ICAIF'25 Tutorial on

Bridging Prediction and Optimization: **Decision-Focused Learning** in Financial Optimization

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ACM ICAIF 2025

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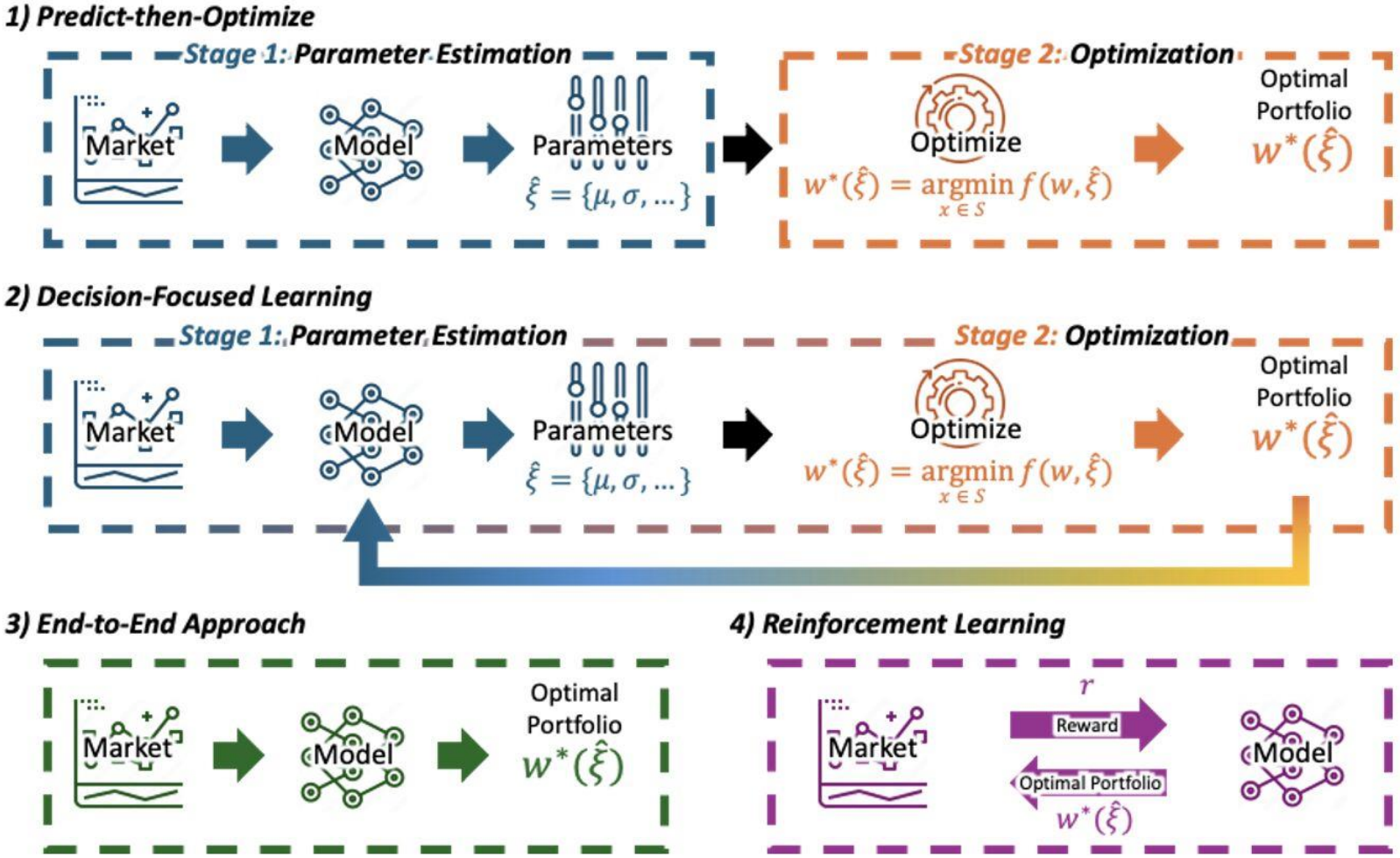
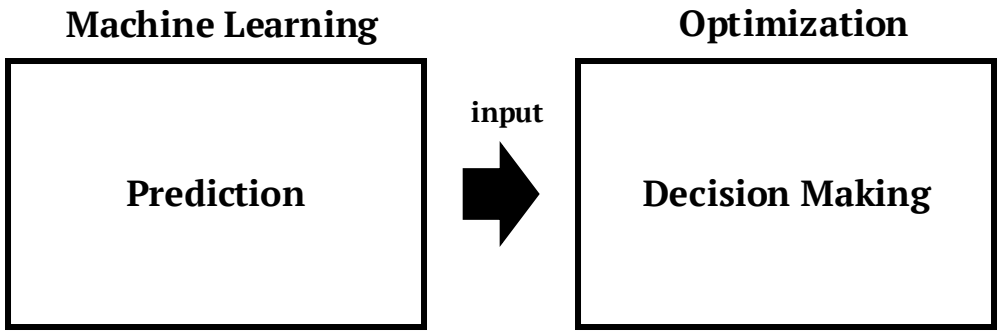


Exhibit 2. Graphical illustration of predict-then-optimize, decision-focused learning, end-to-end approach, and reinforcement learning for portfolio optimization

Lee, Yongjae; Kim, Jang Ho; Kim, Woo Chang; Fabozzi, Frank J. (2024)
"An Overview of Machine Learning for Portfolio Optimization," *Journal of Portfolio Management*, 51 (2), 131-148

ML-based decision making process

- Issues in usual ML-based decision making process
  - Predict-then-optimize



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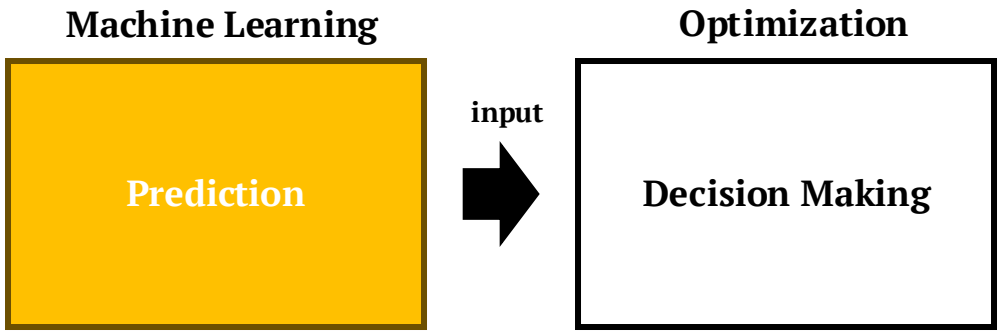
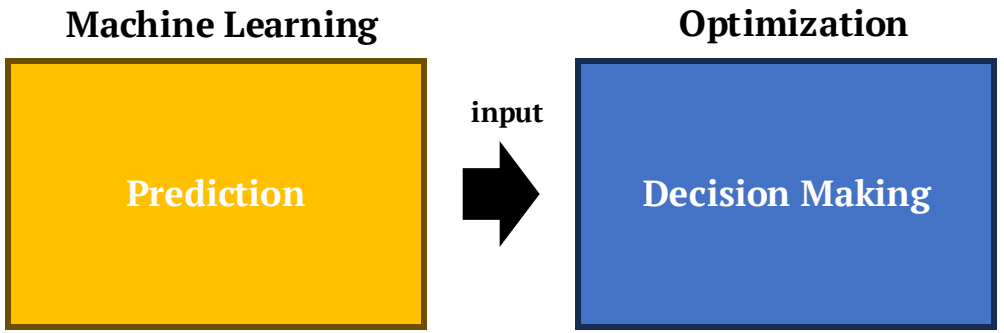


Issue 1

Predictions should contain errors
(Garbage in garbage out)

ML-based decision making process

- Issues in usual ML-based decision making process
  - Predict-then-optimize

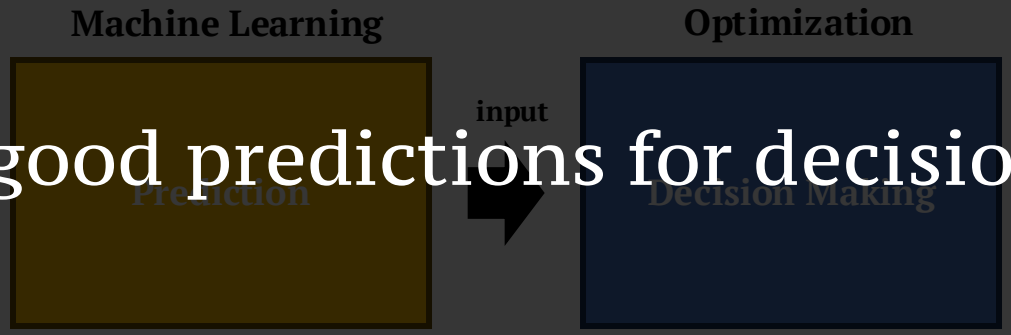


Issue 2

Best prediction ≠ Optimal decision

ML-based decision making process

- Issues in usual ML-based decision making process
  - Predict-then-optimize



What are good predictions for decision making?

Issue 2

Best prediction ≠ Optimal decision

ML-based decision making process

- Issues in usual ML-based decision making process
  - Predict-then-optimize

What are good predictions for decision making?

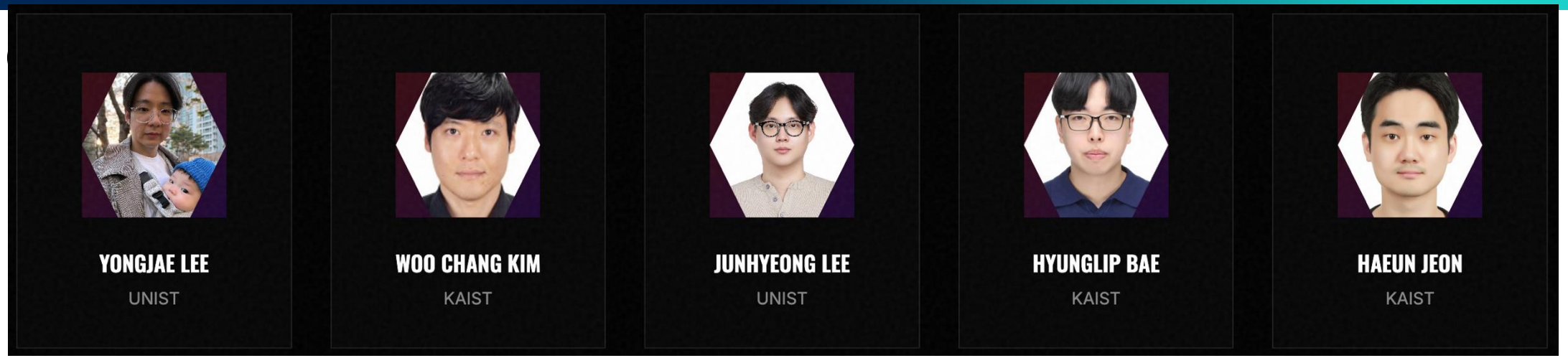
Predictions should be "decision-focused"

Issue 2

Best prediction ≠ Optimal decision

Decision-Focused Learning (DFL) Tutorial

- **Opening remarks** – Yongjae Lee (UNIST)
- **Background in DFL** – Haeun Jeon (KAIST)
- **DFL in Mean-Variance Optimization** – Junhyeong Lee (UNIST)
- **DFL in Partial Index Tracking** – Hyunglip Bae (KAIST)
- **Closing remarks** – Yongjae Lee (UNIST)



Monday, November 17th

Decision-Aware Portfolio Optimization

Oral Session

11:30 AM – 12:30 PM

Ballroom 3

Subsessions

Estimating Covariance for Global Minimum Variance Portfolio: A Decision-Focused Learning Approach

November 17, 2025

11:30 AM – 11:50 AM

Scaling Conditional Autoencoders for Portfolio Optimization via Uncertainty-Aware Factor Selection

November 17, 2025

11:50 AM – 12:10 PM

Return Prediction for Mean-Variance Portfolio Selection: How Decision-Focused Learning Shapes Forecasting Models

November 17, 2025

12:10 PM – 12:30 PM

Tutorial github