TRINITY COLLEGE DUBLIN

Abstract

Computer Science Department School Of Computer Science & Statistics

Integrated Masters In Computer Science

Bitcoin Fraud Detection with Unsupervised Learning

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Currency is the cornerstone of human civilization. The form of currency has changed over time, transitioning from metal, silver and gold in the early stage to paper-money today, and possibly, in the near future, digital currency. The concept of digital cash was first introduced by David Chaum in 1983, in his research paper. In 2008, a revolutionary digital payment system named Bitcoin was released by Satoshi Nakamoto. Bitcoin has a number features that significantly weakened government's control over the currency system. This brought it popularity, against the background of the financial crisis in 2008 where government credit was being questioned. As digital payment systems such as Bitcoin starts to dominate the world economy, Bitcoin or digital currency financial fraud is becoming a critical issue to our society.

This dissertation aims to construct a Bitcoin fraud detection system that uses machine learning algorithms to detect Bitcoin fraud. The system extracts meaningful features from Bitcoin ledger and fits the feature data to the fraud detection model. Unsupervised learning algorithms are implemented to construct the fraud detection model. The unsupervised learning algorithms we have implemented are K-means clustering and one-class SVM. K-means clustering is a method used for clustering analysis and one-class SVM is an algorithm for anomaly detection. The models have successfully recognized some patterns for the identification of Bitcoin fraud and have successfully identified a previously unobserved fraud.