CS6675/ CS4675

Homework Assignment 5

(Programming Category)

Student Name:_____

Student Session: cs6675 or CS4675 (circle one)

You are given the choice of two programming problems in the HW5. You only need to choose one of the problems. For the problems consisting of multiple options, you only need to choose one option from the chosen problem as your second programming homework. Feel free to choose any of your favorite programming language, including but not limited to Java, C, Perl, Python.

Note that if none of the two problems is of interest to you compared to those in the previous four programming assignments, which you wish to work on but did not get a chance because you chose another option or you choose reading critique option. In this case, state this clearly in your assignment 5, including the choice you made in the previous four assignments.

Due Date: Midnight on Friday of March 28 with graceful period till 9AM, March 29.

Problem 1. Learning BlockChain by Examples

This option is designed for those students who are interested in getting hand on blockchain technology.

You are encouraged to write your application of blockchain using hyperleger-fabric or Etherrum or Cardano. Here is the quick start pointer for Hyperleger.

https://hyperledger-fabric.readthedocs.io/en/latest/write_first_app.html

You are encouraged to following the instruction (1) Setting up a development environment, (2) Learning the parameters of the sample smart contract our app will use. **(**3) Developing the applications to be able to query and update assets on the ledger.

Deliverable.

(a) Describe your experience and problems encountered with the three steps. How you solve the problems if you did.

(b) Show the screen shots of your experience, including your query results if you are succeeded in getting query results.

(c) Analysis and discuss your results and your learning experience.

One example is Blockchain Vote Tracking by interacting and modifying examples provided, for example, by Hyperledger Fabric to create an architecture to store and query votes on ledger. Report your vote extension design and implementation, your results, and elaborate on your overall learning experience from this assignment.

Problem 2. Mining Blockchain dataset

There are a number of public blockchain datasets. Examples include:

https://senseable2015-6.mit.edu/bitcoin/
https://data.world/datasets/bitcoin
https://cloud.google.com/blog/products/gcp/bitcoin-in-bigquery-blockchain-analytics-on-public-data
https://www.coindesk.com/9-useful-bitcoin-data-resources

This option of the programming assignment is to let you get hand on some real-world datasets and try to see what kind of statistics you may derive by mining it. You may use any of your favorite machine learning algorithms and use the Collaborative Filtering algorithms.

For example, one interesting possibility is to mine the blockchain data for predicting the cryptocurrency price and compare the predicted value with the real price fluctuations. Because the market price data is a good choice of ground truth that can be used to evaluate the effectiveness of the prediction algorithm. Given this is a homework, and it might be good to simply extract a small subset of the dataset from one of the sources above and use the market price as a labeled data … and see what your chosen algorithm can predict and report how good it can get and elaborate. If something interesting is observed, this might be extended to a good course project.

Alternatively, you may take a subset of dataset and run a simple sorting by the transaction account address and report the statistics for 10 addresses, for example, and then provides the relationship graph between these 10 accounts in terms of # of transactions and the amount of coins sent to or received from. Also try to identify patterns if at all possible … Hint: choose the 10 accounts (hash addresses) carefully so there are some links among them so you can create a graph structure for these 10 accounts. This is also a good class project if you could observe some interesting patterns. Check out some referece papers in the blockchain reading list (reading option).

Deliverable.

(a) Describe your dataset and show some actual statistics about the subset of dataset you choose to work with.

(b) Desribe your design of the homework, your results, elaborate on your experience and problems encountered. How you solve the problems if you did.

(c) Show the screen shots of your experience if any, including data extraction, data mining statistics, and also the analysis of your results and your learning experience.