Hands-On Introduction to Data-Science in Investment Management

CFA Society of Columbus
October 27th 2020

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- **UCLA**, 2001-2005
  - Applied Mathematics, Specialization in Computing
- **American Century Investments**, 2005-2019
  - VP & Senior Quantitative Analyst
  - Quantitative Equity Group: Managing ~ $12B AUM, across a range of Long-Short, Long-Only, Domestic, International products
  - Built & Managed the Data Science & Analytics Team
  - Research Focus: Sentiment signals, economic networks, trend-detection, intangible assets, and other non-financial indicators
- **Investment Management Consultant**, Present
  - Help investment teams get more out of data, analytics, and technology.

Contents

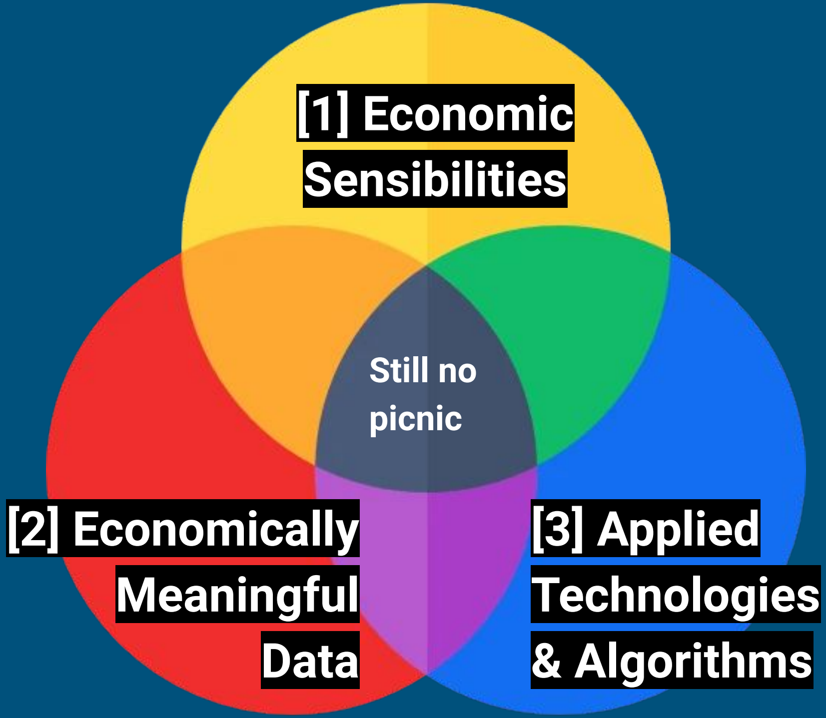
Practical Perspectives on Investment Data-Science

(but mostly just personal opinions)

Start with the Investment Problem First

Data-Science & Technology are a Means not an End

- **Without economic sensibilities there is no anchor for understanding performance, incorporating feedback, and communicating with clients.**
- **Overfitting is the enemy**
- **A Data-Set is not a stock-selection idea**
  - Like any other piece of information: it's how about how you contextualize it into your unique process



My Evolving Quant Research Stack

Big Data Storage, Processing & Power Tools:	**AWS** (S3, Athena, RDS, DynamoDB, EC2, Lambda, ElasticSearch)... with nothing against Google or Azure, but as you do more, it becomes more cost-effective to pick one.
Data Engineering, Web Interfacing & Modelling:	**Python** (but that doesn't mean R can't handle it, it's just a bit more work to make it play nice with other systems).
Interactive Development Environment (IDE):	**Pycharm** for python data/model work; **rStudio** for everything R
Analytics & Data-Exploration:	**RStudio** is great (tidyverse makes analysis easy), but I still use python because I don't want to manage two environments.
Reproducible Research Reports:	**Jupyter Notebook** & **R Markdown** (note: these are amazing tools, but not development environments!!!)
Interactive Dashboards:	**Tableau** for traditional dashboards & canned reports (powerful charts in no-time); **Shiny/Dash/Flask** for highly customized research applications (endlessly flexible);

How to Get Started?
Little Steps That Add Up

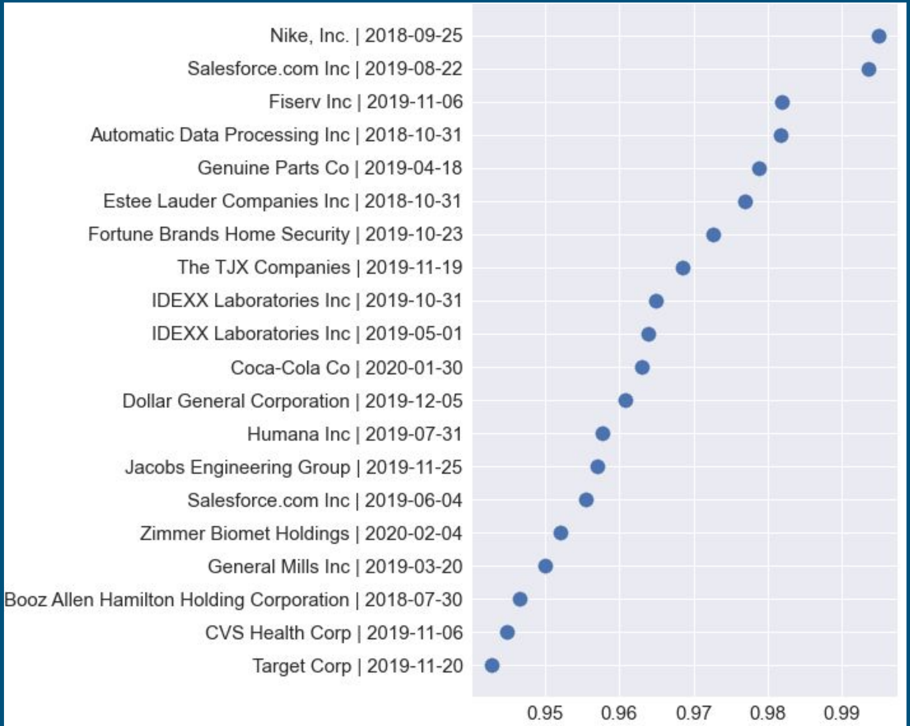
1. **Champion a data-driven culture** and awareness of modern investment applications of data & technology
   - Meaningfully connect data technologists with investment management
2. **Start with a small, targeted, actionable investment idea** or business-process-improvement
   - Avoid big splashes, mass hirings, and giant meetings
3. **Evaluate the value**, the costs, and learn from the pain points
4. **Repeat Steps 1 through 3**
   - Adding resources (talent, data, and technology) along the way

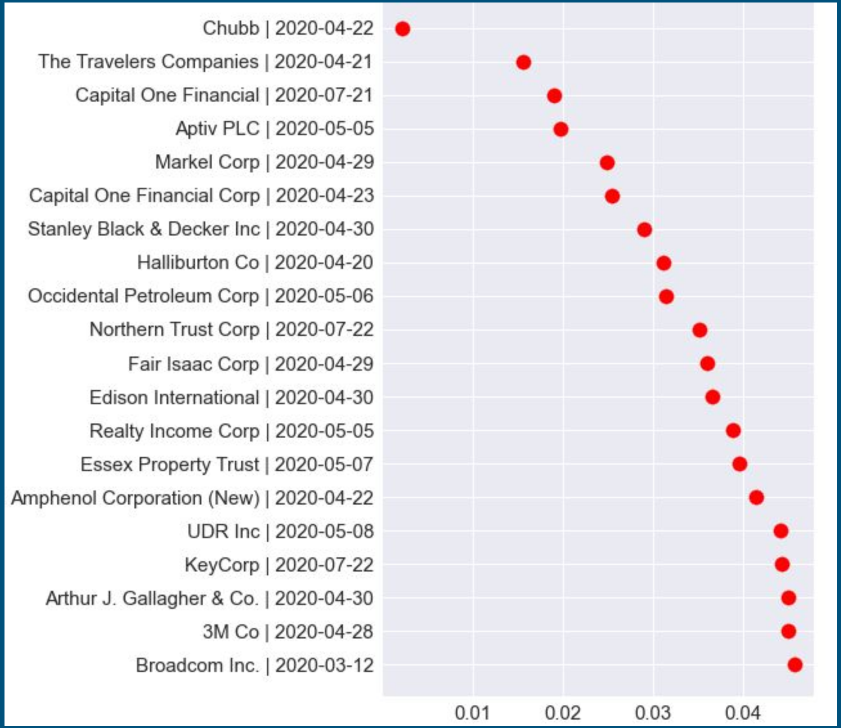
Hands-On Introduction
Textual-Analysis w/ Conference Calls

Part I: Data Sourcing & Structuring
Part II: Three Sentiment Models
Part III: Exploratory Analysis

https://github.com/talsan/calltone

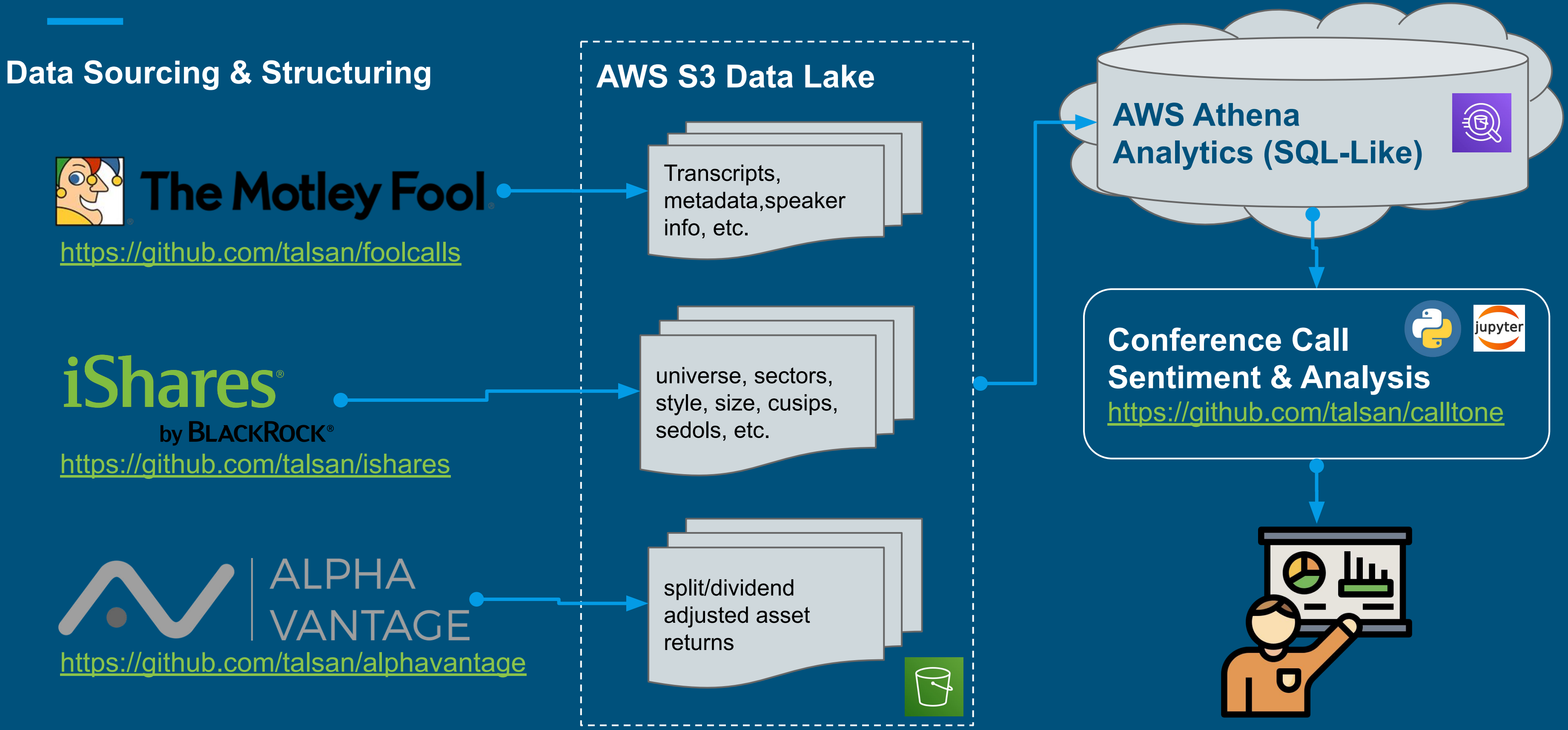
Top / Bottom Sentiment Conference Calls
Over the Last Two Years





… so how did we get here?

Part II: Quant Research Data Flow



Appendix

Appendix A: Building & Cultivating
an Investment Data-Science Team

Hiring Talent

- Find candidates who show genuine interest in the investing domain
- Set realistic expectations
- Don’t get too hung up in specific programming languages or technologies

Cultivating Talent

- Tightly integrate Data scientists and technologists with their investment peers
- Align incentives and blur the multi-disciplinary lines because **it’s all connected** -- data, research, portfolio management, analytics -- and serving a common goal

Appendix B: Applications of Conference Calls

Investment Applications

1. **Tone:**
   Reflects management's optimism (or pessimism) about future prospects

2. **Communication Quality / Manipulation:**
   Are they exaggerating? Obfuscating? Omitting key information?

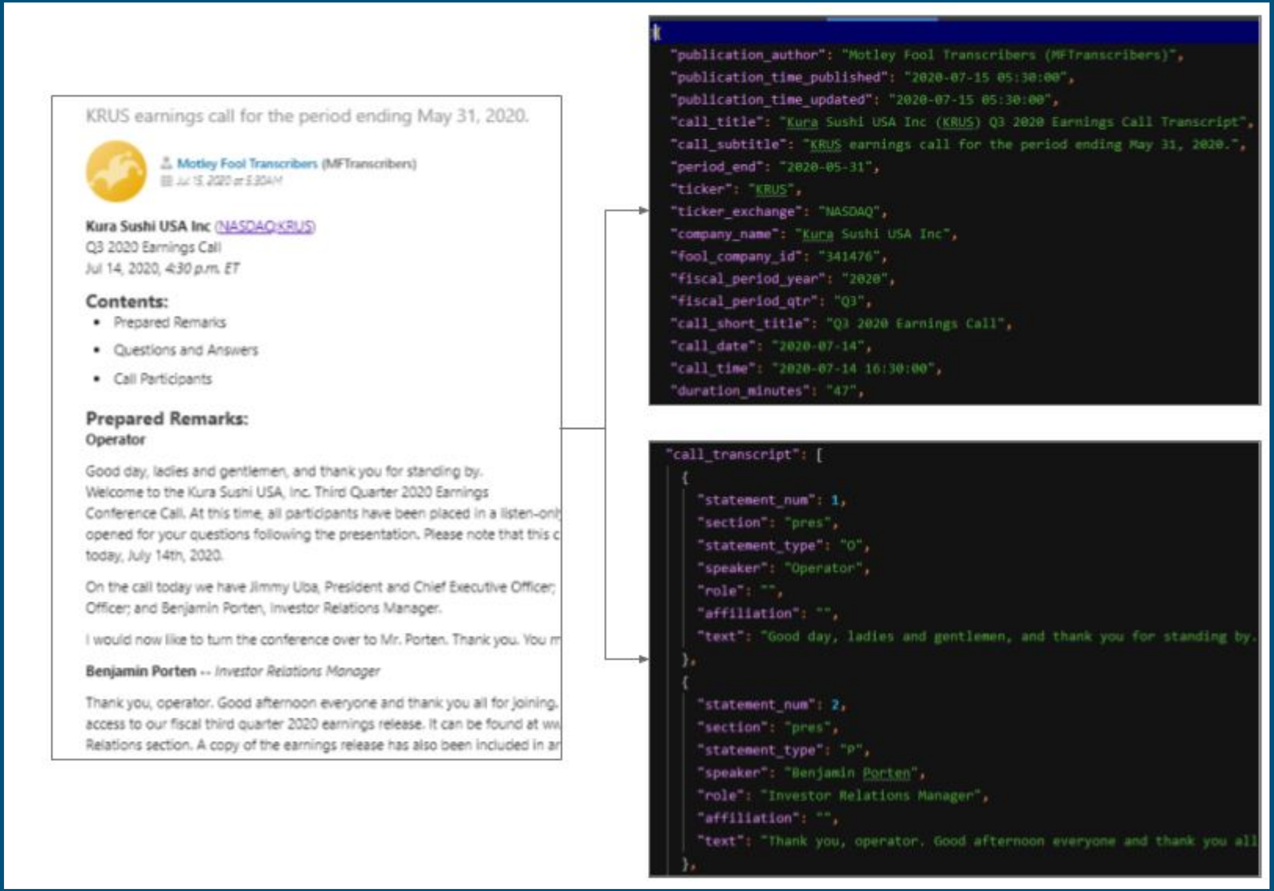
3. **Linkages & Text-Based Peer Groups**

4. **Emerging Themes / Topic Analysis**

Contextual Integration

- **How might this help a quant?**
  - Adds much needed context/“color” to a framework that (usually) invests on numeric/trailing information.
  - Ability to scale systematic insights
- **How might this help a fundamental team?**
  - Bubble up “needle in the haystack” red-flags or insights (especially among less covered names)
  - Streamline research process
  - Provide a “2nd opinion” and potentially reveal biases

Appendix C: Fool.com Structuring Example



Call-Level Meta-Data

Transcripts
(with speaker and
statement metadata)

Appendix D: AWS Athena Screen Shot