CSC 696H Project Proposal

Sunghoon Kim
poizzonkorea@email.arizona.edu

February 3, 2022

1. Problem

- Country risk assessment: Assume an exporter that is dealing with a large number of foreign buyers. If a war or moratorium declaration in the buyer countries occurs, the exporter can suffer great financial damage, so it is essential to handle country risk. Most exporters use ratings from credit rating agencies such as Moodys and S&P or international organizations such as OECD rather than operating their own credit rating systems, since famous organizations' ratings are more reliable than custom ratings.
- Reasons for predicting country risk: Suppose a machine learning model that is trained to predict the country risk ratings of famous organizations in advance. The exporter using the ML model is possible to preemptively reduce the spread of exposure to countries where the country's credit rating is expected to be downgraded. Therefore it helps the exporter's business model to continue.
- The need for explainability of this problem: Financial judgment in companies needs the most conservative approach. This is because in the event of financial loss as a result of such judgment, it may lead to bankruptcy of the company. In addition, if the amount related to the judgment is bigger, the level of the decision maker becomes higher. Therefore, one of the important result in this project is that our ML model provides a user-friendly explainability for making the judgement.

2. Training Procedure

- Supervised Learning: Since 1999, OECD has been operating the country risk grade classification of all countries on a scale of 1 to 7. The country risk grading was recently changed 92 times until January 2022, and on average 4.3 times a year. In this project, I'll implement a ML model that predicts the OECD country grade.
- NLP with world news: I think the news is the first media that can recognize the latest information about the country. After training the factors affecting the change of OECD country grade by natural language processing of world news, it is applied to the test dataset to verify the model.
- NN with economic indicators: Economic indicators are inferior to news in terms of the freshness of information, but because those are composed of numbers and more structured data than the news, it is possible to efficiently analyze them with smaller data. Therefore, in addition to prediction using NLP, monthly or yearly economic indicators are analyzed with a neural network to predict OECD country grades, and then applied to the test dataset. Whether to use NLP and NN in combination or separately will be derived from the experiment results.

3. DataSet

- Source: The news comes from the google cloud dataset or newsdata.io. Also, economic indicators are referred from IMF, World Bank, or OECD.
- Target: Country risk grades of OECD.

4. Schedule

- Until mid-semester report: My project experience using NLP and Transformer Network is not enough, so my goal is to research on NLP and implement an initial model using NLP before the mid-semester report.
- After creating an initial ML model using NN by the end of March, I plan to derive an optimal NL model through various experiments such as a combination of NLP and NN for the rest of project period. Also, I will apply explainablity to the ML model at the same time.