

The project involves obtaining new information on chronology, directions and causes of inflow of ancient gold coins to the territories beyond the Roman frontier in the Late Antiquity and offers an opportunity to use modern information technology tools to do research on these coins. The view which prevails at present is that Roman and early Byzantine gold coins from the 4th-6th centuries AD (first of all solidi, with a weight of about 4.5 g each) entered the barbarian territory en masse for political reasons. Their number in finds can be estimated to thousands of pieces, some of them found within hoards containing over a hundred of coins each. They have been interpreted e.g., as money, which came to the hands of the barbarians in connection with their direct participation in the wars on the Roman frontier or within the Roman world (e.g. as subsidies from the imperial treasury, tribute, plunder, ransom, soldier's pay). In this way, by studying the inflow of solidi we can obtain new information on political contacts between Romans and barbarians in the 4th-6th centuries AD. As parts of the project, special attention will be paid to the groups of finds of solidi dated to the early 350s (conflict between Constantius II – the legitimate emperor, and Magnentius – one of the usurpers to the imperial throne), to the late 4th and early 5th centuries (barbarian invasions of the Roman territory, tributes paid to the Huns and to other barbarian tribes), and to the late 5th and early 6th centuries (historical events over the ruins of the Western Empire and tributes paid to barbarian tribes by the Eastern Empire). From a broader perspective the research problem of solidi addressed in the project is relevant because coin finds are one of the most important elements of studies on the barbarian territory in the Late Antique. The scarcity of written sources and archaeological evidence for this period makes reliably dated coins, determined correctly as to their place of issue a truly invaluable resource.

One of the elements of a detailed coin description is identification of a coin die which was used to struck the coin. Moreover, it is possible to identify coins struck using the same die (of an obvers, or of a revers), or the same pair of dies, what is called die-links. A lot of die-linked, very well preserved coins found within the same hoard could indicate that these coins had not been mixed in circulation and they came directly (or almost directly) from the mint. For some of the individual hoards, evidence from determinations of the date of issue and the study of die-links has helped to tie these finds to the very narrowly dated payments made by the imperial treasury, which may in turn be tied to specific campaigns or to specific tribute payments made to barbarians, recorded in the written sources. On the other hand, it is possible to identify Roman payments that could be linked to some hypothetical events unrecorded in the written sources. The results of such studies on die-links are so promising that it is worth moving forward. Commonly used method of analysing coin die-links (human eyesight) is very labour-intensive. The modern alternative is to use advanced image recognition software do identify die-links which will be built specially for the project.

The software will be developed basing on the convolutional neural network constructed for images of coin dies and their links. The image recognition algorithm will be built involving the project investigators and using their knowledge and experience in the field of numismatics. Convolutional neural network (CNN) is one of the classes of neural networks in deep learning considered under Artificial Intelligence (AI). The development of coin recognition software is not a very advanced task in the field of computer sciences. An innovative aspect is to develop the image recognition system working on the level of specific coin dies and links between them.

The research made within the project will be made on a number of levels: a search of museum collections (including on-line databases), a search of library holdings, studies of classical written sources, and, last but not least, pioneering use of software tools to analyse coin die-links. Innovative studies addressing phenomena which go far beyond the territory of Poland, and their results, made available to research worldwide, will have an international impact. Not to be overestimated is the fact that finds of gold coins never fail to draw the lively interest of archaeologists, historians and numismatists. Furthermore, the undeniably spectacular nature of these finds and linking them to specific political events of the Antiquity is a major opportunity to have the results of the project research made available to a wider general public, rather than having their circulation confined to the relatively narrow research community.