Macroeconomic and Financial Market Analyses and Predictions through Deep Learning

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What is this all about?

- New methodology (called as machine learning, deep learning, or AI) is known to be very good at prediction
- but what can they do about economic prediction or forecasting?
  - Macroeconomic data: low frequency, small data
  - Financial market data: high frequency, big data but quite noisy

- For low frequency small data, we may put outputs from many different algorithms together to get a distribution of a prediction result: ensemble learning

- For high frequency and noisy data, we can extract latent common factors from as many series to regenerate as many denoised series to train an algorithm to get a distribution of a prediction result: Bayesian learning

Macroeconomic Data

- A month is a long interval to train a machine
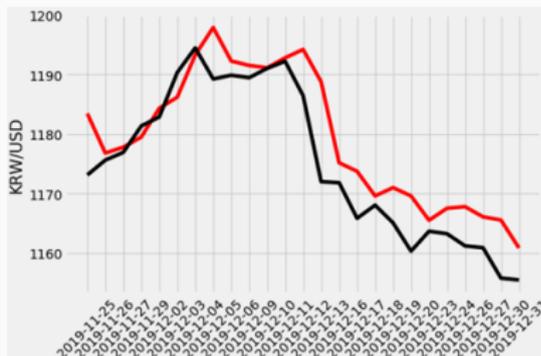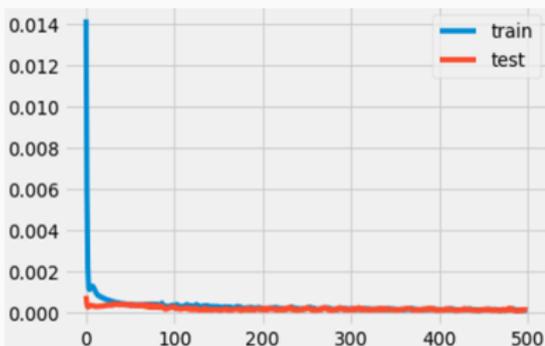 - "They are dogs"…..

(A month later) "It's a cat"

- High frequency does not help
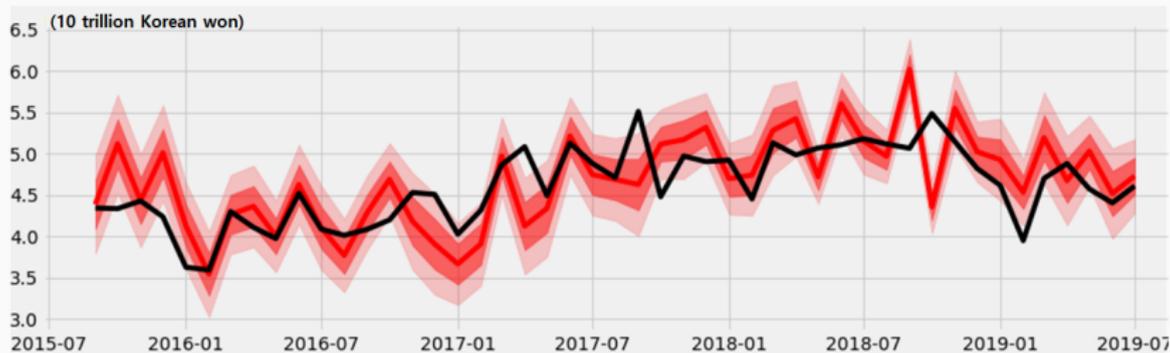 - cat? bear? rabbit?

Overfitted When trained

- LSTM (Long and Short Term Memory) to prediction of daily Korean won/US dollar exchange rates
  - learning curve looks fine, prediction shows over-fitting
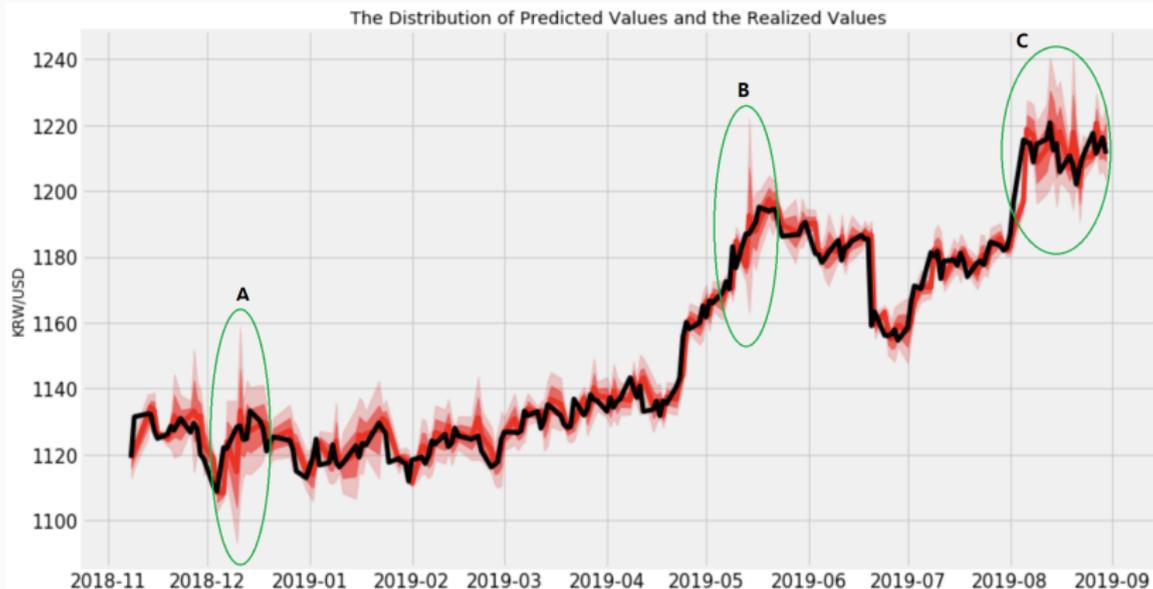 - no prediction power

- Korean Custom Clearance Exports (YoY), University of Michigan
  Consumer Sentiment Index (YoY), US Economic Policy Uncertainty
  Index (YoY)

Prediction of Korean monthly nominal exports with the distribution of predicted values

Korean won/US dollar Exchange Rates Prediction

- The results from an ordinary MLP trained with the latent common factors for Korean won/US dollar exchange rates extracted from 10 different major currencies exchange rates

The Distribution of Predicted Values and the Realized Values

A, B, and C

- **A** (Dec 7 to 8, 2018):
    - The Canadian authority arrested CFO of Huawei upon the request of the US
    - Trade friction between US and China was aggravated

- **B** (May 13 to 14, 2019):
    - Concerns over Chinese yuan depreciation over 7 against US dollar exchange rates

- **C** (Aug 2019):
    - Saying that the trade deal between US and China might be cancelled
    - Chinese government defined Hong Kong demonstration as the terrorism
    - Chinese yuan depreciation over 7 against US dollar