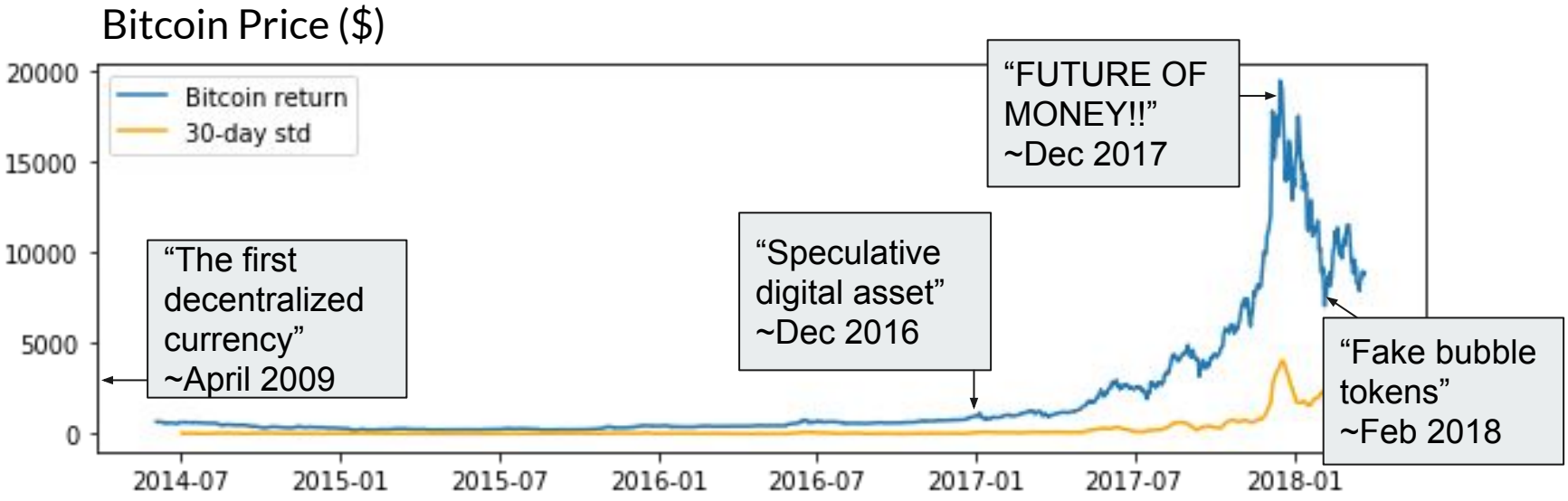
Predicting Bitcoin Returns

Perry Chu

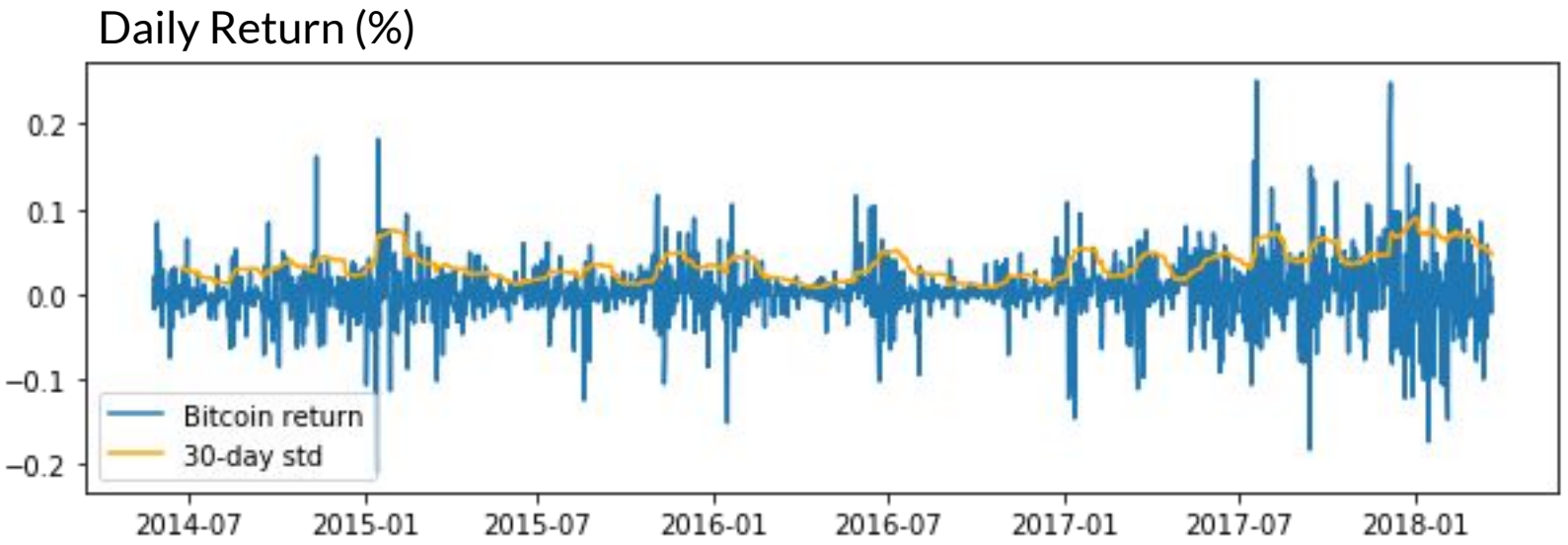
Bitcoin History



An interesting data challenge!

Possible to predict returns?

Predict tomorrow (return @ t+1) given data today (return + features @ t, … , t-n)



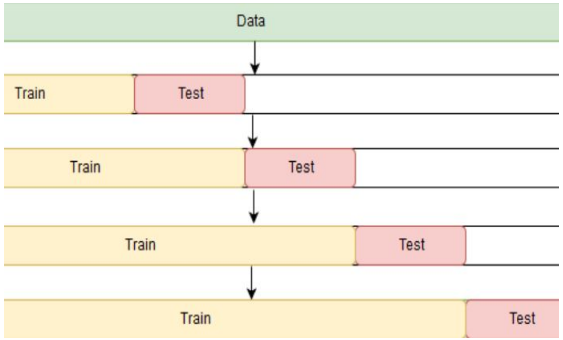
Pipeline

1. **Data Acquisition & Processing**
   - Daily change
   - Lag data
2. **Feature & Model Tuning**
   - Find useful inputs
   - Capture relationships
3. **Model Validation**
   - R-squared
   - Rolling validation

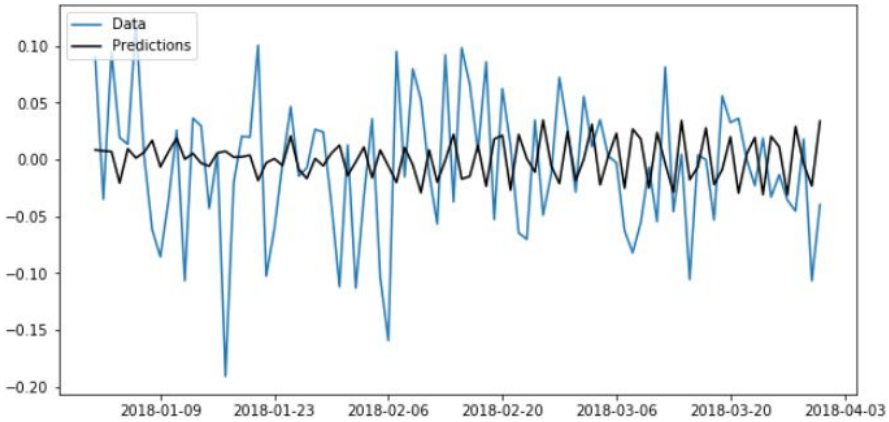
coin metrics

YAHOO! FINANCE

Google Trends



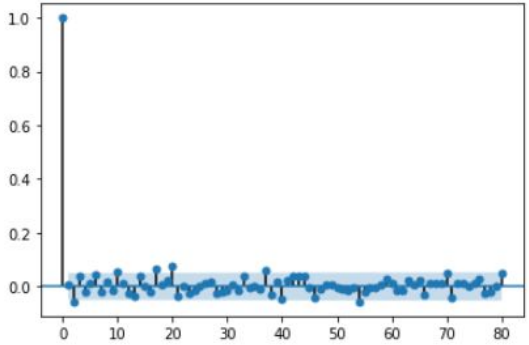
Baseline: Past Returns & Errors -> Future Return



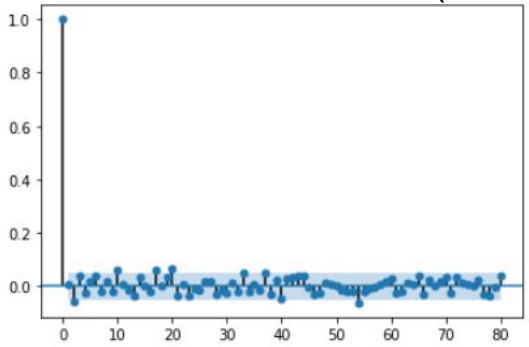
ARMA Limitations

- Assumes a generative process, doesn't address external changes
- Assumes stable volatility

Auto-correlation (ACF)



Partial Auto-correlation (PACF)



Looking for signal... more features?

Bitcoin Features

- Exchange volume
- Live transactions
- Mining fees

“Alt-coin” Prices

- Litecoin
- Ripple
- Monero
- Dash

External Indices

- S&P 500
- Gold
- USD
- Google search trends
  “Bitcoin”
  “Blockchain”

Looking for signal… better representation?

1. Predict Training Mean
2. ARMA

Baseline
(Past Returns Only)

3. Linear Regression

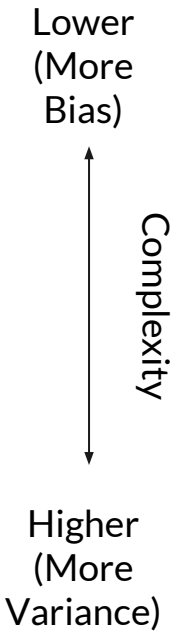
External factors

4. Trees
   - Random Forest
   - Gradient Boosting

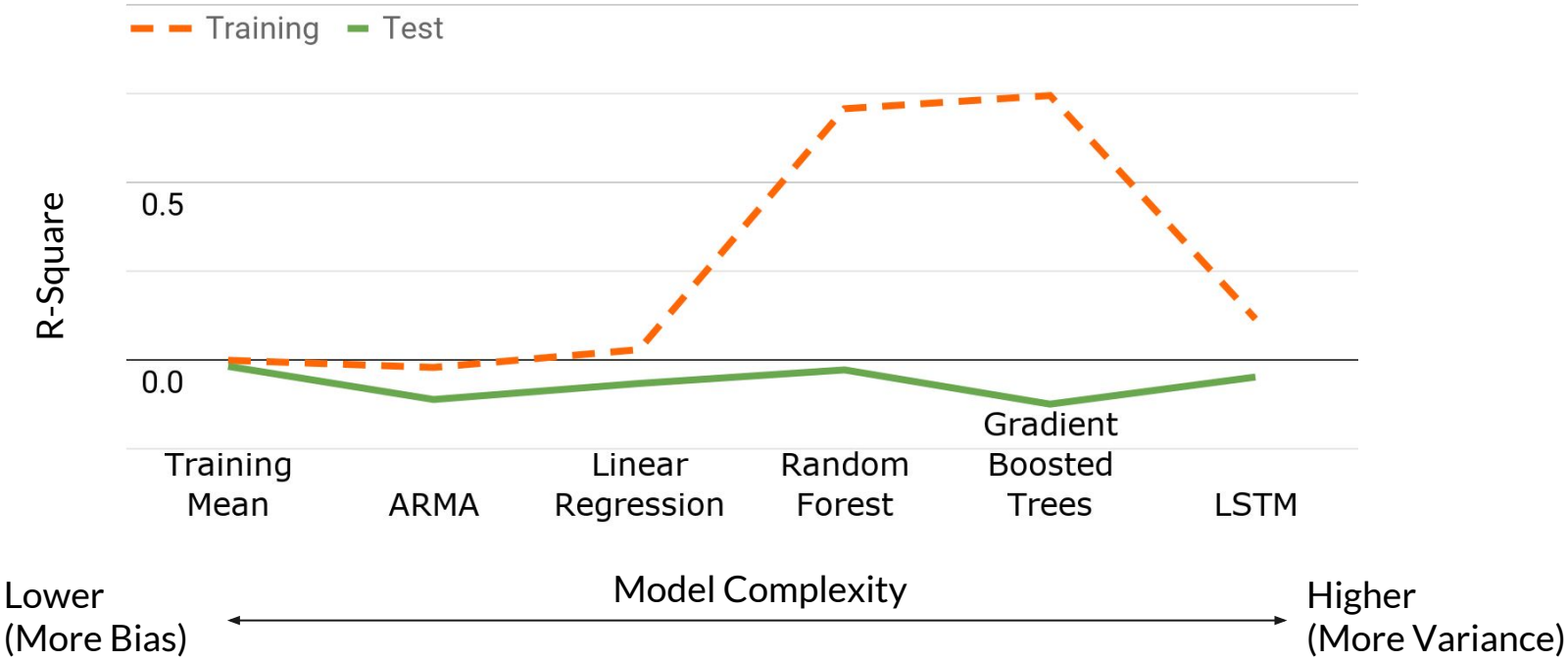
Non-linear representation

5. LSTM

Recurring structure



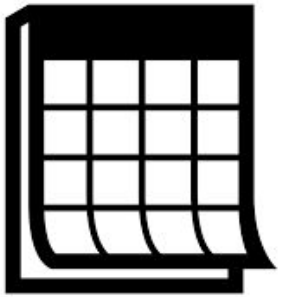
Results: Limited signal in data



Conclusions

Limited signal

- Current data doesn’t capture relationship to future
- Proven out by thorough analytical process



Future work

- Reframe question: classify positive / negative returns
- Prediction over longer time frame
- Apply techniques on other time series

Thank you!

a.perry.chu@gmail.com

/in/perrychu

github.com/perrychu

Perry Chu
CS @ Carnegie Mellon
Former consultant / business analyst