**FIN580 Midterm Project**

**Goal:** Produce daily forecasts of realized volatilities for major stock indices (31 of them)

The forecasting starts from Feb, 1st 2020, but we will submit forecasts for the time period 4/23 ~ 5/15

**Data Given:**

3 features that are measured with daily frequency (open price, close price, realized variance based on 5-minute interval return).

Different index have different start and end date for the data -> needs to be processed.

**The form of database that we want to have: 3 tabular data frames**

Table for open price -> (31 columns for index, row are each trading day)

Table for closing price -> (31 columns for index, row are each trading day)

Table for realized variance -> (31 columns for index, row are each trading day)

* For indices that do not have full data back to Jan, 2,000, let’s just impute with zero

**Model to fit:**

Jacob, please feel free to provide any idea here.

**Thins to consider when building a model:**

1. **Potential Cross-Correlation** & **lead-lag effects** among different markets -> idea: use Vector Auto Regressive Model and use its estimate as new features.
2. **Potential Nonlinearities** caused by asymmetric response to bad/good news -> idea: basis expansion using up to 3rd moment (i.e. skewness of return)
3. **Potential structural breaks** over the sample -> idea: use Gaussian Process Time Series regression with kernels that can account for abrupt jumps and then use them as augmented features.

**Evaluation:**

1. MSE – Mean Squared Error
2. Evaluate the quality of your VAR estimate based on the paper that Caio provided.

**Expectation for the write-up:**

The written paper should generally have an introduction, a discussion of the data used, a discussion of the methods used, your results, a discussion of these results, and your conclusion. Please include any relevant tables and figures, and if you like, you can include an appendix for excess tables and figures.

**Practical Issues:**

1. Share Latex – let’s use share latex to produce the write-up.
2. Code sharing – Can you set up shared github repositories?