Jellen VERMEIR

SUMMARY

Jellen graduated as a computer engineer and subsequently completed several high impact government projects as a business analyst in Brussels. Jellen then made a career shift towards quantitative finance and obtained an additional degree in financial and actuarial engineering. He completed this advanced education track while simultaneously working on his personal startup projects related to algorithmic trading and quantitative fund management. Additionally, Jellen also received an award from Belfius bank Belgium for his academic research on financial risk measurement modeling and forecasting. Jellen has recently founded Essential Data Science Consulting ltd. (EssentialQuant) and is now providing high profile consultancy services towards the industry as a data scientist and/or quantitative analyst.

PERSONAL INFORMATION

- International Coverage
- +32 473 47 48 59
- jellenvermeir@essentialquant.com
- http://www.essentialquant.com

EXPERIENCE AND BACKGROUND

AREAS OF EXPERTISE

- Business Analysis (Agile, Waterfall)
- Structural and Behavioural Software Design Patterns: OOA / OOD, UML
- Business Intelligence & Data Analytics
- Statistics and Predictive Modeling
- Machine Learning and AI
- Time Series Analysis
- Asset and Portfolio Management
- Algorithmic Trading
- Quantitative Risk Management
- (Robust) Mathematical Optimization
- Financial Engineering (Options & Derivative Pricing, Fixed Income, ..)

RECENT PROJECTS

- IT and Data Science Contracting.
- Full lifecycle management of a quantitative hedge fund startup.
- R&D of statistically validated financial risk forecasting tools.
- Structuring and hedging of financial derivative products (options, FIS)
- Setting up a securities master database containing stock & fin. data
- Design and implementation of an MT4 FX strategy development framework.
- Claim arrival, loss severity and claim frequency modeling (Insurance)
- Preparation and Production Execution of Pension Right Mass Adaptations

BUSINESS SECTORS

- Information Technology
- Statistics
- Financial Services
- Banking
- Asset & Portfolio Management
- Hedge funds

TOOLS & METHODS

- MS Office Suite
- Java SE / EE
- C / C++ / Cuda
- R / JRI
- Matlab
- Python / Django
- SQL / ER modeling
- Windows
- AWS / RDS
- Scrum, Stories
- Sparx EA (UML)
- Jira

EDUCATION

University of Ghent (BE)
Msc. In Computer Science Engineering: ICT (Cum Laude) – 2011
Catholic University of Leuven (BE)
Advanced Msc. in Financial and Actuarial Engineering (Cum Laude) – 2016
Stanford University (USA)
Graduate Certificate in Artificial Intelligence: Four courses - Enrolled

LANGUAGES

- Dutch – Mother tongue
- English – Fluent
- French – Professional proficiency

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MAIN ACHIEVEMENTS

EssentialQuant ltd.	Researcher / Developer	Jan. 2017 - Ongoing

CryptoCurrency Trading Research (View Github Repository)

Research and Development Objectives:

- Use in-house developed optimization tools and timeseries models to analyze and trade highly volatile cryptocurrency trading markets.
- Obtain community exposure through open-source package release (CRAN)

Responsibilities and key achievements:

- Re-calibrate Egarch-Copula models to capture the volatility behaviour and dependency structure of digital asset timeseries.
- Backtest statistical arbitrage (cointegration) trading strategy: Bitcoin versus side-chains and Ethereum.
- Gaining significant insight into Blockchain technology, decentralized apps, smart contracts and their potential future impact on society.
- Writing an R client wrapper for the Poloniex REST trading API – Open source release through CRAN submission.

Value Creation

- Combining well-performing trading strategies with sound risk control measures has potential for spectacular risk-adjusted returns (impossible to obtain on more traditional markets)
- Lucrative short-term trading returns on cryptocurrency trading account.

EssentialQuant ltd.	Independent Contractor	Jan. 2017 - Ongoing

Algorithmic Trading Consultant – IT and Data Science Support

Project Summary

- Client is an active player on the commodity trading markets.
- Company data is currently inaccessible from R/Python. Transparent data access should be provided to traders and analysts (“users”) in order to facilitate further data analysis and modeling.

Approach

- Hide database complexity from users - Create a simplified conceptual business view on top of the technical database layer.
- Implement business view logic (Python) and encapsulate inside a server side Django framework - Expose functionality through REST.
- Encapsulate Django into IIS server - Allow interation with legacy C# .NET trading systems and data feeds.
- Implement client-side R/Python packages - Set up custom in-house package repositories and allow user access.
- Create technical architecture for the model deployment process.

Value Creation

- Data access from R/Python is now possible – This milestone allows for better data analysis, market insight and associated trading profits.

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MAIN ACHIEVEMENTS

EssentialQuant ltd	Quantitative Research and Development	Jan. 2016 - Ongoing

Quantitative Hedge Fund Startup – RiskResTrained Fund

Project Summary

The EssentialQuant RiskResTrained fund is a quantitative hedge fund that is currently in startup phase. The fund will become operational and attract institutional investors starting Q2 2018.

Approach

- The predictive trading models in the pipeline mainly consist of machine learning ensembles.
- The portfolio management system of the fund employs a Bayesian approach in combination with robust convex optimization procedures to mix the market distribution with strategy signals.
- The transaction cost optimizer implements reinforcement learning techniques.
- The fund adopts a risk centric asset allocation process.

Value Creation

- Outperforming the market and corresponding benchmark indices.
- Achieving a sharpe ratio of 1.6 over a 15 year period. This includes transaction cost and market impact models.
- Protecting capital investment through portfolio-level risk targeting.

Responsibilities as Company Founder

- Project ownership - Motivation, Ambition and Drive.
- Exposure to operational and business aspects.
- Managing the complete project and software lifecycle.

Responsibilities as Quantitative Researcher

- Strategy Development (Machine Learning)
  - Trend prediction (R-ANN / SVM / K-Means / KNN)
  - Boosting and model stacking
  - Model validation / Cross validation
- Portfolio and Mathematical Optimization
  - Robust Convex Optimization (uncertainty sets, minmum CVaR)
  - Bayesian modelling (Black Litterman, Entropy Pooling)
- Risk Management Modelling
  - Time Series Analysis (eGarch / Copula dependency modelling)
- Transaction Cost Optimization
  - Reinforcement Learning (Q-learning, Value iteration)

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MAIN ACHIEVEMENTS

EssentialQuant ltd	Quantitative Research and Development	Jan. 2016 - Ongoing

Design of an Algorithmic Trading R&D Framework

Project Summary

The EssentialQuant Algorithmic Trading R&D Framework is a flexible research, backtest and trade execution framework. The framework is fully customizable to streamline and robustify algo-trading R&D efforts.

Approach

- Decouple individual fund components via modular design. All components act as independent input/output systems that are subsequently coupled together through underlying framework functionality.
- Expose high level functional interfaces to algo-trading researchers. Researchers must only implement the independent input/output behavior.
- Java enterprise deployment. Individual research modules are language independent (wrapper functionality).

Value creation

- Facilitate highly focused research efforts and offload the burden of technical know how to non-technical quants.
- Streamline the algorithmic trading R&D process.
- Provide a language-independent research interface.

Responsibilities

- Requirement Analysis and Architectural Design
  - Waterfall process
  - OOA / OOD /Altova UModel
- Implementation:
  - Java SE / Java Enterprise
    - EJB / JPA / JSP / JSF / Servlets
  - Database Setup
    - Entity Relationship Modeling
    - MySQL Workbench
  - R / JRI
  - Interactive Brokers API
- Deployment:
  - JBoss Server
  - Ubuntu Linux
  - Amazon Web Services / RDS

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MAIN ACHIEVEMENTS

KUL	Researcher / Student	Sep. 2015-Jun. 2016

Financial Risk Modeling Research (View Github repository)

Research objectives:

- Investigate advanced statistical models and their potential application towards asset return modeling and risk measurement forecasting.
- Derive useful tools from the theoretical concepts and illustrate and apply the techniques in a realistic setting in such a way that industry professionals can directly benefit from them.

Responsibilities and key achievements

- Perform out of sample backtests and statistical tests to evaluate risk forecasting performance of several models (GHD, EVT, ..).
- It was concluded that eGARCH models are well suited to perform out of sample risk measurement forecasts for univariate time series.
- A mixed eGARCH-Clayton/Gumbel copula model was deemed suitable for asset return modelling and risk forecasting at the portfolio level.
- Received the Belfius Thesis Award for writing the best Msc Thesis of the Financial and Actuarial Engineering program.

Value creation

The models and tools can be used to reliable target fixed portfolio wide risk metrics such as VaR and CVaR. The tools are also utilized in the risk management components of the RiskResTrained fund.

KUL	Researcher / Student	Sep. 2015–Dec. 2015

Actuarial Statistics Research (View Github repository)

Project Summary

This project contains multiple subprojects that lie in the domain of non-life insurance actuarial statistics.

Responsibilities and key achievements

- Claim arrival modelling using Poisson processes:
  - Investigate suitability of (in)homogeneous Poisson processes to model the claim arrival process.
  - Perform operational time change via transformation of inter-arrival times (using the continuous mean-value function).
- Loss severity modelling using a spliced body and tail approach:
  - Separate data generating processes for the body and tail of loss distributions by using a spliced distribution.
  - Use a GPD for the tail and a lognormal or exponential distribution for the body to obtain good results.
- Claim frequency modelling using Generalized Linear Models
  - Investigate claim frequencies and its dependency on external covariates. Calibrate GLM.
  - Build a parsimonious model: drop-in deviance analysis, Wald Tests, ..

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MAIN ACHIEVEMENTS

EssentialQuant ltd	Quantitative R&D	Jul. 2015 – Aug. 2015

Securities Master Database (View Github repository)

Project Summary

This project includes scripts to set up a securities master database and download, parse and insert timeseries data for the S&P500 stocks, SPDR ETF funds, BEL20 stocks and its ETF tracker. Scripts for data cleaning, outlier detection and corporate action backadjustment are also provided.

Responsibilities and key achievements

- Web page scraping using Python (Wikipedia, fidelity corporate action calendar).
- Database setup: Entity relationship modeling, SQL, stored procedures, triggers.
- Handling of financial reference & metadata: Exchange data, merge-split and dividend info, sector and industry information, ..
- Data wrangling: alignment, data cleaning, outlier detection , handling of missing data, holiday calendars, ..
- Downloading timeseries data via Quandl API.
- Providing a Database facade that is accessible from R.
- Deployed the database on Amazon RDS servers and created open demo users. Hence, the data is accessible to the public.

KUL / EssentialQuant ltd	Researcher / Student	Jan. 2015 - Ongoing

Financial Engineering Toolkit (View Github repository)

Project Summary

The Matlab Financial Engineering Toolkit contains several packages that are related to option pricing and structuring / hedging of derivative products.

Responsibilities and key achievements

Open sourced following functionality and packages:

- Barrier and Lookback options: Monte Carlo and analytical pricers, Greeks and implied volatility calculations under the BS model.
- Highly optimized and cross-validated Heston model calibration functionality.
- Stock Path simulations under Black-Scholes and Heston.
- Yahoo Option Chain downloader: Parsing option data from the Yahoo Finance website.
- Structuring of a reverse convertibles.
- Pricing of exotic barrier options, structuring and hedging of partially principal protected notes under the Heston model. View separate Github page.

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MAIN ACHIEVEMENTS

EssentialQuant ltd	Quantitative R&D	Sep. 2014-Dec. 2014

Statistical Arbitrage Trading Research (View Github repository)

Research objectives:

- Apply statistical methods to detect mean reverting behavior in univariate timeseries and / or multivariate portfolios.
- Implement a mean-reversion and / or "stat-arb" trading strategy. Apply this strategy to the FX market.

Responsibilities and key achievements

- Financial data modelling (FX), cleaning and data alignment.
- Determine order of integration for univariate assets.
  - Unit root tests (ADF, PP, KPSS)
- Search for co-integrating asset combinations.
  - VAR models / SC criterion / Trace statistic
  - Johansen co-integration procedure
- Determine hedge-ratio's and half life of mean reversion.
- Create portfolio spreads, apply multivariate Bollinger band strategy.

Value creation

Statistical arbitrage trading strategies have significant profit potential when applied to less efficient markets.

EssentialQuant ltd	Quantitative R&D	Jul 2014-Aug 2014

MT4 Strategy Development Framework (View Github repository)

Project Summary

The mql4-framework consists of a few dedicated modules that are linked together in order to assist developers with rapid prototyping and testing of Technical Analysis forex strategies (using the Metatrader 4 backtester).

Responsibilities and key achievements

- Provide transparent trade execution, logging and order management functionality.
- Provide additional trading strategy parameter optimization modules (with improved logging).
- Provide quick and streamlined strategy development by simply overwriting order entry, exit and modification conditions.
- A momentum type trading strategy is provided as an example.

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MAIN ACHIEVEMENTS

Smals vzw	**Senior Business Analyst Consultant at RVP (Federal Government Agency of Pensions)**	**Jan. 2012- Jan. 2015**

Pension Right Mass Adaptations

Business Case

The federal government agency of pensions is responsible for the periodic execution of pension right mass adaptations such as indexations and holiday money calculations. The old adaptation software systems that were originally in place consisted of separate implementations for each individual adaptation. Additionally, the specifications of these adaptations were unstable due to continuously changing legal requirements. This situation resulted in high maintenance costs due to the necessity of periodic refactoring and development efforts.

After successfully completing several smaller projects as a business analyst during the previous years, I was put in charge of the refactoring process and the production execution of these mission critical and deadline sensitive mass-adaptations.

Problem analysis

After the initial requirement gathering phase, I reviewed the technical specifications of the current adaptation systems and noticed that drastic changes would be required. Refactoring the current systems would be very costly and similar problems were likely to reoccur in the future.

Solution and approach

I designed a completely new modular and test-driven adaptation framework that manages the control flow of all existing adaptations. This framework consists of small independent functional modules that are linked together through configuration files and underlying framework functionality. More importantly, this new system is robust against future legal changes. Modules can easily be swapped or re-implemented and the control flow of the adaptations is now completely adaptable.

Business implications and value creation

I convinced senior management that the one-time immediate cost of this new adaptation framework would more than offset future refactoring costs. Under my supervision, the technical teams developed the new adaptation framework while simultaneously re-implementing the modular adaptations from scratch. We succeeded in reaching all adaptation deadlines. More importantly, the system is robust to future requirement changes and is extremely cost-effective.

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FORMAL EDUCATION

Catholic University of Leuven (KUL)	Part-Time Student	Sep. 2014-Jun. 2016

Advanced Msc. in Financial and Actuarial Engineering (Cum Laude)

Summary

Provides students with up-to-date, sound and advanced financial, actuarial and statistical skills, aiming for university graduates interested in a career in risk management, financial and/or actuarial engineering.

Accomplishments

- Completing the program while working full time and/or working on personal R&D projects (future hedge fund startup).
- Introducing personal projects into the program for maximum synergy.
- Receiving the Belfius bank thesis award for writing the best Masters thesis of the 2016 program.

Unmentioned Projects:

- Bond portfolio rebalancing and immunization in a dynamic market environment.
- Implementation of rate and discount curve estimation algorithms.
- Structuring and selling of mortgage loans.
- Life Insurance Modeling – Stochastic Mortality, Multistate Modeling.
- Pure Endowment Modeling (branch 21/23).

University of Ghent (Ugent)	Full-Time Student	Sep 2005-Feb. 2011

Bsc & Msc. in Computer Science Engineering (Cum Laude)

Master Thesis

- Designing and implementing a modular framework that facilitates the development of high performance and energy efficient data protocols for wireless sensor networks.
- Energy and performance optimization using network embedded system C (nesC) in a tinyOS environment.

Relevant Projects

- Implementation of video, image and signal processing algorithms (C/C++).
- Development of a secure encryption protocol stack for electronic voting purposes (Java).
- Development of a benchmark framework for micro-processor performance analysis (C programming).
- Image and fractal rendering with GPU computing support (Matlab, C and Nvidea Cuda).
- Designing and Modeling a citywide sensornetwork while imposing cost and resource constraints (Java).
- Development of a web-based sales platform (Java, Struts, Hibernate).
- R&D, benchmarking of complex data structures. Scientific computing.