Rough volatility for vanilla option trading

Volatility modeling is at the core of option trading, not necessarily for pricing but for the representation of risks.

In recent years, a lot of articles have been published on rough volatility and many have argued for this class of models to replace traditional stochastic vol, local vol or hybrid models. Initially, mathematical formulations were difficult to grasp but today many heuristics and approximations have been developed by researchers and professionals alike.

The aim of this project is:

- from a theoretical point of view, learn and summarize some of the existing literature on rough volatility, analytical tractable solutions and heuristics
- on simple products (vanillas, vol futures) compare empirical performance against traditional models both with tick, intraday and eod data
- assuming that we want to trade 2 or 3 factors, project these risks in the model and test this approach on a portfolio of options or its equivalent risks
- if successful, integrate the best predictors built via machine learning to an existing signal bundle and create a prototype strategy

Tools:

- Python or Scala / Java code base for models (R also possible)
- usual time series analysis libraries in Python (ex: scikit, stats lib, pandas)
- for machine learning, ideally use of Tensor Flow, Keras, Smile or DL4j
- interface with Excel or open office as a simple GUI (ex: pyxll, excel python or OBBA)
- use of small / big data visualization libraries in Python (ex: bokeh, vispy, matplotlib, datashader)
- access to data ranging from daily bars, intraday bars (mn) to HF data (sec snapshot or event tick resolution)
- for intensive computations, access to a proprietary grid / cluster

Deliverable:

Project code / reports will be in English but some of the communications / back and forth discussions will be in French

Meeting and working together in Paris every 2 / 3 months

Weekly or biweekly video conf calls, email communication as often as needed, one monthly summary, 3 quarterly reports with code freeze (2 intermediate in Dec / Mar + final)

Volga Technologies:

Volga Technologies (NY based) is a new trading startup seeded by a systematic trading incubator in Israel and in the US.

We develop systematic trading strategies at the frontier of flow trading and high frequency. Everything we do is fully automatized, can run on a wide range of names / markets / regions and at various frequencies.

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In France from 25-Sept to Oct-10 if students want to meet to discuss the project