Northeastern University
College *of* Professional Studies

Capstone - 90334 - ALY 6980 - 01

SUMMER 2023

Company Name
Marathon Digital Holdings

Project Title
Predictive/Regression Modeling and Analysis of Bitcoin Hashrate

Description

Bitcoin mining hashrate shows a high intraday variance which cannot logically be explained by how the participants in this industry (miners) operate. A Nevada company, supporting the Bitcoin ecosystem, would like to gain better insights into what drives this variance. Multiple possible explanations exist – (a) hashrate is not directly measured but inferred indirectly from block timestamps; the normal variance in block discovery times could lead to large estimation errors for hashrate (b) miners mining with intermittent solar or wind power may be ramping up and down their hashrate frequently (c) miners are deliberately fluctuating the hashrate to manipulate difficulty and increase their rewards down the road.

Deliverable

The students will analyze the historical hashrate, block timestamps, and miner hardware efficiency and energy-prices data to: (a) Try to find a logical explanation for the variance. First, the students will examine if the block discovery time variance falls within the expected bounds of a normal distribution with a constant hashrate hypothesis. (b) If it does not, they will estimate the portion of variance that is not explainable and try to create a model to predict it. The model should ideally be both explainable and predictable. Possible models' students can create: a. use miner efficiency and energy-price data and make assumptions about power availability to see if it explains the pattern. b. analyze using game-theoretic models to see if miners are deliberately manipulating the hashrate. c. create PCA and/or regression based predictive model for the hashrate.