

## 1. Contribution/Project Goal

Developing a classifier capable of accurately classifying various coins originating from the ancient Ptolemaic kingdom according to the issuing ruler, by considering their distinct and intricate patterns.

## 3. Methods/Algorithms/Alternatives or Design Consideration

Our project focused on two primary considerations, and these played a fundamental role in shaping our approach. The first being the data gathering, as it held significant influence over the learning process. We chose an online database for data scraping and determined the most effective approaches for data cleaning to ensure optimal quality and reliability.

The second consideration involved the construction of our learning model. Given the many open-source image recognition models available, we carefully tried to identify the one that best suited our unique dataset and goals. This allowed us to select the most suitable model that would yield the highest performance.

## 2. Introduction

Our project utilizes machine learning and deep learning algorithms to tackle the above task. Through extensive training of the model using diverse coin images, we aim to evaluate the accuracy of various methodologies and ultimately develop an optimal model tailored to our data.

Presently, archaeologists primarily rely on analyzing the tail side of the coin for classification purposes. However, in our project we were posed the challenge of distinguishing between coins solely based on the portrait of the king displayed on the head side of each coin. This classification problem is especially difficult since the portraits of the different kings are remarkably similar. In fact, their resemblance is so striking that even professional archaeologists encounter difficulties in determining the exact identity of the coins based on their portraits alone.

To achieve our goal, we build a model that will be able to identify significant distinctions among these portraits and help researchers by automating the coin classification process.

## 4. Selected Approach

Regarding data scraping, we utilized the website coinsarchives.com as our primary source to gather the necessary data. To ensure accuracy and precision in the collected information, we used the expertise of our archaeologist mentor, who assisted us in the data cleaning process. For our modelling approach, we compared various techniques, including the Conventional Neural Network (CNN), Residual Network (ResNet), and Visual Geometry Group (VGG) models.

## 5. Solution Description (Algorithms, Modulation, Patterns, Infrastructure, UI, Functionality)

In our project, we developed multiple models utilizing various algorithms, including the CNN algorithm which we fine-tuned, as well as the ResNet and VGG algorithms.

### Data Scraping:

1. Selenium – A powerful Python library used for extracting data.

### Model building:

1. Pandas – A Python library utilized for efficient organization and manipulation of data.
2. TensorFlow – A popular Python library specifically designed for machine learning and deep learning algorithms.
3. Seaborn, Sklearn, matplotlib, cv2 - These Python libraries provided valuable tools for data analysis and visualization.

*The same era of  
Ptolemy the 12<sup>th</sup>*



*Ptolemy the 1<sup>st</sup>*



*Ptolemy the 6<sup>th</sup>*



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