BIG DATA & ALGORITHMIC FINANCE

Mohammad POURMOHAMMADI

PhD student, University of Geneva

My research interests are at the intersection of Machine Learning and Economics.

Currently, I am a third-year student at both the Swiss Finance Institute and the University of Geneva. Before this, I completed an MSc. in Finance at Bocconi University and a BSc. in Applied Mathematics at Sharif University of Technology.

I have a deep appreciation for mathematics and problem-solving. This passion is reflected in my achievement of a Silver medal in the Iranian National Mathematics Olympiad.

UNIVERSAL PORTFOLIO SHRINKAGE

Mohammad POURMOHAMMADI, Fabio TROJANI, Bryan KELLY, and Semyon MALAMUD.

We introduce a novel shrinkage methodology for building optimal portfolios in environments of high complexity, where the number of assets is comparable to or larger than the number of observations. Our universal portfolio shrinkage approximator (UPSA) is given in closed form, is easy to implement, and improves existing shrinkage methods. It exhibits an explicit two-fund separation, complementing the Markowitz portfolio with an optimal complexity correction. Importantly, UPSA does not annihilate the low-variance principal components (PCs) of returns but weights them optimally. Contrary to conventional wisdom, we find that low variance in-sample PCs are key to out-of-sample portfolio performance. By optimally balancing them in the portfolio construction, UPSA produces a stochastic discount factor that substantially improves on its PC-sparse counterparts, showing that PC sparsity is highly costly once SDFs are optimally shrunk.

Download the paper