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**Research field**: Probability Theory / Mathematical Statistics

**Key words**: Asymptotic statistics, Limit theorem, Stochastic calculus, High-frequency data, Financial econometrics

**Current research**: I am currently studying statistical inference for stochastic processes from high-frequency observation data. Since such a model is typically used for modeling intraday transaction data of financial assets, this topic is actively studied in financial econometrics. Meanwhile, researchers in this area use stochastic calculus and limit theorems for semimartingales as main mathematical tools, so there are many statisticians for stochastic processes in this area. I am one of such researchers.

More precisely, I am mainly studying covariance estimation from high-frequency data. Nowadays, I am particularly interested in studying such a problem in a high-dimensional setting where the dimension of the data can be much larger than the sample size, which appears in application to financial data when we need to simultaneously consider a large number of assets. Related to this problem, I am also studying how to approximate the distributions of statistics in a high-dimensional situation.

**Notice for students**: Mathematically, it is desirable that you have learned measure theory and basics of probability theory (such as conditional expectations and martingales). Some knowledge of functional analysis and stochastic calculus (such as semimartingale theory and Malliavin calculus) will also be useful.

My research area is statistics and thus closely related to actual problems; you will need to apply theories you develop to real data and interpret their consequences. Then, you will need some knowledge of the areas from which the data are taken, so it is important that you are interested in areas other than mathematics as well; it is better if you already have some knowledge of such an area. My current research area is related to finance, but statistics is used in many areas other than finance, so I recommend you to be interested in various areas which are not necessarily limited to mathematics and finance.

Also, since it is usually difficult to ensure the mathematical validity of a statistical method in an exact manner for a complex model, one commonly consider a virtual situation where the sample size of data tends to infinity and establish a relevant limit theorem to validate the method. Formally, such an argument does not ensure the validity of the method for a fixed sample size, so one needs to assess finite sample performance of the method by numerical experiments. For this purpose one needs to implement the statistical method as a computer program, so it is convenient for you to have knowledge of programming.