



COMPUTATIONAL FINANCE & RISK MANAGEMENT

UNIVERSITY *of* WASHINGTON

Department of Applied Mathematics

A Day in the Life of Prop Traders Highlights from R in Finance 2017

CFRM 522

Introduction to Trading Systems

A Day in the Life of Prop Traders

- Visit to *DV Trading* day before *R in Finance* conference, 2017
- Met with Brian Peterson and his group
 - Research and trading
 - Group of ~five total
 - Maintain the quantstrat, blotter, and quantmod R packages
- Research, test, and then implement systematic trading models
- Once implemented, strategies are left to run on their own
 - However, there is constant monitoring of market and political news that may affect strategies
 - Parameters in models may be modified in response
 - Or, a strategy may be pulled altogether, as we have discussed
 - Upshot: working in quant finance is not all math and programming; you need to have an understanding of current events and the ability to comprehend news reports adequately to work in this field!

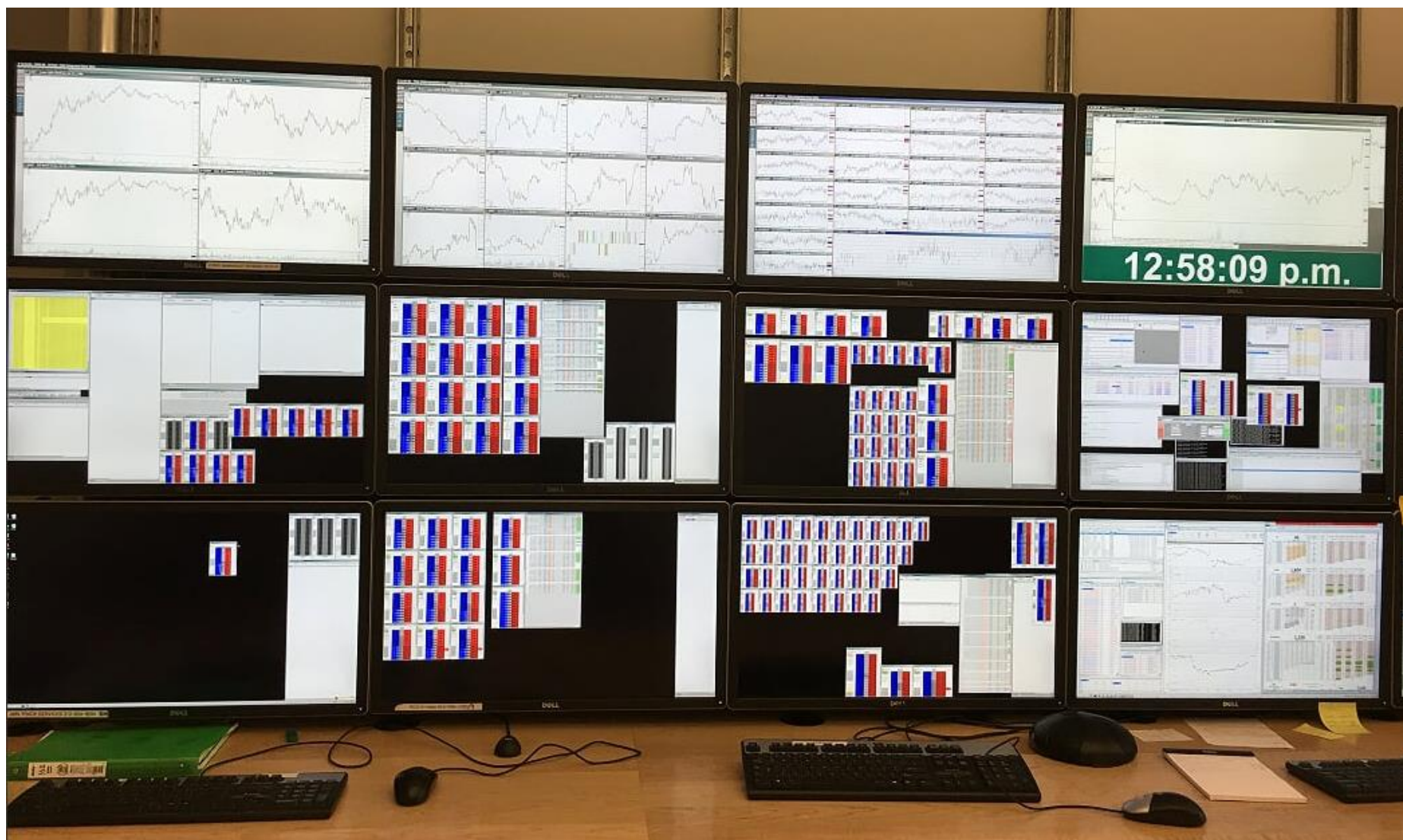
A Day in the Life of Prop Traders

- Quantopian vs quantstrat
 - Quantopian useful for individual investors
 - To work with advanced strategies in research papers and actual practice, need more power as provided in quantstrat and R
 - It is “bleeding edge” technology, but this is common in practice
 - New features and bug fixed pushed out rapidly to GitHub repository
 - The blotter package is in very wide use (even larger than quantstrat)
 - Much more in real world strategies beyond market orders
 - Will also need for 523:
http://braverock.com/brian/uw_course_overview.html
 - 2019 update: QuantConnect, however, has developed into a robust tool
- Servers co-located on exchanges (central location in suburbs)
- Minimized latency just as important or more so for exiting orders as quickly as possible (eg on bad news), vs executing buy orders within microseconds

A Day in the Life of Prop Traders



A Day in the Life of Prop Traders – Order Books!

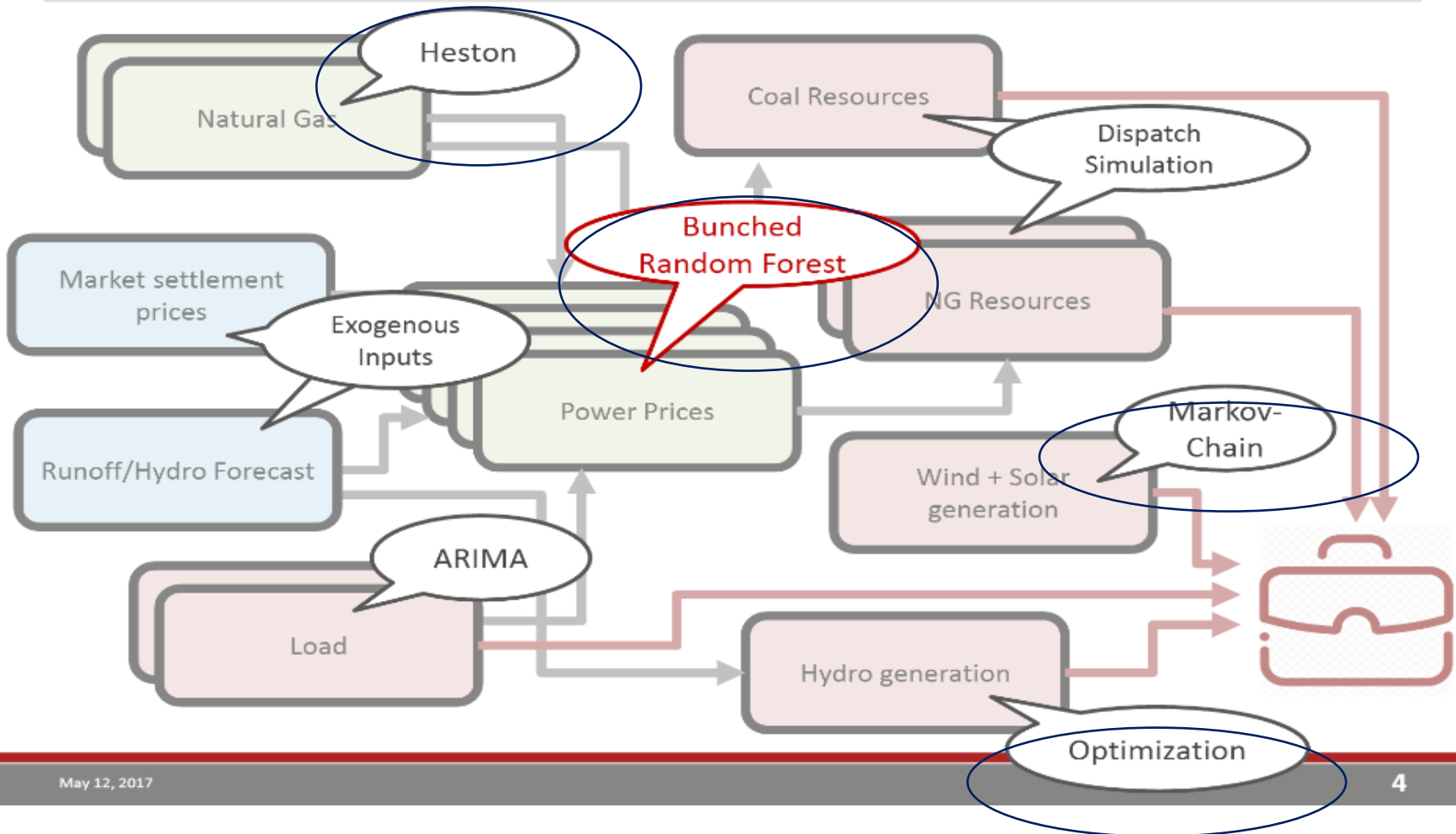


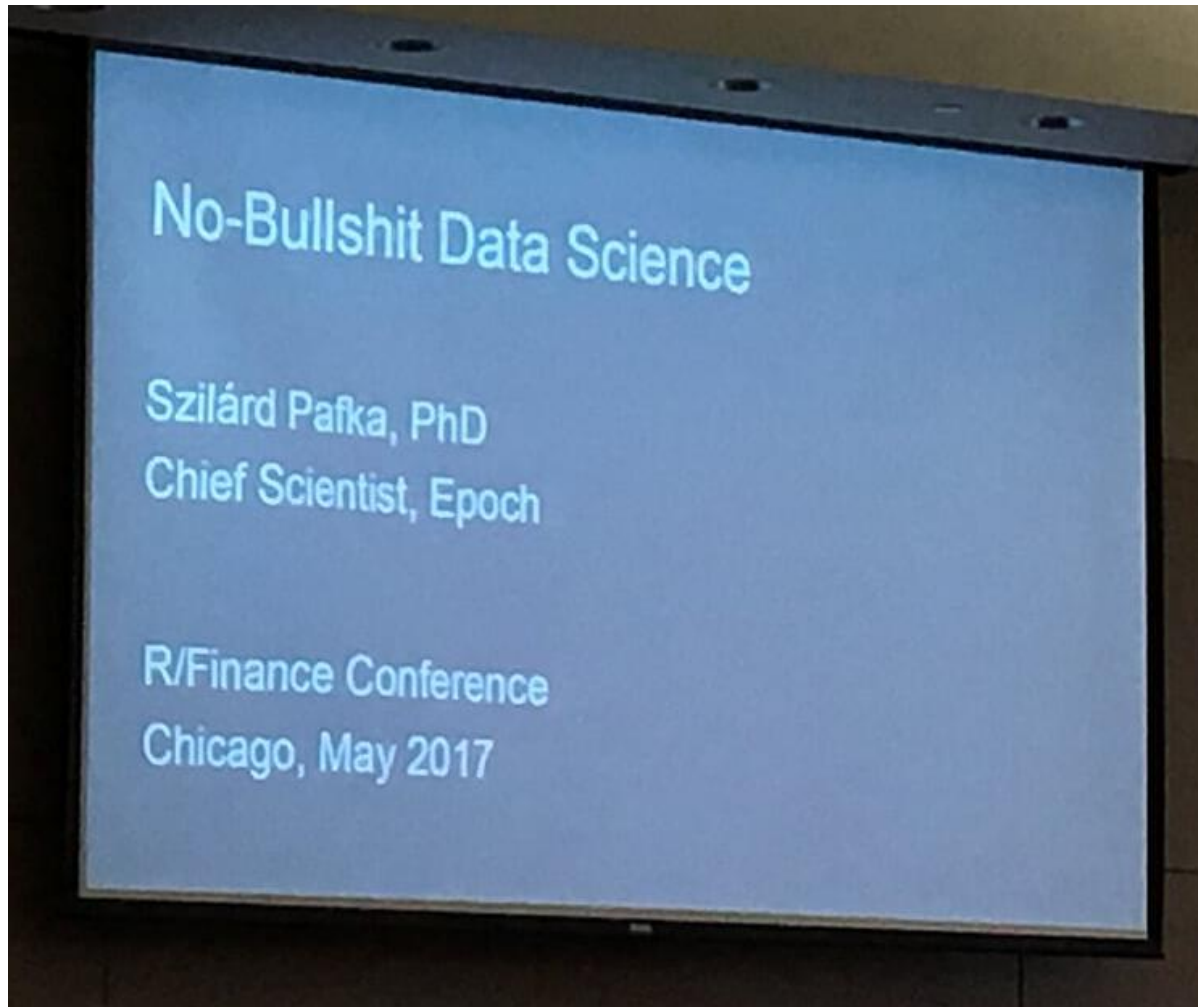
R in Finance – Selected Speakers and Topics

- Data science/predictive analytics-related talks:
 - Szilard Pafka: *No-Bullsh*t Data Science*
 - <https://www.slideshare.net/dominodatalab/nobullshit-data-science>
 - Eina Ooka (The Energy Authority, Bellevue WA): *Bunched Random Forest in Monte Carlo Risk Simulation*
 - <https://github.com/einaooka/R-Finance2017/blob/master/Bunched%20Random%20Forest%20in%20Monte%20Carlo%20Risk%20Simulation.pdf>
 - Thomas Zakrzewski: *Using R for Regulatory Stress Testing Modeling*
- Bernard Pfaff: R package: mcrp: Multiple criteria risk contribution optimization
- Options/Volatility/Return Distributions:
 - Oliver Haynold (CME): *Practical Options Modeling with the sn Package, Fat Tails, and How to Avoid the Ultraviolet Catastrophe*
 - Luis Damiano: *A Quick Intro to Hidden Markov Models Applied to Stock Volatility* (uses R Notebooks in R Studio)
 - Xin Chen: *Risk and Performance Estimator Standard Errors for Serially Correlated Returns*
 - <https://github.com/rstats-gsoc/gsoc2017/wiki/Risk-and-Performance-Standard-Errors-for-Serially-Correlated>Returns>
 - Emanuele Guidotti: yuimaGUI: A graphical user interface for the yuima package
- Daniel Kowal: *A Bayesian Multivariate Functional Dynamic Linear Model – MCMC & Gibbs Sampling to model term structures*

- Portfolio Strategies/Risk
 - Jason Foster: *Scenario Analysis of Risk Parity using RcppParallel*
 - Eric Glass: *Equity Factor Portfolio Case Study* (Heston Model)
- GARCH/Time Series
 - David Ardia: *Markov-Switching GARCH Models in R: The MSGARCH Package*
 - [https://github.com/rstats-gsoc/gsoc2017/wiki/Markov-Switching-GARCH-models-\(MSGARCH\)-in-R](https://github.com/rstats-gsoc/gsoc2017/wiki/Markov-Switching-GARCH-models-(MSGARCH)-in-R)
 - Keven Bluteau: *Forecasting Performance of Markov-Switching GARCH Models: A Large-Scale Empirical Study*
 - https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2845809

MC Simulation Approach





No-Bullshit Data Science

Szilárd Pafka, PhD
Chief Scientist, Epoch

R/Finance Conference
Chicago, May 2017

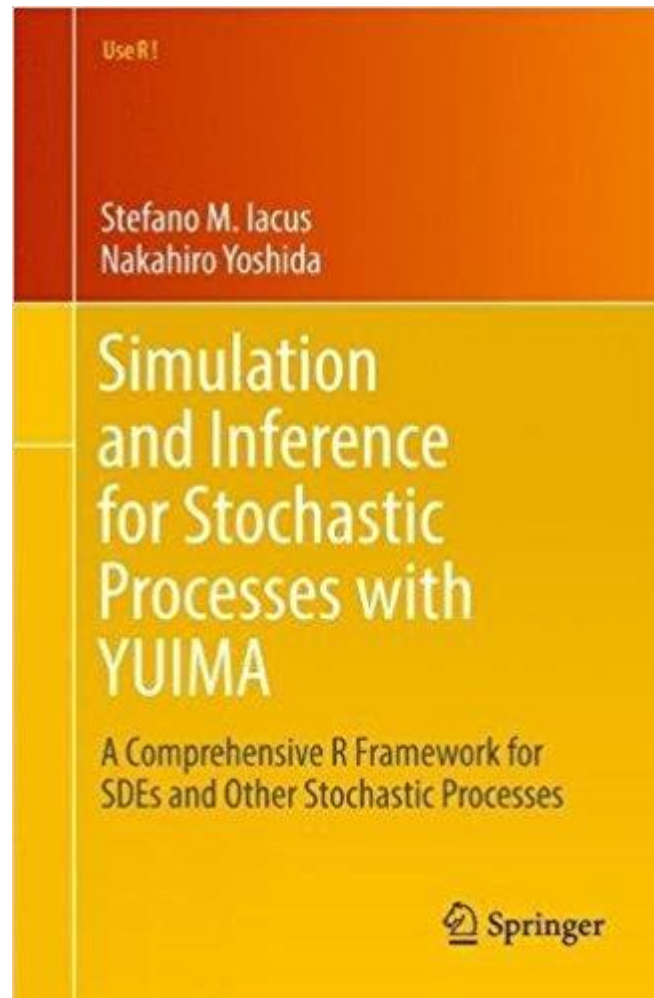
- Same talk from another conference:

<http://www.ustream.tv/recorded/92448101>

The yuima package/project

- The Yuima Project is an open source and collaborative effort aimed at developing the R package named yuima for simulation and inference of stochastic differential equations.
- In the yuima package stochastic differential equations can be of very abstract type, multidimensional, driven by Wiener process or fractional Brownian motion with general Hurst parameter, with or without jumps specified as Levy noise.
- The yuima package is intended to offer the basic infrastructure on which complex models and inference procedures can be built on.
- J-Stat article: http://www.ms.u-tokyo.ac.jp/~nakahiro/kenkyu_gaiyou/article-new.pdf
- Presented at the conference was a convenient GUI for the package, developed by Emanuele Guidotti
- Cool video overview: https://www.youtube.com/watch?v=XX_bmCrI_gc
- “YUIMA” represents the initials of the package authors
- “Yuima” (維摩) is also the Japanese name for the Buddhist figure Vimalakirti
 - A wealthy and well-educated family man from the central Indian town of Vaisali
 - Was a paragon of Buddhist virtues despite his worldly attachments
 - As such, he was a favorite figure with Buddhist people particularly in China and Japan with their strong cultural emphasis on family responsibility (<http://www.aisf.or.jp/~jaanus/deta/y/yuima.htm>)

- There is also a book that was subsequently published on yuima:



Opportunities for You

- Have an idea, or working on a research project? Write an R package!
 - Put on GitHub
 - Submit to CRAN
 - Present at R in Finance next year
- Is there a useful R package you would like to see improved?
 - Get involved – write enhancements and submit pull request
 - Need better performance? Use C++ and Rcpp to replace the R code
- Would you like better documentation for an R package you use?
 - Write a blog post
 - Write a vignette and submit to the package author
 - Recognition on your CV