



## The digital numismatics research development in Ukraine (2013-2021)

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**Abstract.** The significance of this historiographical study lies in the need to summarise the preliminary results of numismatic scientific thought development in the field of digitalisation and to determine further prospects for both digitalisation itself and scientific directions for its study. The research objective was to systematise and review the Ukrainian historiography concerning the use of modern technologies and general digitalisation processes in numismatic science during the period from 2013 to 2021: a crucial period from the beginning of the publication of the first works in this research area in Ukraine to its full institutionalisation and integration into international cooperation. The work was written using critical, comparative, evolutionary historiographical research methods and meta-analysis of sources, which allowed to determine the direction of the scientists' interests and general trends in the digitalisation study development in numismatics. In the study process the author conducted a historiographical analysis of the national scholars' works on the problems of numismatic digitalisation in 2013-2021 in order to identify the views and changes related to the problem under study and to draw balanced and reasonable conclusions. The conducted study results showed that during mentioned period not only the Ukrainian scientific numismatic community prestige increased, but also new knowledge was formed, new methods and approaches in the numismatics study were rethought and formed. The study results demonstrated the importance of incorporating digital tools into the numismatists' scientific practice, and specific recommendations for future research in this area are developed, considering its role in expanding opportunities for domestic research in the field of numismatics. The relevance and expediency of using specialised Internet sources for numismatic research, as well as their role in revealing new facts about the history of coinage and money circulation, were emphasised. The article analysed scientific publications that emphasise the importance of having official and properly structured

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resources that could serve as a basis for further research. The practical value lies in the possibility of applying the results and recommendations of the research in planning the topics of further numismatic and historiographical research, preparing lectures on the national numismatics history

**Keywords:** digital numismatic sources; computerisation; historiography; digitalisation; electronic numismatic resources; website

## Introduction

The modern information and digital technologies implementation caused colossal transformations in the social and scientific environment. The modern transformation has affected all the humanities areas, and numismatic science is no exception. This has led to the "digital numismatics" field emergence, which, thanks to its innovation and the opening of new research paths, has gained popularity not only among young researchers but also among established experts in history and archaeology fields. Digital technologies make it possible to create interactive web resources, databases and virtual museums, which facilitates access to numismatic collections and promotes numismatic science popularisation.

The emergence of specialised Internet resources, which have become a significant historical source in monetary circulation, specialised software and hardware has provided numismatic researchers with several opportunities and tools that numismatists around the world are now actively using to improve the research quality of studying the past. Since Ukraine, with its complex and multifaceted history, has a significant potential in numismatic research, and today's realities require increased attention to the cultural heritage preservation and our country's historical memory, digital numismatics has become an important tool for preserving and researching valuable cultural artefacts. This has led to a significant increase in domestic interest in modern technologies usage in numismatic research, which application requires a detailed analysis of their potential and new methods of conducting research in special historical disciplines development. This growing interest has created a favourable atmosphere for new research areas development, and Ukrainian scholars have begun to study them, which is reflected in the form of increased research activity and the emergence of a certain number of scientific publications. Accordingly, the current historiographical study relevance lies in the need to summarise the preliminary results of numismatic developments in digitalisation field over almost a quarter-century, as well as to determine its future prospects.

Since 2013, the first domestic works on digital numismatics development were created and published, which, using all the world's experience, laid the foundation for the movement from preliminary experiments to the full institutionalisation of this research area in Ukraine, which has been thoroughly implemented since the beginning of 2021, thanks to domestic scientists' integration into international cooperation and their active participation

in international projects on digital numismatics (such as Princeton University's FLAME project, which studies and reconstructs the economies of the Mediterranean and surrounding regions during the transition from antiquity to the early Middle Ages). It was this turning point, in the period from 2013 to 2021, that became decisive in a new national scientific thought formation. This process analysis suggests that Ukrainian scientists have not only shown a significant interest in digital technologies integration in numismatics field, but also strive and try to integrate into the global scientific community. Such transformations have brought the national numismatic science to a completely different level and are the subject of a separate paper and discussion. This is what today creates a significant potential for future research and development for Ukrainian digital numismatics, and also reflects the growing importance of digital numismatics role in modern scientific thought in Ukraine.

As digital technologies have actively entered the inventory of domestic researchers in numismatic science, the issue relevance of digitalisation in numismatic science is constantly growing. In particular, V. Orlyk & S. Orlyk (2019) analysed digital technologies integration processes in the research and storage of numismatic collections. The authors' research shows how digital tools use can improve the accessibility and preservation of numismatic artefacts. I. Khromova (2015; 2020) draws attention to digitalisation's impact on numismatic research methods. She notes that digital resources can significantly expand the research database, which contributes to a deeper analysis of numismatic materials. V. Kotsur (2016) studied the standardisation and unification issues of digital methods in numismatics. His work emphasised the importance of common standards to ensure compatibility and usability of digital resources in this field. V. Nechitaylo (2019) highlighted the security and preservation importance of digital numismatic collections. The author emphasises the importance of developing reliable data storage systems that can prevent loss of important historical materials. K. Myzgin (2018a; 2018b) showed in his researches how the analysis of a large amount of data and electronic databases creation can help to identify new patterns and current trends in numismatics. A. Luzanova (2020a; 2020b), meanwhile, analysed digital technologies impact on scientific processes dynamics in numismatics field, as well as the integration of digital tools in museums. Her research has shown how digital technologies can help create virtual

exhibitions and improve the accessibility of numismatic collections to a wider audience. O. Shportun (2016a; 2016b) conducted a detailed analysis of the information potential and main characteristics of a numismatic Internet resources in Ukraine. She presented a classification of numismatic websites by such criteria as accessibility, type and nature. O. Shvets (2015; 2020; 2021) analysed the prospects for digital numismatics development. The author draws attention to the new opportunities offered by digital technologies and the challenges arising from their implementation. Thus, these authors' works show a wide range of issues related to numismatic digitalisation, from data storage and security to digital technologies integration into the educational process and museum activities.

The study purpose is to systematise and review the Ukrainian historiography on modern technologies usage and general digitalisation processes in numismatic science during the period from 2013 to 2021. This work is aimed at identifying the main research areas for this period, analysing key trends and establishing their impact on Ukrainian numismatics development, which makes it possible to obtain a deeper understanding of digital technologies role in the context of Ukrainian numismatic science development and prepare the ground for further research in this area and development of national numismatic science.

The work is written using the main historiographical methods, such as critical, comparative, evolutionary and sources meta-analysis. These methods were used to determine the context of the works (time of writing, authorship and purpose), identify their common and distinctive characteristics, general trends, conclusions, views and changes in the development of the problem under study, which, accordingly, helps not only to reveal but also to deepen the interconnections between the different works contexts.

### ■ Using web resources in numismatic research

The existence issue of the problem of using Internet resources in Ukrainian numismatic research was one of the first raised by the Ukrainian scientist V. Orlyk (2013) in his article "Information potential of WEB-resources in numismatic research (on the example of Crusader states coins)". In this work, the author examined the problems of using the information potential of Internet resources in numismatic research, for example, by conducting a general analysis of the Internet auctions potential, online shops and websites of certain orientation. Noting that since information technology has become an integral part of historians' scientific inventory and has expanded into an integral part of their research sources, the problem of using Internet resources in historical research has been a matter of urgency and has been actively studied in the world for the past two decades. The scientist noted that modern tools have made it possible to draw several new conclusions (for example, regarding

the dynamics of changes in the weight of coins) and to carry out high-quality modern reconstructions, conduct stamp analysis, study the iconography and palaeography of rare coins, etc. In addition to the advantages, the researcher also highlighted a several existing problems such as the need for caution in treating information from Internet sources; the need to repeatedly verify the facts obtained from there, due to the possibility of indicating incorrect or general topographic data.

More recently, when studying the use of information resources in numismatic research and considering its general state, O. Shvets (2015) emphasised the problem of the lack a full-scale domestic materials databases (classified by extensive topics), the absence of a single criterion for systematising the Internet periodicals and highlighted the need for competent organisation of specialised resources and the need for numismatic science to have more modernised approaches to the modern research work organisation, which can become the key to successful scientific activity. The researcher also emphasised the importance of proper work and the methodology development for working with information virtual sources and materials on websites related to historical and numismatic topics during research.

Several domestic scholars have devoted separate works to the usage of various Internet information sources in numismatic research. In particular, the place of official websites of museums, museum and government institutions in numismatic research is devoted to the works of such researchers as O. Shportun (2016b), V. Nechitaylo (2019).

Since the world wide web and the Ukrainian web space have a fairly large number of both scientific and commercial or amateur numismatic sites, numismatic researchers' attention has been drawn to the possibilities and problems of their use in conducting research on the monetary circulation history. Particular attention is paid to domestic Internet auctions pages. For example, O. Shportun (2016a) analysed the information potential and main characteristics of numismatic Internet resources in Ukraine, giving an example of numismatic websites classification by the following criteria such as accessibility, type and nature (using the example of such resources as numizmat.com.ua, money.in.ua, ukrcoins.kiev.ua and others). She also provided the content comparison of the most popular Ukrainian numismatic websites of that time ("VIOLITY" antiques auction, "Numismatics and Phaleristics" reference and information magazine, kolekcioner.net.ua, coins.kiev.ua, and Numiz). O. Shportun (2016b) devoted a separate publication to the positive aspects and problems of using the "VIOLITY" website in numismatic research. Having made a comprehensive review of the content, functions and capabilities of the website according to several general requirements for Internet resources, the researcher noted the content quality and technical features of the resource, and also emphasised that despite some shortcomings, this website, at the



time of writing, was not only an Internet platform for auctions, but also played a significant role in the search and analysis of materials for numismatic research.

Also, the advantages and disadvantages associated with the use of auctions and forums such as "Violity", "New Auction" and "Unc.ua", the electronic encyclopaedia "Wikipedia", social networks "Academia.edu" and "Facebook" and even private channels on the "YouTube" service were discussed in one of the works by V. Nechitaylo (2019). In the article, the author examined and analysed the information and scientific potential of using Internet resources in the history of monetary circulation in Ukraine-Hetmanate study. When using such resources in the study, the author discovered new data for numismatic science on previously unpublished varieties of Petro I coins found in the Hetmanate and facts about the coins discovery, which were considered quite rare in the national numismatic historiography. In this work, the author emphasised that "despite the existing shortcomings, specific features and certain risks in use, electronic web resources still have significant information and scientific potential in the study of the Hetmanate's monetary circulation study".

Electronic databases creation, a collection of findings, as well as museum and private collections catalogues with numismatic content were the focus of K. Myzgin (2018b) works, as part of digitalisation research in the field of ancient numismatics. In these works, the author noted that due to their technical capabilities, they have several advantages over their paper versions, and their use is especially significant in the historical science research and its special branches. The paper rightly notes that such resources existence is obvious, and Eastern European countries are moving rather slowly towards the system development of museum collections electronic catalogues and findings databases. The researcher highlighted such important foreign Internet resources for studying this area as the Nomisma.org catalogue of the American Numismatic Society (its subsidiary resources such as the CHRR dedicated to the findings of Republican Roman treasures and collections databases), the RPC catalogue from the Ashmolean Museum, Oxford University, dedicated to provincial coins, and the coin treasures catalogue of the Roman Empire, RIC VOnline Internet portal, Wildwinds catalogue of Roman coins, the catalogue of late Roman bronze coins, databases of auction houses Coinarchives, Acsearch, the page of the European Coin Finds Network ECFN, an online catalogue of finds of barbarian imitations of Roman coins in Ukraine and Moldova O. Anokhin, and the online catalogue of gold Roman coins finds from Ukraine and the entire European Barbaricum, RGCBOnline website RomanGold Coins from Barbaricum.

The website usage separate analysis of the British Museum's Department of Coins and Medals in numismatic research was conducted by A. Luzanova (2020a). Having reviewed the content, directions, functionality,

interface and features of using this resource for research purposes, the author noted the current relevance and significant information potential of online museums in scientific processes, especially during the global cataclysms period, for researchers about the history of monetary circulation around the world. Also, scientists V. Orlyk & S. Orlyk (2019) analysed the information potential of official museum websites in numismatic research and museum institutions' activities promotion on the example the official websites of the National Museum of History of Ukraine, Odesa Archaeological Museum of the National Academy of Sciences of Ukraine, M.F. Sumtsov Kharkiv Historical Museum and the British Museum. Following the study results, the authors published a detailed analysis and comparison of the content and characteristics of these resources, where they noted that, unfortunately, unlike the official website of the British Museum, Ukrainian museum Internet resources are useful for obtaining preliminary information about numismatic exhibits, but are not yet a basis for scientific research. The main reasons for this are several technical shortcomings, the absence of remote access to the numismatic collection, and a series of methodological errors made during the collection structuring, "which were probably laid down through Soviet ideologemes and aimed at the appropriate distortion of the historical past. First of all, the attribution to Russian numismatics of coins of Kievan Rus and Russian lands in the late Middle Ages and early modern times"

#### ▀ Online auction risks and challenges for archaeological and numismatic research

The negative side of the Internet auctions existence as platforms for the sale of "black" archaeology materials for historical and numismatic science was also highlighted by V. Kotsur (2016), K. Myzgin (2018b), V. Orlyk & S. Orlyk (2019). Indeed, the 21<sup>st</sup> century was the "golden age" for the active development and widespread use of metal detectors by amateurs to search for and sell coins, and the incompetence of amateur metal detectors resulted in the irreversible loss of the archaeological context of the finds themselves. Some coins and treasures are not registered, the places where they were found are not recorded, and as a result of the sale, they will never physically get into museums or scientific circulation, which is disastrous for Ukrainian numismatic science. Due to several specific aspects and reasons, the collection shadow market is constantly increasing the amount of archaeological material, as evidenced by the constant publication of dozens and hundreds new coins at online auctions.

But, in addition to unauthorised research destructive consequences, the scientists noted that their research materials publication also led to an increase in the number of new sources. And while this process cannot be stopped yet, it would be unwise to ignore such sources in numismatic research, as the increase in the number of coins known from unofficial amateur searches may

contribute to revising conclusions about the history of certain periods of coin circulation in Ukraine. However, information about coins disseminated on the Internet by treasure hunters should be carefully checked, so working with such information requires special methodological guidelines.

Later, considering the traditions, challenges and prospects of medieval numismatics studies in Ukraine, I. Khromova (2020) emphasised that "despite the fact that numismatists have now gained access to the latest technological tools, which has qualitatively expanded research opportunities, the written monuments study is still actively underway and there is still a need to organise work with the source base, which is characterised by the active use of information from the Internet. Research and work in this area has all the prospects for discovering new facts about the development history of local monetary circulation, which is why there is a need to identify and study the role of this material type, and discussions around this topic continue".

A. Luzanova (2020b), having examined the scientific study state of using information technologies and information resources problem in numismatics, rightly noted that the methodologically balanced use of Internet resources has opened up the possibility for many modern numismatic science researchers to solve several scientific problems and make real scientific discoveries. However, despite the admission by almost all authors of the significant information potential provided by Internet resources in research, the undeniable prospects for creating online collections, specialised numismatic websites and software, they are convinced to state the fact of insufficient development, the existence in this segment of the national Internet a number of shortcomings and the urgent need to develop methodological approaches to the Internet resources usage as a source of scientific research in numismatics.

### Internet resources and digital innovations in archaeology and numismatics research

It is worth noting that due to the emergence of electronic (or virtual) collections, among private collectors and museum institutions, there was also a need to organise such collections, and a number of computer programs were created by developers. It also influenced the scientific research development, raising the requirements for the approach to compiling information support for numismatic collection objects. Software use and capabilities in working with numismatic collections, as well as its use in numismatic research, were the subject of a separate work by I. Khromova (2015). In this work, the author noted that electronic collections should not be confused with online expositions and highlighted the features, algorithms, attributes, functionality, interfaces user-friendly and working principles of a certain number of computer programs for working with them, such as "Numizmatik\_Ru 1.01", "N-CAT (Numismatic Database

Management for the Historian and Collector)", "Euro Coin Assistant", "So Many Euros", "Coin Manage" and others, the complete list of them can be found in the article itself.

Within the research on the direction towards implementation in the numismatic research processes, O. Shvets (2020), in addition to considering the Internet resources usage potential, devoted two of her works to several more practical areas. In particular, having considered the prospects and peculiarities of using three-dimensional technologies in numismatic research, the author emphasised that obtaining high-quality three-dimensional models of numismatic objects and the software extensive functionality for working with them opens up great opportunities for editing, conducting comparative work, creating realistic reconstructions, and obtaining the necessary calculations. The researcher quite rightly noted that such technologies today can contribute to significant breakthroughs in this scientific field, opening up new opportunities and facilitating the work for many researchers of special historical disciplines.

The author also raised the issue of the correct process features of "Research objects digitisation in special branches of historical science" and digital copies size optimisation, noting the importance of correctly determining the necessary technical characteristics in the digitisation process in accordance with the features and specifics of the numismatic objects under study in order to avoid distortions, inaccuracies and for the quality presentation of numismatic objects in galleries, online museums, auctions and other information resources. Since the massive transfer of numismatic research objects into a virtual form is expected to help and accelerate the creation of museum collections integrated databases, as well as contribute to the creation of a high-quality domestic electronic catalogue that can provide high-quality research and reconstruction (Shvets, 2021).

Analysing the digital numismatics historiography issue that emerged between 2013 and 2021, it is also necessary to mention several publications in which digital numismatics issues, although being not the subject of a special study, were emphasised by the authors, who used available numismatic Internet sources. Among them are studies on the historiography of Ukrainian treasury studies (Kotsur, 2017), a medieval European denarius with Slavic runes and three fake medieval Western European denarii found in Rivne region (Kuleshov, 2017; 2018), the coins topography found in Ukraine of the Teutonic Order state in Prussia and its Livonian branch, as well as the identification of Severin banat coins with the male figure image and a cross in a shield under the crown, theories on the Ukrainian Hetmans' own coinage emissions (Nechitaylo, 2019), Celtic coins of South-eastern Europe iconography (Kazakevych, 2021), the basic periodisation issue on Roman imperial denarii imitations in the area of Chernyakhivska culture (Kasperovich & Yushkavskas, 2021), two finds of Podillia half-groschen in Lviv region (Kryzhanivsky, 2021), and others. The use of online

numismatic catalogues and auctions in the research of the mentioned scholars, numismatists' and treasure hunters' forums, as well as other mainly specialised websites and electronic resources, has proven to be an effective tool for accessing the necessary information, analysing and forming reasonable conclusions in their own research.

Accordingly, all researchers unanimously noted that despite the existing shortcomings, specific features and certain risks in its use, digital technologies today can contribute to significant breakthroughs in this scientific field, open up new opportunities and facilitate the activities of many researchers of coinage and the monetary circulation history. At the same time, there is a need to organise and develop methodological approaches to working with the modern source base, and there is a need to be cautious about information from Internet sources, to repeatedly check the facts obtained from them, and to ensure proper work and develop a methodology for working with virtual sources of information and materials on Internet websites.

## ■ Conclusions

In 2013-2021, the national numismatic research space saw a marked increase in interest in studying the role of digitalisation of historical, including numismatic research, the introduction of modern technologies in research processes, and their impact on research methods, but the study of the digitalisation of numismatic science in Ukraine has not been institutionalised.

Since Internet resources are becoming a significant source of materials search and analysis for historical and numismatic research at the traditional source level, scientific publications main topics are focused on the relevance and prospects of using the information and scientific potential of specialised Internet sources in numismatic research, and thus on the role study of this materials type in discovering new facts about the coinage and monetary circulation history. The analysed publications draw attention to the importance of such

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official and properly constructed domestic resources existence, which can later become the basis for scientific research. In addition to the authors' recognition of the importance of the Internet resources information potential in numismatic research and the undeniable prospects of creating specialised domestic websites, the researchers considered the use and a specialised software creation. In addition, considerable attention is paid to the correct process of digitising research objects in special branches of historical science and to the observance for a number of technical characteristics in the implementation of a high-quality research process.

In general, the works devoted to various digital numismatics aspects in 2013-2021, it is emphasised the importance of digital tools active integration into the scientific practice of numismatists, developing recommendations for future researches in this area, which is a significant addition and opportunity expansion for any domestic scientific numismatic research. With the new horizons opening up in digital numismatics in Ukraine since 2013, it has become clear that the development stage has not only raised the Ukrainian scientific community prestige, but also brought new knowledge, gave impetus to rethinking and forming the basis for creating unique methods and approaches in national numismatics.

It became the basis for the further development of this research area, opened up new opportunities for cooperation and experience exchange with recognised experts from around the world, and has a great potential to change the approach to national numismatic research and work with historical sources, which justifies the need for a separate study and discussion of this transitional period in the Ukrainian numismatic science history.

## ■ Acknowledgements

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## ■ Conflict of Interest

None.

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## Становлення досліджень з цифрової нумізматики в Україні (2013-2021 рр.)

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**Анотація.** Актуальність поточного історіографічного дослідження полягає в потребі підбиття попередніх підсумків розвитку нумізматики наукової думки у сфері діджиталізації та визначення подальших перспектив як самої діджиталізації, так і наукових спрямувань її вивчення. Метою дослідження є систематизація та огляд української історіографії, що стосується використання сучасних технологій та загальних процесів цифровізації в нумізматиці протягом періоду з 2013 по 2021 роки: вирішальний період від початку публікацій перших робіт цього напрямку досліджень в Україні до повноцінної інституалізації та інтеграції до міжнародної співпраці. Робота була написана з використанням критичного, порівняльного, еволюційного методів історіографічного дослідження та мета-аналізу джерел, які дозволили визначити спрямування інтересів науковців та загальні тенденції в розвитку вивчення цифровізації в нумізматиці. В процесі дослідження було здійснено історіографічний аналіз праць вітчизняних науковців, присвячених проблемам діджиталізації нумізматики в 2013-2021 рр., задля виявлення поглядів та змін, пов'язаних з досліджуваною проблемою та підведенню виважених та обґрунтованих висновків. За результатами проведеного дослідження показано, що впродовж вказаного періоду не лише зріс престиж української наукової нумізматики спільноти, але й були сформовані нові знання, відбулося переосмислення та формування нових методів та підходів у вивченні нумізматики. Результати дослідження свідчать про важливість включення цифрового інструментарію у наукову практику нумізматів, а також розроблено конкретні рекомендації для майбутніх досліджень у цій царині, враховуючи її роль у розширенні можливостей для вітчизняних досліджень в області нумізматики. Наголошено на актуальності та доцільності використання спеціалізованих Інтернет-джерел для нумізматики досліджень, а також їхній ролі у виявленні нових фактів про історію монетної справи та грошового обігу. Проаналізовано наукові публікації, які підкреслюють важливість наявності офіційних та належно структурованих ресурсів, які можуть стати базою для подальших наукових робіт. Практична цінність полягає у можливості застосування результатів та рекомендацій досліджень при плануванні тематики подальших нумізматики та історіографічних розвідок, підготовці лекцій з історії вітчизняної нумізматики

**Ключові слова:** цифрові нумізматики джерела; цифровізація; історіографія; діджиталізація; електронні нумізматики ресурси; веб-сайт