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Fitting a Model by the Numbers

Dr. Melody Ghahramani works in time series analysis, a branch of applied statistics that draws conclusions from correlated data. Her specific interests lie in both financial and medical applications.

A time series is a sequence of data points measured at specific times. Through statistical modelling, future data points can be forecast based on past values. For example, time series data collected on quarterly sales can be modelled to predict future sales. Accuracy of the forecast depends on the appropriateness of the model used – if the model doesn't fit, the forecast will not be accurate.

Dr. Ghahramani is working on the analysis of financial time series, such as returns on a stock. Investors are interested in assets with a high rate of return and low risk. One of the major issues in finance is how we should model returns. Risk is quantified using a volatility model, which is derived from the model for returns. A risk manager, for example, needs an estimate of volatility to know the amount by which a portfolio is likely to decline in the future. "A number of

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volatility models have been proposed over the past 20-25 years", says Ghahramani, "but since one model cannot capture all the features exhibited by data, volatility modelling continues to be an active area of research. I am interested in studying the statistical properties of volatility models".

In medicine, Dr. Ghahramani's interest is in infectious disease modeling. Her long-term goal is to collaborate on pandemic influenza modelling, producing a model to forecast influenza counts over time.

Dr. Ghahramani wants to explore how forecasting can be improved in existing models. "I am also interested in developing data driven methods for assessing whether model assumptions hold for a particular data set. No matter how impressive the mathematics behind a model, the conclusions drawn will be incorrect if the assumptions do not hold." The results of her research will provide useful tools for applications. ■

