Artificial Intelligence in Fintech Exam (1)[1]

[1] No discussion will be allowed

Pricing implied volatility via integrative machine learning (100 points)

- Dataset: Option12110.csv
- Visualize[2] OTM, ITM, and ATM by using PCA, t-SNE and UMAP as well as c-SNE so that people can detect the three options for calls and puts. What can you find? why?
  - ATM options mean its strike price is identical to the market price of the stock
  - OTM refers to a call (put) with a strike price higher (lower) than the market price of the stock
  - ITM means the stock's market price of a call (put) option is above (below) its strike price.
  - Example: you need to separate the OTM, ITM, and ATM options of calls and puts
- Apply the following machine learning methods for the dataset and the ITM and OTM datasets and compare their results in terms of r^2 and MSE. What a kind of conclusion can you draw?
  - Train/test partition: 80%: 20%
  - Learning machines: k-NN, SVM, Random forest, DNN, and Gradient boosting
  - Deep learning models: LSTM, ReSnet, Transformer (at least 2 models)
- Conduct feature interpolations to enhance at least two methods' performance

[2]Be professional

- Develop a method to *integrate* machine learning methods to get better learning results than any one of them. Evaluate your enhancement percentage.
  - Note: you can select any set of machine learning methods to integrate, but at least four methods are there.

What should you turn in?

- 1. A folder that contains
  - A report to show details of your analytics (at least 30 pages)
  - Your *workable* codes MUST be able *to reproduce all results you claim.* The misfunctional codes would be counted as cheating.
  - your data
  - source files
  - corresponding related output.