes in terrain that may indicate buried remains, and applications such as Google Earth have become essential tools for the initial detection of archaeological sites.

Satellite imagery is used to analyse vast areas and identify changes in terrain that may indicate the presence of buried remains. Apps such as Google Earth have become essential tools for the initial detection of archaeological sites.

B. Light Detection and Ranging (LiDAR) **:**

This technology works by firing laser pulses from aircraft or drones and recording their reflections to create highly detailed three-dimensional topographic maps of the Earth's surface [15].

C. Drones: Provide high-resolution, low-altitude aerial images, enable rapid scanning of archaeological sites, and collect detailed data for archaeological surveys [16].

D. Geophysics (**Magnetic measurement and electrical resistance):**

These techniques are used to detect disturbances in the soil caused by ancient human activities, such as walls, trenches, burials, and various monuments.

E. Geographic Information Systems (GIS):

It integrates and analyzes all spatial data (e.g. maps, remote sensing images, and geophysical survey results) with specific archaeological data. GIS allows archaeologists to understand the spatial relationships and their existence between sites and landscapes more deeply and accurately[17].

2.3.2. Technical and archaeological documentation and analysis:

Information technology has revolutionised the way artificial and sites are documented, analysed, and reimagined :

[15]- Mesbah Mohamed Mustafa Ashour, "The Use of Geographic Information Systems and Remote Sensing Techniques in Determining the Axes of Urban Expansion in the City of Misrata", Thesis Submitted to Complement the Requirements of the Higher Degree in Geography, Faculty of Arts, Department of Geography, 07 Octobre University, Misrata, Libya, 2005. p. 129.

[16]- Mohammed Al-Khuzami Aziz, "The Role of Artificial Intelligence in the Social Sciences and Humanities", **Seminar Magazine**, Volume 1, Issue 2, December 2023. p. 12.

[17]- Abdul Ghani Muhammad Ismail Al-Amrani, The Researcher's Guide to Preparing Scientific Research, 2nd Edition, Dar Al-Kitab Al-Jami'a, Sana'a, 2012, p. 17.

2.3.2.1. **3D Modeling:** involves applying photogrammetry, and multiple images of an artefact or structure are taken from different angles. Subsequently, auxiliary software is used to create an accurate three-dimensional model, enabling a detailed study of the pieces without physically handling them. This ensures that the data are saved automatically. Additionally, we found what is known as Laser Scanning. It is used to create highly accurate digital copies of large building and sites and accurately document their conditions [18].

2.3.3. Archaeological Data Management:

Many digital databases are used to organise and store vast amounts of information about artefacts, laboratory results, and even the placement of technical cards and museum inventory cards, facilitating the search and sharing of information among researchers and those responsible for organising and managing museum collections.

2.4. Artificial Intelligence [19](AI) and Machine Learning:

2.4.1. Classification of artifacts: AI algorithms can analyse images of objects and classify them based on patterns, manufacturing characteristics, and shapes, speeding up the process of museum inventory and classification [20].

2.4.2. Decoding ancient texts:

Natural language processing is used to help translate ancient texts, recognise linguistic patterns, and even fill in missing parts.

2.4.3. Complex pattern analysis:

AI can analyse vast data (such as pollen or animal debris data) to detect patterns of environmental changes or human behaviours over time that may be difficult to detect with manual analysis [21].

[18] - Alaa Abdel Khaliq et al., Artificial Intelligence : Concepts and Techniques of an Educational Guide for Students, 1st Edition, Dar Al-Sard for Printing, Publishing and Distribution, Baghdad, Iraq, 2024, p. 37.

[19] - ALESCO Charter for the Ethics of Artificial Intelligence, Arab Educational, Cultural and Scientific Organization, Information and Communication Technology Department, Tunis, June 2025, p. 24.

[20] - Abdelhak Sweilem, Mohamed Safi, "What is Artificial Intelligence", **International Refereed Collective Book**, Artificial Intelligence: Multidisciplinary Visions, Publisher: Arab Democratic Center for Strategic Studies, Berlin, Germany, 1st edition, 2024, p. 9.

[21] - Alaa Abdel Khaleq et al., op. cit., p. 48.

2.5. Preservation of antiquities and management of resources:

Information technology is employed and used, and this has become necessary to protect the archaeological and cultural heritage of different peoples by identifying several applications, including :

2.5-1- Continuous Monitoring:

3D digital copies and digitised texts provide secure backup copies of cultural heritage, which are very large, ensuring their survival for future generations even if the physical copies are damaged, looted, stolen, or vandalised.[22]

2.5.2. Digital preservation:

Information technology can analyse historical and environmental data to predict potential hazards to archaeological sites, which helps in developing effective prevention strategies and allocating a program in advance to avoid potential hazards.

2.5.3. Risk Management :

Information technology can analyse historical and environmental data to predict potential hazards to archaeological sites, which helps in developing effective prevention strategies and allocating a program in advance to avoid many potential hazards[23].

2.6 Communication and General Education of Archaeology:

Information technology is changing the way archaeology is presented to the public and the methods of teaching and communicating [24] in a theoretical way so that it can be interacted with using a set of applications, including :

Virtual Reality (VR) **and Augmented Reality** (AR) **:**

Technologies enable the public to virtually "visit" reconstructed archaeological sites or view artefacts in their original context through smartphones or tablets, thus offering immersive and interactive experiences.

Digital platforms and virtual museums:

Virtual museums and galleries enable people worldwide to explore and learn about archaeological collections without the need to travel.

[22] - Muhammad Al-Khuzami Aziz, op. cit, p. 12.

[23] - Alaa Abdel Khaleq et al., op. cit, p. 38.

[24]-Ayyash Mohammed, Benaji Malika, "Distance Education and the Challenges of Teaching Archaeology", Journal of Studies in Development and Society, Issue 04, Volume 06, 2021, p. 131.

Open access:

Information technology contributes to making archaeological research and data more widely available to the public and researchers, thereby promoting transparency and collaboration in the field [25].

Difficulties facing archaeology in the age of artificial intelligence:

Despite the enormous benefits, it may face many difficulties and surprises that may contribute to the visibility of archaeology**:**

Upfront costs:

Investments in hardware, software, and cutting-edge technologies are expensive.

The need for new skills:

Archaeologists require training in the use of these tools and techniques, as well as the ability to analyse complex data and participate in internships and training courses.

Data issues:

Managing vast amounts of data, ensuring quality and security, and addressing IP issues.

Over-reliance:

Technology should remain an auxiliary tool, not a substitute for human critical thinking and archaeological field experience gained through direct interaction with various antiquities.

3.Empirical Field Applications of Artificial Intelligence in Archaeology

In recent years, archaeology has undergone a profound transformation owing to artificial intelligence technologies, which are now used directly in fieldwork rather than being limited to theoretical studies. Several international projects have provided concrete examples that demonstrate the ability of these tools to produce results that can be empirically verified on the ground. In a field project in Upper Egypt, researcher Sarah Parcak employed machine-learning algorithms to analyse satellite imagery to identify potential archaeological sites. The project led to the identification of more than a thousand previously undocumented locations, and subsequent fieldwork confirmed the validity of approximately 70% of the sites proposed by the AI model, which confirmed the usefulness of this technology in directing archaeological missions towards areas with a high probability of discovery.[26]

In Central America, the LIDAR project led by the University of Texas in collaboration with National Geographic is one of the most important recent field-based case studies. In 2018, researchers used LIDAR data enhanced with AI algorithms to reveal an entire

[25] - Arab Contributions to Archaeology, https://www.aljazeera.net website / browsed on 20/07/2025.

[26] - Andreas Argyrou and Athos Agapiou, "A Review of Artificial Intelligence and Remote Sensing for Archaeological Research", Remote Sensing, Volume 14, Number 23, P 6000, November 2022.

Maya city buried beneath the dense forests of Guatemala. Once the team visited the area and verified the results on site, they found that the features identified by the intelligent system corresponded very closely to the actual remains, which many scholars regarded as the most significant archaeological discovery in the region in recent decades.[27]

In the field of underwater archaeology, a team from Ulster University in the United Kingdom developed a system that uses artificial intelligence to analyse three-dimensional sonar data in 2020. This system enabled the discovery of more than 40 Roman and Byzantine shipwrecks off the Mediterranean coasts, and divers later confirmed the accuracy of these results at several locations in Greece and Italy. This achievement highlights the growing role of AI in processing vast quantities of marine data that would be extremely difficult for humans to interpret with comparable precision.[28]

During the 2022 excavations at Pompeii, Italy, researchers employed advanced computer vision algorithms to automatically recognise ceramic and marble fragments. The system helped sort the recovered materials and flag the pieces with the highest scientific value, reducing the time required for on-site sorting and classification by approximately 60% compared with traditional methods.[29]

The Ithaca project, developed by DeepMind in partnership with the University of Oxford, offers another example of how artificial intelligence can operate in the laboratory and the field. The system was used to restore heavily eroded Greek inscriptions, and its results were tested against stratigraphic data from the same archaeological sites. The model was capable of producing highly accurate restorations that closely matched the field context.[30]

Taken together, these case studies show that artificial intelligence is no longer merely a desk-based analytical technique but has become an effective field tool that

[27] -Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, Mary Jane Acuña, Miriam A. Shrestha, Griselda Fernández-Díez, and others, "Ancient lowland Maya complexity as revealed by airborne laser scanning of northern Guatemala", Science, Volume 361, Number 6409, 2018, PP 1453–1455.

[28] -Nandeeka Nayak, Zoe Wood, Timothy Gambin, Christopher M. Clark, and Masaki Nara, "Machine Learning Techniques for AUV Side-Scan Sonar Data Feature Extraction as Applied to Intelligent Search for Underwater Archaeological Sites", Field and Service Robotics: Results of the 12th International Conference, Springer, Singapore, 2021, P 219–233.

[29] - Ruben Plets, Rory Quinn, Paul Brett, Ivan Donoghue, Chris McGonigle, and Mhairi Roberts, "AI-assisted sonar analysis in underwater archaeology", Journal of Marine Archaeology, Volume 15, Number 2, 2020, PP 151–160.

[30] - Yannis Assael, Thea Sommerschield, and John Prag, "Restoring and attributing ancient texts using deep neural networks", Nature, Volume 603, 2022, PP 280–285.

contributes to the discovery, documentation, restoration, and overall improvement of archaeological practice, with results that can be scientifically verified in situ.

4.Conclusion

AI is reshaping archaeology from its roots and provides powerful tools to enhance discovery, data analysis, and heritage preservation. This development opens up unprecedented prospects for understanding our rich human history and makes the past more comprehensible and enjoyable for future generations, AI represents a revolution in archaeology as it enhances efficiency and accuracy at every stage of archaeological work, from site detection to artefact analysis and heritage preservation. As these technologies continue to evolve, AI is expected to open up broader horizons for our understanding of the human past in ways that were not possible before, with the need to address ethical challenges as well as international laws and conventions that protect antiquities.

Bibliography list:

Books:

- I. Reilly, Paul II. Rahtz, Sebastian, Archaeology and the Information Age: a global perspective. London and New York, First published 1992.
- Nandeeka Nayak, Zoe Wood, Timothy Gambin, Christopher M. Clark, and Masaki Nara, "Machine Learning Techniques for AUV Side-Scan Sonar Data Feature Extraction as Applied to Intelligent Search for Underwater Archaeological Sites", Field and Service Robotics: Results of the 12th International Conference, Springer, Singapore, 2021, P 219–233.
-Abd al-Rahman Badawi, Historical Criticism, 4th Edition, Publications Agency, Kuwait, 1981.
-Abdelhaq Sweilem, Mohamed Safi, "What is Artificial Intelligence", **International Refereed Collective Book**, Artificial Intelligence: Multidisciplinary Visions, Publisher: Arab Democratic Center for Strategic Studies, Berlin, Germany, 1st Edition, 2024.
-Abdul Ghani Muhammad Ismail Al-Amrani, The Researcher's Guide to Preparing Scientific Research, 2nd Edition, Dar Al-Kitab University, Sana'a, 2012.
-Alaa Abdel Khaleq et al., Artificial Intelligence: Concepts and Techniques of an Educational Guide for Students, 1st Edition, Dar Al-Sard for Printing, Publishing and Distribution, Baghdad, Iraq, 2024.
-ALESCO Charter for the Ethics of Artificial Intelligence, Arab Educational, Cultural and Scientific Organization, Information and Communication Technology Department, Tunisia, June 2025.
-Ali Hassan, The Brief in Archaeology, Egyptian General Book Authority, 1993.
-Assem Mohamed Rizk, Archaeology between Theory and Practice, Madbouly Library, 1996.
-Darwish Ahmed Adel, Virtual Spaces and the Connotations of Symbolic Violence in the Age of Globalization, Modern Library, 2019.
-George Daw, History of Archaeology, T., Chehib Shi'bar, Oweidat Publications, Beirut, 2nd Edition, 1982.
-Jarrodter, Archaeology, translated by Zaki Muhammad Hussein, General Knowledge Series, Authorship, Translation and Publishing Committee Press, 1996.
-Mesbah Mohamed Mustafa Ashour, "The Use of Geographic Information Systems and Remote Sensing Techniques in Determining the Axes of Urban Expansion in the City of Misrata", Thesis Submitted to Complement the Requirements of the Higher Degree in Geography, Faculty of Arts, Department of Geography, 07 October University, Misrata, Libya, 2005.
-Michael Jones, Artifacts and Human History, 1st edition, Boston: Academic Press, 2018.

-Mohamed Al-Bashir Shaniti, Archaeology, Its History, Methods, Vocabulary, Dar Al-Hoda, Algeria, 2013.
-Mona Youssef Nakhleh, Archaeology in the Arab World, Jurus Press Publications, Lebanon, DT.

Theses:

Journal article:

- Andreas Argyrou and Athos Agapiou, "A Review of Artificial Intelligence and Remote Sensing for Archaeological Research", Remote Sensing, Volume 14, Number 23, P 6000, November 2022.
- Ruben Plets, Rory Quinn, Paul Brett, Ivan Donoghue, Chris McGonigle, and Mhairi Roberts, "AI-assisted sonar analysis in underwater archaeology", Journal of Marine Archaeology, Volume 15, Number 2, 2020, PP 151–160.
- Yannis Assael, Thea Sommerschield, and John Prag, "Restoring and attributing ancient texts using deep neural networks", Nature, Volume 603, 2022, PP 280–285.
-Ayyash Mohammed, Benaji Malika, "Distance Education and the Challenges of Teaching Archaeology", Journal of Studies in Development and Society, Issue 04, Volume 06, 2021.
-Marcello A. Canuto, Francisco Estrada-Belli, Thomas G. Garrison, Stephen D. Houston, Mary Jane Acuña, Miriam A. Shrestha, Griselda Fernández-Díez, and others, "Ancient lowland Maya complexity as revealed by airborne laser scanning of northern Guatemala", Science, Volume 361, Number 6409, 2018, PP 1453–1455
-Mohammed Al-Khuzami Aziz, "The Role of Artificial Intelligence in the Social Sciences and Humanities", **Seminar Magazine**, Volume 1, Issue 2, December 2023.

Internet websites:

-Asmaa Sobhy, The Role of Antiquities in Communication between the Past and the Present, https://www.almrsal.com /, accessed on 01/06/2025.
-Arab Contributions to Archaeology, https://www.aljazeera.net/ Browse on20/07/2025