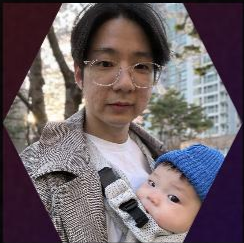ICAIF'25 Tutorial on

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

Yongjae Lee, Woo Chang Kim, Junhyeong Lee, Hyunglip Bae, Haeun Jeon

ACM ICAIF 2025

UNIST
ULSAN NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY

KAIST
Korea Advanced Institute of Science and Technology

Organizers

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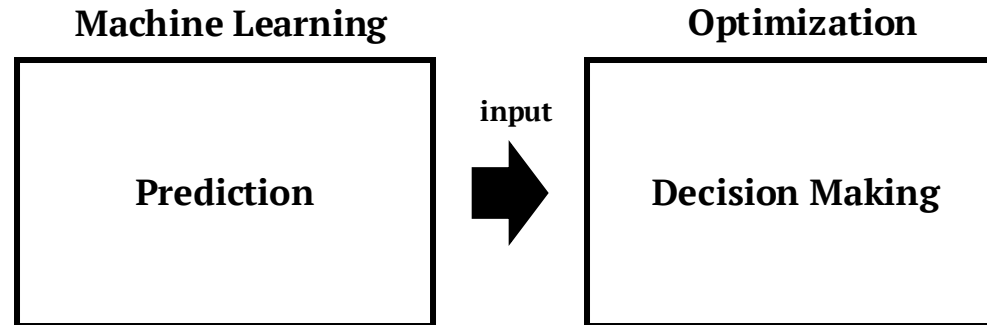**JUNHYEONG LEE**
UNIST

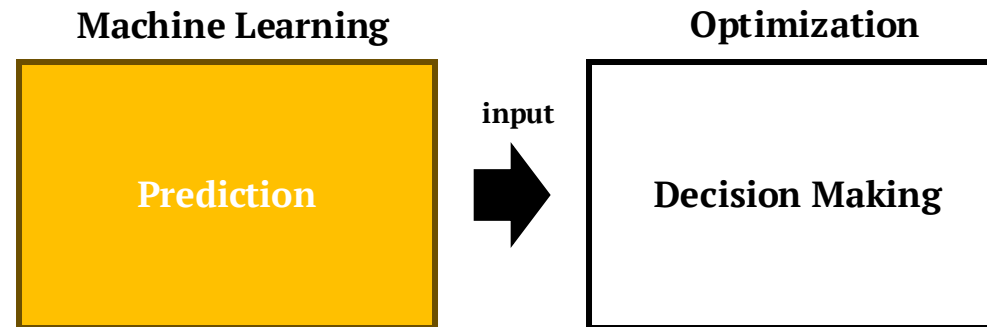**HYUNGLIP BAE**
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HAEUN JEON
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ML-based decision making process

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

ML-based decision making process

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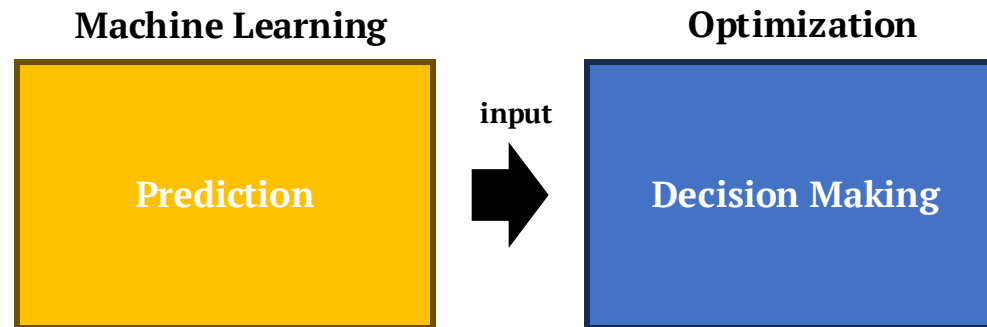 - Predict-then-optimize

Machine Learning

Optimization

Prediction

input

Decision Making

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

Machine Learning

Optimization

Prediction

input

Decision Making

Issue 2

Best prediction ≠ Optimal decision

ML-based decision making process

- Issues in usual ML-based decision making process
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What are good predictions for decision making?

Issue 2

Best prediction ≠ Optimal decision

ML-based decision making process

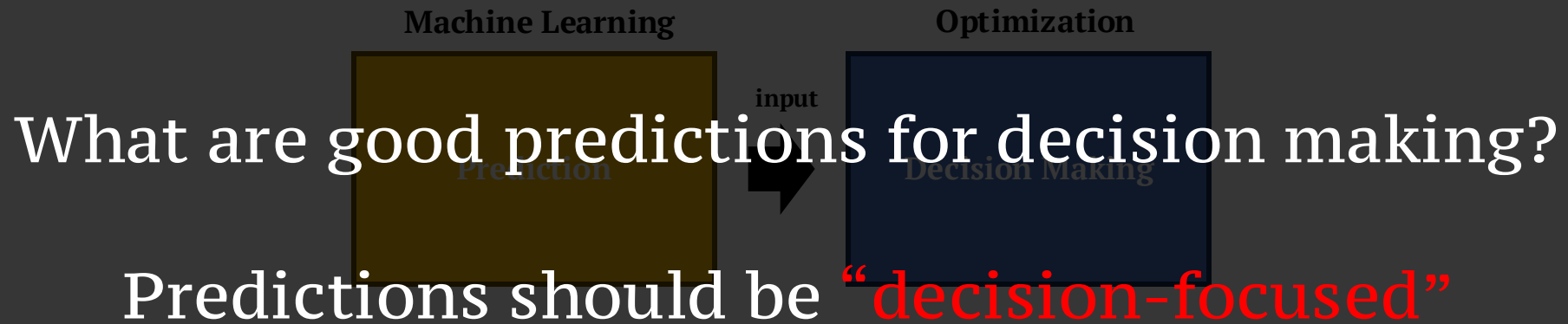- Issues in usual ML-based decision making process
  - Predict-then-optimize

Machine Learning

Optimization

input

Prediction

Decision Making

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)

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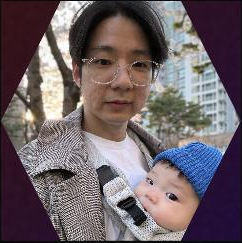
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Tutorial github