Portfolio Optimization, Regression and Conic Programming

Thomas Schmelzer

Jobs you might be interested in (from LinkedIn):

Quantitative Trader

... - Zurich Area, Switzerland

Candidates should possess:

- Excellent knowledge in at least one object oriented language e.g. Java, C# or C++
- Knowledge of Linux/Unix shells and scripting languages
- **Knowledge of optimization solvers (SOCP) and experience with an optimization toolbox e.g. Mosek**
- Solid experience in statistical analysis and software (e.g. R)
- more wishful thinking...

Most utterly humble brief personal history within portfolio optimization

- 2007: Joined **Winton Capital**. Risk measurement (covariance matrices, volatilities, etc.) and portfolio optimization. Projects with **Raphael Hauser**.

- 2008: Started to cooperate with **Mosek** (Danish company providing mathematical software).

- 2010: Return to Switzerland via **IMC Zug**.

- 2013: Gardening leave at **Maui**. Two publications with Raphael Hauser.

- since Feb 2014: Head of Research for **Lobnek Wealth Management** in Geneva.

Warning

Be **careful** when you mention Optimization... the term is just too ambigious.

Today

- we render problems arising in quantitative finance as conic programs.
- we solve such programs using 3rd party software (Mosek).
- we illustrate common mistakes made in practice.

Challenges

- underestimated?

- modelling (implicit constraints, reverse engineering, politics etc).

- complex maths, flexibility to formulate problems

User feedback

- It works!
- It's **broken**.
- It's **not relevant**. It's all about getting the estimators correct.
- Our problems are far too complicated for this. We have developed a **proprietary** method far superior.
- Some are rediscovering **familiar concepts**: *(The solvers) overuse statistically estimated information and magnify the impact of estimation errors. It is not simply a matter of garbage in, garbage out, but, rather, a molehill of garbage in, a mountain of garbage out* (Michaud 1998)

If the answer is highly sensitive to perturbations, you have probably asked the wrong question.

Lloyd N. Trefethen, FRS

MAXIMS ABOUT NUMERICAL MATHEMATICS, SCIENCE, COMPUTERS, AND LIFE ON EARTH.

Literature

- Stephen Boyd, Convex Optimization, http://stanford.edu/~boyd/cvxbook/ (http://stanford.edu/~boyd/cvxbook/)

- Mosek Modeling Manual, http://docs.mosek.com/generic/modeling-letter.pdf (http://docs.mosek.com/generic/modeling-letter.pdf)

- Mosek Tutorials, https://github.com/MOSEK/Tutorials (https://github.com/MOSEK/Tutorials)

- Thomas Schmelzer and Raphael Hauser, Seven Sins in Portfolio Optimization, http://arxiv.org/abs/1310.3396 (http://arxiv.org/abs/1310.3396)

- Thomas Schmelzer et al., Regression techniques for Portfolio Optimization using MOSEK, http://arxiv.org/abs/1310.3397 (http://arxiv.org/abs/1310.3397)

- Gerard Cornuejols, Reha Tutuncu, Optimization Methods in Finance