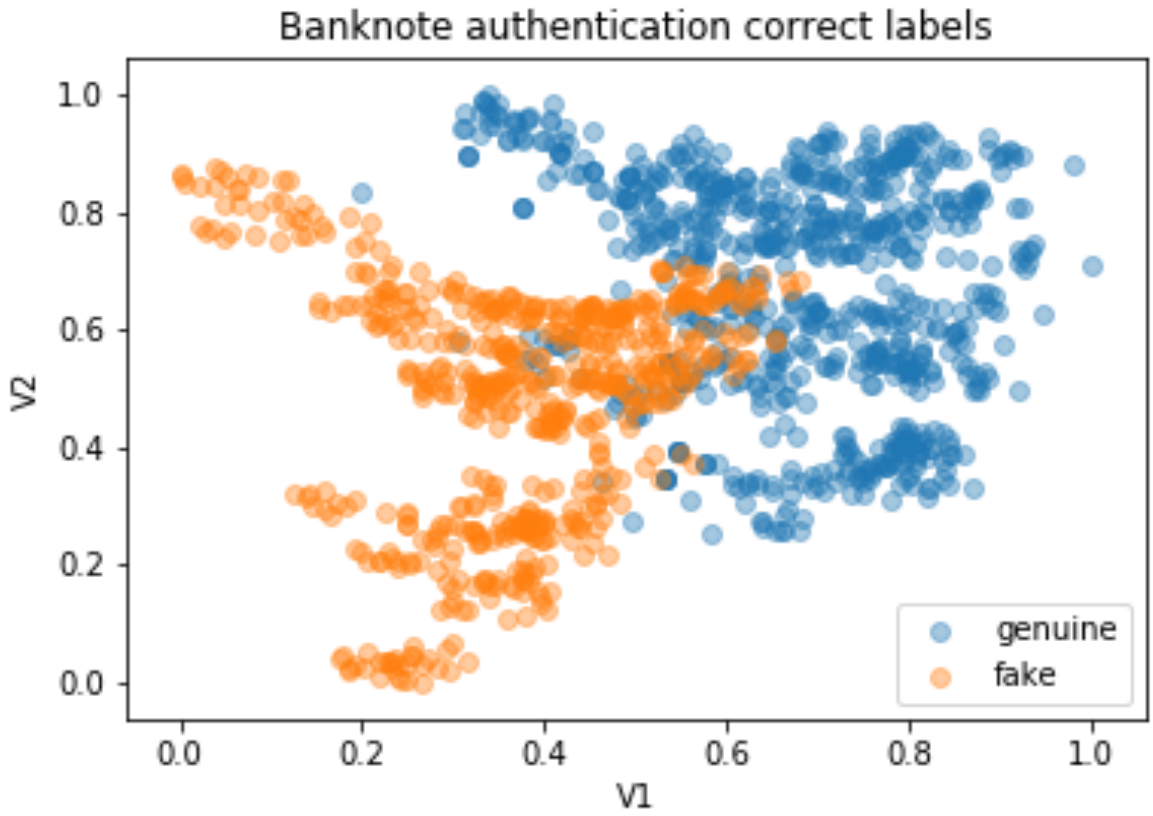
REPORT ON BANKNOTE AUTHENTICATION ANALYSIS



Purpose

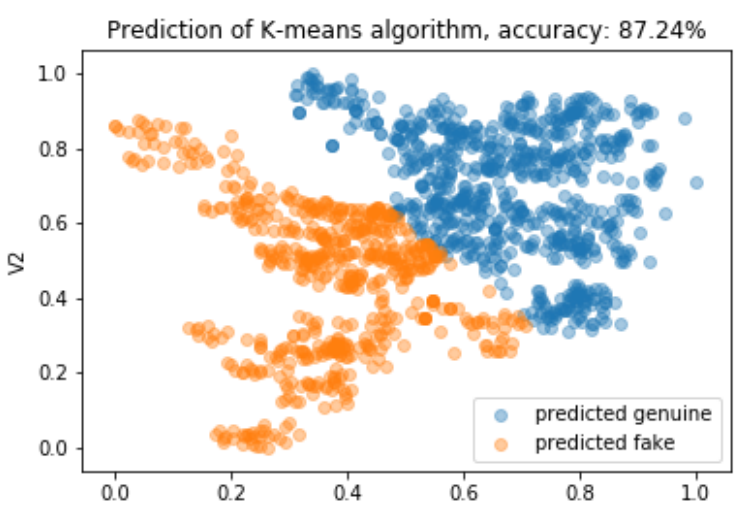
This project Is run to determine if authentication between forged and genuine banknotes can be done automatically.

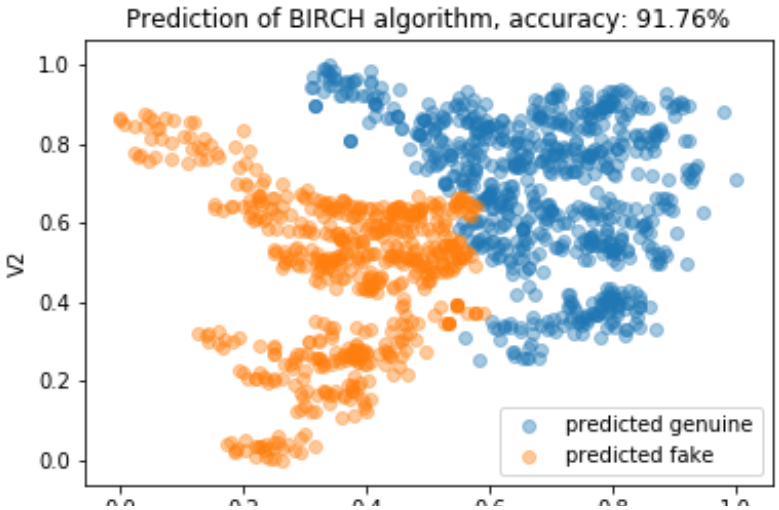
Data

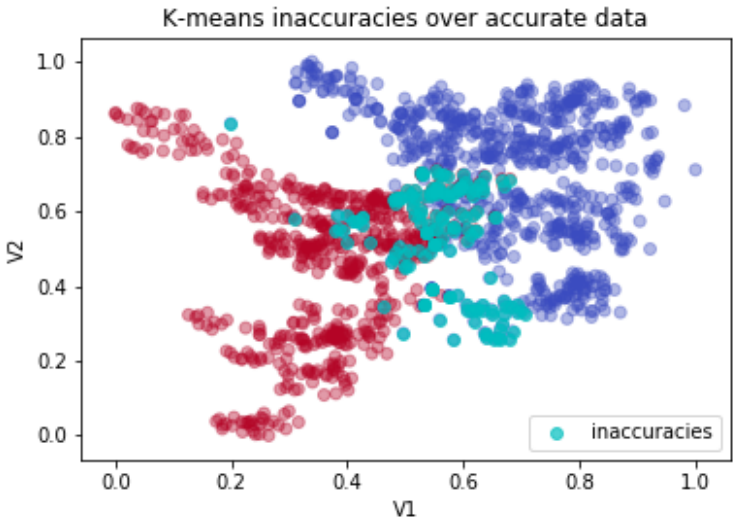
Data were extracted from images that were taken from genuine and forged banknote-like specimens. The above figure maps the actual genuine and fake banknotes when compared to two features of the collected dataset.

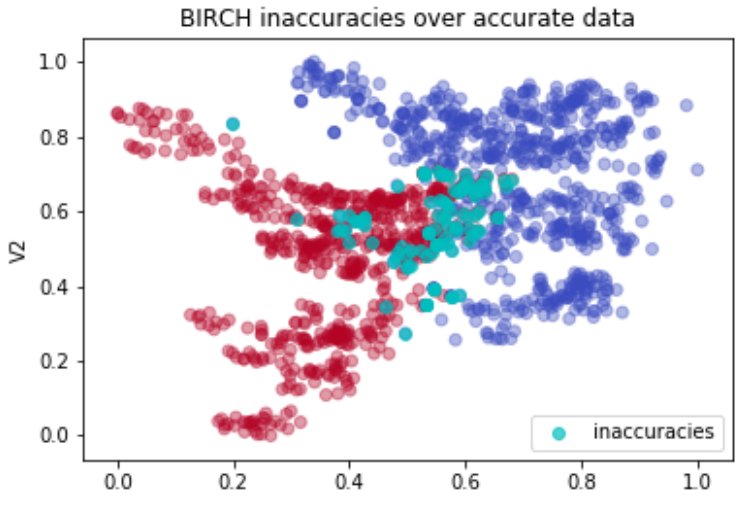
Method: Unsupervised Learning

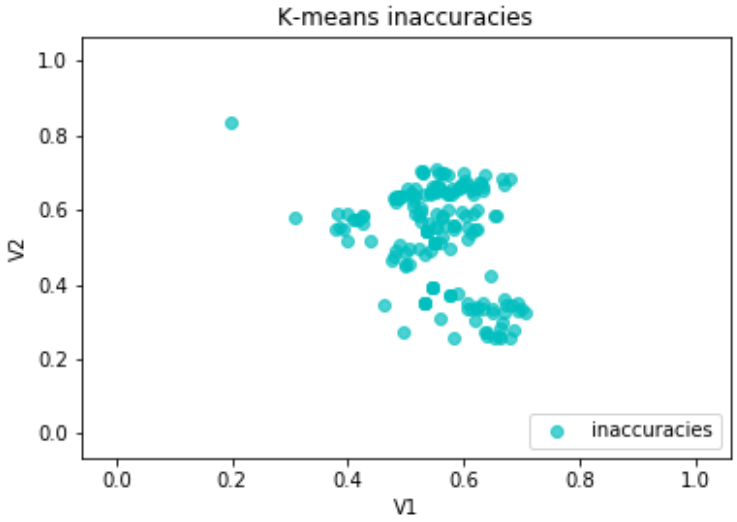
With Unsupervised learning, the algorithm learns from the data without human supervision. So in the below example, two types of clustering algorithms, **K-Means** and **BIRCH** clustering, were used and they group the data without guidance on which banknotes are actually genuine and fake from the dataset.

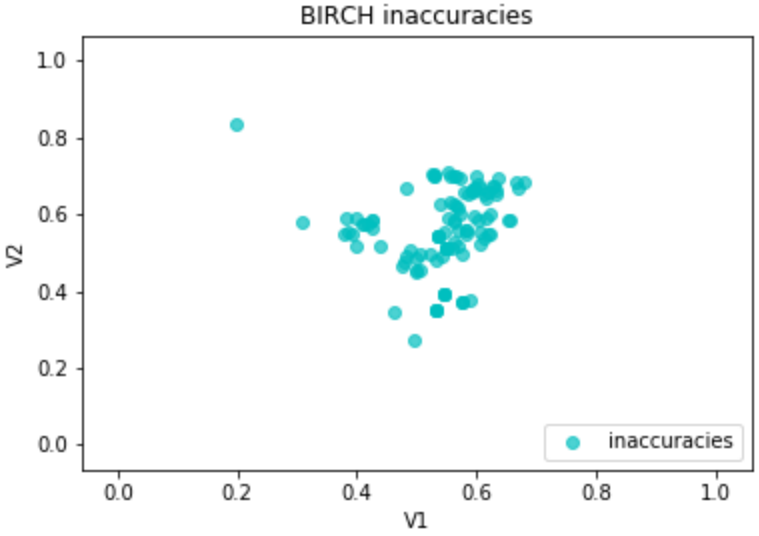






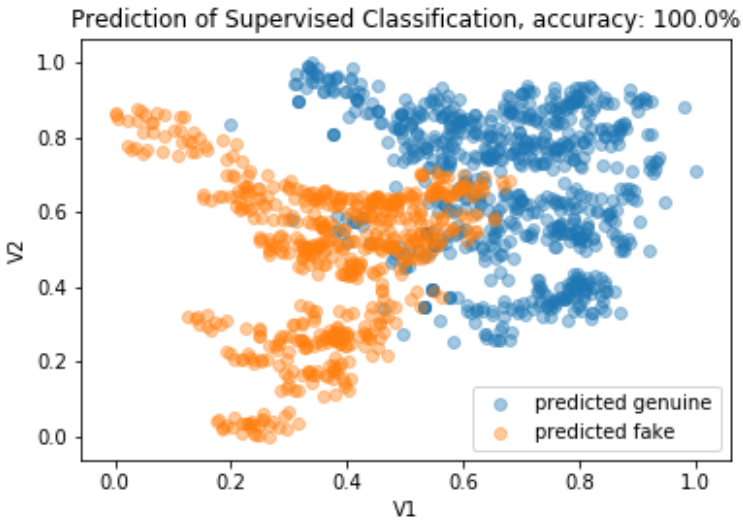


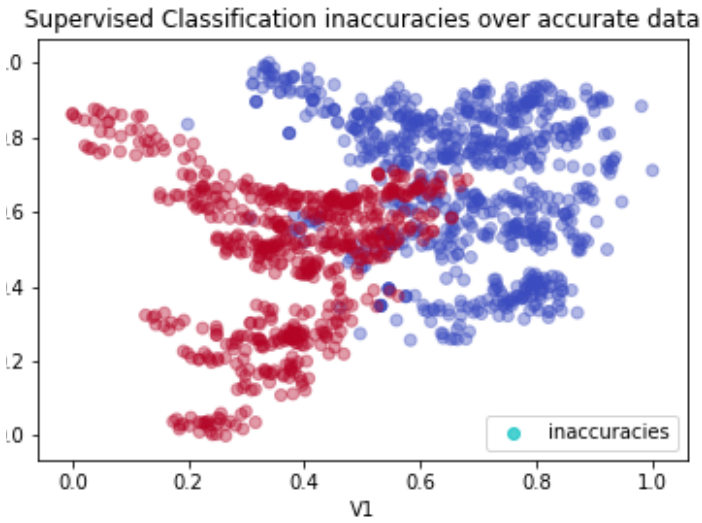




Method: Supervised learning

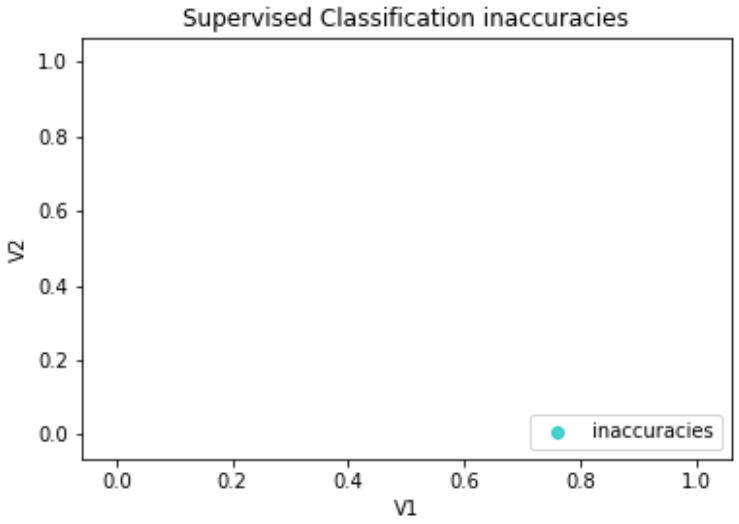
In this method, the algorithm used the labels of the real and forged banknotes from the dataset to train in classifying data and predict the outcome accurately.





Summary

From all the tests run, it is clear that although the unsupervised learning algorithm can roughly group the data into the appropriate clusters, they have a higher margin of error compared to supervised learning algorithm.



Recommendation

With money exchanging hands by the thousands, or millions everyday, every little inaccuracies will be very costly. For the algorithm to provide accurate predictions, they need to be trained by the correct data set; thus they require upfront human intervention to label the data appropriately. Therefore, this report concludes that it is unwise to fully automate banknote authentication without any human influence.