

Ho Huu Binh

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INTERESTS

My research interests center on developing and applying robust statistical and machine learning models to address complex, practical data science challenges, particularly those involving time series and high-dimensional data. I am actively exploring areas such as statistical learning (model selection, uncertainty quantification, missing data), machine learning (deep learning, mixture models, generative models), approximate inference, optimization (supply chain management), and time series forecasting.

A core part of my focus is tackling computationally demanding problems within these domains, analyzing the trade-offs between solution quality and efficiency. I am driven by both understanding the theoretical structure of such problems while also engaging in their empirical implications, implementation and validation to create effective solution methods.

EDUCATION

- **University of Science - Vietnam National University** HCMC, Vietnam
MS. Mathematical Statistics, current GPA:3.9/4 *Dec 2023 - Current*
 - **Anticipated Thesis title:** Model-based Clustering with Variable Selection for Missing Data
- **International University - Vietnam National University** HCMC, Vietnam
BS. Applied Mathematics *Aug 2018 - July 2022*
 - **Thesis title:** Forecasting Unit Sales of Retail Goods using DGLMs
- **Honors and Awards:**
 - **First Prize** - Vietnam National Olympic Econometrics and Application contest (July 2021).
 - **Third Prize** - Scientific Conference for Student in 2021 (Vietnam National University.)

EXPERIENCE

- **FPT Japan - Usee** HCMC, Vietnam
Inventory Optimization and Forecasting (Intern) *July 2021 – November 2022*
 - **Inventory optimization:** Developed and evaluated inventory management policies for pharmaceutical SKUs, focusing on mitigating stockout risks through simple statistical modeling.
 - **Forecasting sales:** Investigated zero-sales phenomena in demand data and applied AI-driven and statistical models (e.g., probabilistic forecasting methods) to generate forecasts, improving accuracy (5% reduction in error) and enhancing uncertainty quantification.
- **Manulife** HCMC, Vietnam
Product Development (Intern) *July 2022 - November 2022*
 - **Product specification:** Analyzed insurance product cash flows to detect anomalies using data analysis techniques. Derived premium rates for critical illness products. Examined quota share treaty for reinsurance, conducted quarterly market researches. (All tasks using Excel and R)
 - **Data fetching:** Retrieved and structured data from data lakes using SQL queries for product specification validation.

RESEARCH PROJECTS

- **Model-based Clustering with Variable Selection for Missing Data (Ongoing)**
 - Integrated Clustering Framework for Missing Data: Created a **unified** method that combines robust handling of missing data (both MAR and MNAR), variable selection, and model-based clustering.
 - Theoretical insights: Selection consistency of relevant variables under missing values, and time complexity of the hybrid penalized and model selection framework for variable selection.
- **Time Series Forecasting (July 2022 - Present):**

- Inspected the efficiency of some notable time series models with large and high-granularity data sets. Applied a novel, scalable, expeditious forecasting process equipped with machine learning and deep learning frameworks and **suitable metrics** for all types of data patterns. Achieved a **42%** in forecasting accuracy over baseline models. Designed simple and easy-to-optimize replenishment strategies for inventory problems. Reduced the number of deliveries from warehouses. Achieved storage utilization nearly **100%** with no stock-out incidents.
- Continually reproduced and benchmarked up-to-date forecasting methods in recent academic literature to assess and probe the efficacy of these models in real-world settings.
- **Deep Portfolio Allocation (November 2023):** Investigated the efficacy of deep learning model specifically designed for sequential data to the portfolio optimization problem. Validated the findings of the paper of Hieu K. Cao and Binh T. Nguyen's paper on the superior performance of simple autoregressive models equipped with an integrated attention mechanism. Achieved **23%** increase in the Sharpe ratio compared to equally weighted portfolio.
- **Incorporating Deep Learning In Predicting Risk In Vietnam Financial Market (Nov 2021):** Modelled conditional volatilities and forecasting Value at Risk (NeuralNet - GARCH). Compared with the traditional model (ARIMA-GARCH), demonstrating a **62%** enhancement in mean distance error for VaR **99%**.
- **Maximal Predictability Portfolio Optimization (Feb 2021):** Developed an optimization model for investment portfolios designed to capture market predictability in stock returns while mitigating forecasting errors. Employed Mean Absolute Deviation transformation approach to solve a non-convex fractional quadratic programming problem. Achieved a **6%** increase in investment efficiency metric compared to the traditional Mean-Variance model benchmark.

PUBLICATIONS

- Bao Q. Ta *, Vu T. Huynh, Khai Q. H. Nguyen, Phung N. Nguyen and **Binh H. Ho** - **Maximal predictability portfolio optimization model and applications to Vietnam stock market** - "Studies in Systems, Decision and Control" Series - "Credible Asset Allocation, Optimal Transport Method and Related Topics", ISSN 2198-4182, Springer 2022 (The 15th International Conference of The Thailand Econometric Society - TES)

SKILLS

- **Deep/Machine learning Framework** (PyTorch, Pyro, PyMC3, Git), **Data wrangling** (Pandas), **Forecasting** (Nixtla, Darts, GluonTS, PyTorchTS), **Optimization** (GUROBI, CVXPY, Pulp, OR-Tools), **Visualization**(matplotlib, ggplot2), **R**, SQL