

EIM Group Develops Quantitative Tools for Hedge Fund Portfolio Management

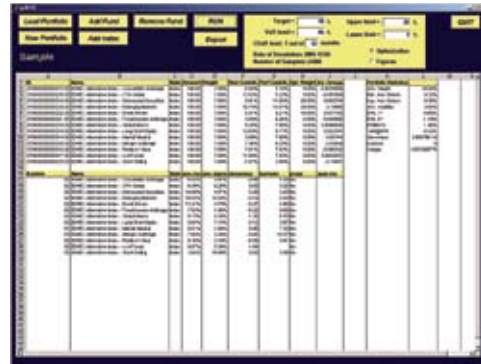
Institutional investors, such as insurance companies and central banks, invest in hedge fund portfolios to diversify the risks associated with traditional stock and bond portfolios. To assess, monitor, and forecast these risks, hedge fund portfolio managers rely heavily on quantitative methods. Since hedge funds have more complex statistical characteristics than equities and bonds, however, portfolio managers cannot use traditional models and standard analytical approaches.

EIM Group, a fund-of-funds manager and a global leader in the hedge fund industry, has developed a sophisticated analytical model using MATLAB® that enables portfolio managers to tailor hedge fund portfolios to each client’s needs and risk profile using quantitative assessments and risk analysis.

“Using MathWorks tools and enhanced statistical methods, we have constructed a risk model that is unique in the industry,” explains Dr. Stéphane Daul, certified financial analyst and senior quantitative analyst at EIM. “Each portfolio manager at EIM uses a compiled, standalone application, also built with MathWorks tools, to incorporate simulation results from the model as they create and monitor portfolios.”

THE CHALLENGE

To tailor hedge fund portfolios for clients, EIM portfolio managers use advanced analytical models that incorporate copulas, which are mathematical functions to describe the dependencies between investments. Because the complexity of the model makes analytical solutions impossible, EIM uses Monte Carlo simulations of thousands of samples to construct accurate risk and return assessments for each portfolio.



Application developed with MATLAB to access simulation results and perform calculations.

To do this, the company needs a development environment that enables quantitative analysts to model complex algorithms and run thousands of simulations quickly. EIM also needs to build and deploy easy-to-use tools that portfolio managers use to access simulation results and calculate their portfolio’s profit-and-loss distribution.

THE SOLUTION

The EIM team uses MATLAB technical computing software to develop and simulate the advanced model for quantitative hedge fund analysis. They then use MATLAB development tools and MATLAB Compiler™ to build and deploy an application that includes a graphical user interface (GUI). Portfolio managers use this standalone application to access simulation results and to calculate their portfolio’s profit-and-loss distribution, which includes relevant statistics and measures such as value at risk, drawdowns, expected returns, and the risk contribution of each fund.

The team first used MATLAB to build an advanced analytical model based on a year

THE CHALLENGE

To develop quantitative tools for hedge fund portfolio optimization and analysis

THE SOLUTION

Use MathWorks tools to develop distributed algorithms and models, accelerate simulation, and streamline user interface development and deployment

THE RESULTS

- Development time cut in half
- Simulation time reduced by 80%
- Development and deployment streamlined

of research. The group then used MATLAB to run Monte Carlo simulations of 24,000 samples for the 700 hedge funds that the company tracks.

Simulations, which are scheduled to run automatically each night, initially required six hours to complete. To accelerate this task, EIM used Parallel Computing Toolbox™ to run the simulations in parallel on three dual-processor servers, reducing the simulation time by more than four hours.

Using MATLAB development tools, Daul and his team then created a second application for portfolio managers to calculate the profit and loss distribution of their portfolios. This application uses the simulation results built with the distributed computing tools. The results are then displayed in an ActiveX Excel® worksheet.

“Without the MATLAB Compiler, it would have taken us between two to five times longer to develop our deployable application,” Daul notes.

EIM used Optimization Toolbox™ to propose allocation weights to their portfolio managers that maximize the Omega ratio, a performance measure that considers the skewness and fat tails inherent in asymmetrical hedge fund distributions.

Throughout development, the group also used Statistics Toolbox™ to create key distributions, histograms, logistic progressions, and linear regressions.

EIM is currently working on the second version of the portfolio management tool. They plan to integrate functionality from existing qualitative risk management tools into their quantitative tools.

APPLICATION AREAS

- Algorithm development
- Application deployment
- Distributed computing
- Financial services
- Modeling and analysis

PRODUCTS USED

- MATLAB®
- MATLAB Compiler™
- MATLAB Distributed Computing Server™
- Parallel Computing Toolbox™
- Optimization Toolbox™
- Statistics Toolbox™

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With MathWorks tools, we provide answers to complex portfolio management questions rapidly. Responding quickly to our clients with quantitative analysis is a competitive advantage for EIM.

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Dr. Stéphane Daul, EIM Group

THE RESULTS

▪ Development time cut in half.

“Compared to developing in C or Excel, MATLAB enables us to develop numeric algorithms twice as fast,” says Daul. “Also, developing the interface is 10 times faster with MATLAB.”

▪ Simulation time reduced by 80%.

“Using Parallel Computing Toolbox, we easily parallelized our simulations without modifying the underlying algorithms,” explains Daul. “By distributing the tasks across three servers, we reduced the simulation time from 6 hours to 1.2 hours. Adding more processors would further reduce our simulation time.”

▪ Development and deployment streamlined.

EIM streamlined development by assembling a library of commonly used functions and by using the same environment for algorithm development and application development and deployment. “Because all development is in MATLAB, we save time by reusing the algorithm developed during research in the real application,” says Daul.

To learn more about EIM Group, visit www.eimgroup.com

 The MathWorks™