

Counterfeit Currency Detection

Goal: Use machine-learning classification models to determine the most prominent predictors of real versus fake currency, analyze the efficacy of different security measures on paper currency, and predict the legitimacy of paper currency.

Data: <https://www.kaggle.com/datasets/mdladla/fake-currency-data/data>

Description: *“This dataset contains synthetic data representing fake currency samples. It includes information such as the country of origin, denomination, whether the currency is genuine or counterfeit, serial numbers, security features, weight, length, width, and thickness of the currency. The dataset can be used for various machine-learning tasks such as classification, anomaly detection, and feature engineering. It is suitable for exploring patterns and trends in counterfeit currency and analyzing the effectiveness of security features.”*

Methods: This project aims to use component analysis and multiple classification models to derive conclusions and predictions from the data. To analyze the most prominent predictors of real and fake currency and evaluate the efficacy of security measures, this project will employ PCA and exploratory factor analysis. In order to predict the legitimacy of paper currency, this project will train on a logistic regression model since the classification is binary and a SGD classifier with kernel approximation due to the large quantity of data.

Research: The goal of this research is to detect and eventually halt the creation or use of counterfeit currency, as doing so will improve society's financial stability. The models will

enable financial institutions and businesses to recognize counterfeit currency more accurately and remove it from circulation, decreasing the amount of phony currency produced and making it more difficult for criminals to use. This will guarantee that a currency's value will remain high and have room to increase, giving those who earn and spend real money legally the opportunity to acquire the full worth of their money. Reducing the amount of counterfeit money in circulation will also contribute to the preservation of public confidence in the financial system, which will ultimately benefit both people and companies. The research will contribute to a more secure and stable economy overall by putting more effective detection systems into practice.