What’s New in Computational Finance

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What’s new in MATLAB Computational Finance Products

Access
- Files
- Databases
- Datafeeds

Research and Quantify
- Data Analysis and Visualization
- Financial Modeling
- Application Development

Share
- Reporting
- Applications
- Production

**CFS = MATLAB Computational Finance Suite**
Risk Management Toolbox

➢ Market Risk
  ➢ Value-at-Risk Backtesting Tools
  ➢ Expected Shortfall Backtesting

➢ Consumer Credit Risk
  ➢ Binning Explorer for Credit Scorecards
  ➢ Stress Testing of Consumer Credit Default Probabilities Using Panel Data

➢ Corporate Credit Risk
  ➢ Estimate credit portfolio losses by simulating credit rating migrations or corporate defaults based on multifactor copula model
  ➢ Asymptotic Single Risk Factor (ASRF) model
  ➢ Quantify credit concentration risk by Herfindahl index and other measures
Backtesting Market Risk Models

➢ The varbacktest suite supports:
   ➢ Binomial test
   ➢ Traffic light test
   ➢ Kupiec’s proportion of failures (POF) and time until first failure (TUFF) tests
   ➢ Christoffersen’s interval forecast tests
   ➢ Haas’s time between failures test

➢ The esbacktest suite supports table-based tests for the unconditional Acerbi-Szekely test for both Normal and T critical values

➢ The esbacktestbysim suite supports simulation-based tests for expected shortfall backtesting
Financial Instruments Toolbox

- Compute prices and sensitivities using Heston, Bates, and Merton76 models with FFT and numerical integration
- Calculate prices and sensitivities using Cox-Ingersoll-Ross trees.
- Haug-Haug-Margrabe and Turnbull-Wakeman model for continuous arithmetic fixed options
- Normal and Shifted SABR models for caps, floors and swaptions.
Calibrating a Heston Model

- Use `optByHestonFFT` to price the options
- Compare the results using a standard gradient-based solver (`lsqnonlin`) and a derivative-free solver (`particleswarm`)
- Improve performance using the Parallel Computing Toolbox

\[
dS_t = (r - q)S_t dt + \sqrt{v_t} S_t dW_t
\]

\[
dv_t = \kappa(\theta - v_t)dt + \sigma \sqrt{v_t} dW^v_t
\]

\[
E[dW_t dW^v_t] = pdt
\]
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Database
- Financial
- Financial Instruments
- Statistics and Machine Learning
- Curve Fitting
- Text Analytics

Econometrics
- Risk Management
- Optimization
- Global Optimization
- Neural Network

MATLAB Report Generator
- MATLAB Production Server
- MATLAB Compiler SDK
- MATLAB Compiler
- GPU Coder

MATLAB Distributed Computing Server
- Parallel Computing

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Econometrics Toolbox: What’s new?

➢ Econometrics App (R2018a)
➢ Discrete Time Markov Chain (R2017b)
➢ Vector Error-Correction (VEC) Model: Analyze cointegrated multivariate time series including exogenous predictors (R2017b)
➢ Bayesian Linear Regression: Analyze posterior distributions of random parameters in multiple regression models (R2017a)
➢ Vector Autoregressive Model: Analyze multivariate time series data including exogenous predictors (R2017a)
Econometrics Toolbox

What’s New?

Existing

- Iterative coding
- Time consuming to prepare data/develop models
- Need to produce visualization by yourself

R2018a

Econometric Modeler App

- Easy to use guided model development
- Built in diagnostics/visualizations
- Generate MATLAB Code to reproduce/automate workflow
New Twitter API in Datafeed Toolbox

Historical Tweets and access to Twitter® REST API endpoints

- Search for Tweets by strings
- Retrieve historical Twitter data for sentiment analysis modeling
- Tweet programmatically
Data Connectivity (Datafeed and Trading) R2018a

- Thomson Reuters Tick History/Datascope support R2018a
- Wind support R2018a
- Ravenpack RPA 1.0 (File Exchange, Spring 2018)
Data connectivity (Datafeed and Trading)

R2015a - R2017b

- Interactive Brokers interface enhancements for custom event handlers and market depth, contract details, trade execution records, and portfolio data R2015a
- Bloomberg Data License support R2015a
- Ravenpack News Analytics Interface R2015b
- Bloomberg portfolio access R2015b
- FIX Flyer Integration R2015b
- FIX Data Support R2015b: Convert between structure arrays and tables to and from FIX messages
- Bloomberg multiple order routing functionality R2015b
- STATS.com R2016b
- money.net R2016b
- Transaction cost analysis R2016a, R2016b, R2017a
- Thomson Reuters Elektron R2017a
Database Toolbox

- Database Explorer app
  - Visually explore relational databases without knowing SQL

- Easily interact with MongoDB
  - Import data stored in a collection of documents in MongoDB for analysis in MATLAB

- `splitsqlquery` function
  - Split a SQL query into multiple SQL page queries to access large amounts of data
Database Toolbox R2016b - R2017b

Work easily with both structured and unstructured databases

- Retrieve graph data from Neo4j Graph Database R2016b
- Native-ODBC ready to replace JDBC-ODBC bridge R2017a
- MongoDB Support Package R2017b
- DatabaseDataStore & Tall Integration R2017b
- SQL Speaking methods R2018a
- Neo4j upgrade .. Write capability, support for multi-relational graphs R2018a
Thank You!

Questions?