WHY RESEARCH?

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THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

FIVE YEARS AT IIM INDORE

LEARNING, RESEARCH, AND FUN

Summer 2017: Research with Prof Pritam Ranjan on Near-singular Matrices (IGNOU!)

Term V: Research Methodology by Prof Ajit Phadnis

Summer 2018: Research with Prof Pritam Ranjan on Gaussian Models

Term VIII: CIS Research with Prof Rahul Nilakantan

MBA Year 1: Aspect Ratio Forecasting Challenge

MBA Year 2: Case Study on Invento Robotics

Statistical Modelling and Analysis of the Computer-Simulated Datasets

M. Harshvardhan, Pritam Ranjan

Source Title: Handbook of Research on Cloud Computing and Big Data Applications in IoT

Copyright: © 2019 | Pages: 27

DOI: 10.4018/978-1-5225-8407-0.ch011

Abstract

Over the last two decades, the science has come a long way from relying on only physical experiments and observations to experimentation using computer simulators. This chapter focuses on the modelling and analysis of data arising from computer simulators. It turns out that traditional statistical metamodels are often not very useful for analyzing such datasets. For deterministic computer simulators, the realizations of Gaussian process (GP) models are commonly used for fitting a surrogate statistical metamodel of the simulator output. The chapter starts with a quick review of the standard GP-based statistical surrogate model. The chapter also emphasizes on the numerical instability due to near-singularity of the spatial correlation structure in the GP model fitting process. The authors also present a few generalizations of the GP model, reviews methods, and algorithms specifically developed for analyzing big data obtained from computer model runs, and reviews the popular analysis goals of such computer experiments. A few real-life computer simulators are also briefly outlined here.

Invento Robotics: Launching Humanoid Robots

Teaching note - Reference no. 8B21A019

Subject category: Marketing

Authors: M Harshvardhan; Bipul Kumar

Published by: Ivey Publishing

Originally published in: 2021

Version: 2021-06-16

Length: 15 pages

Data source: Field research

IVEY | Publishing

Home > Applied Statistical Methods > Conference paper

The Evolution of Dynamic Gaussian Process Model with Applications to Malaria Vaccine Coverage Prediction

Pritam Ranjan ✉ & M. Harshvardhan

Conference paper | First Online: 14 April 2022

402 Accesses | 3 Altmetric

Part of the Springer Proceedings in Mathematics & Statistics book series (PROMS, volume 380)

These publications boosted my PhD application significantly, even though I had no idea at the time how important they would be.

RESEARCH AS A CAREER OPTION

WHY RESEARCH?

ASK INTERESTING QUESTIONS, GET INTERESTING ANSWERS!

📚 **Pursuit of Knowledge:** research is pure and not driven by money

⛲ **Independence:** freedom to decide what to work on

🎛️ **Novelty:** create methods instead of just applying them

🪴 **Greatness:** be the best in the "niche" world

IS IT?

RESEARCH REQUIRES MONEY!

WORK ON WHAT OTHER RESEARCHERS FIND INTERESTING

CREATING NOVEL METHODS IS *HARD*

CONSTANT SOUL SEARCHING

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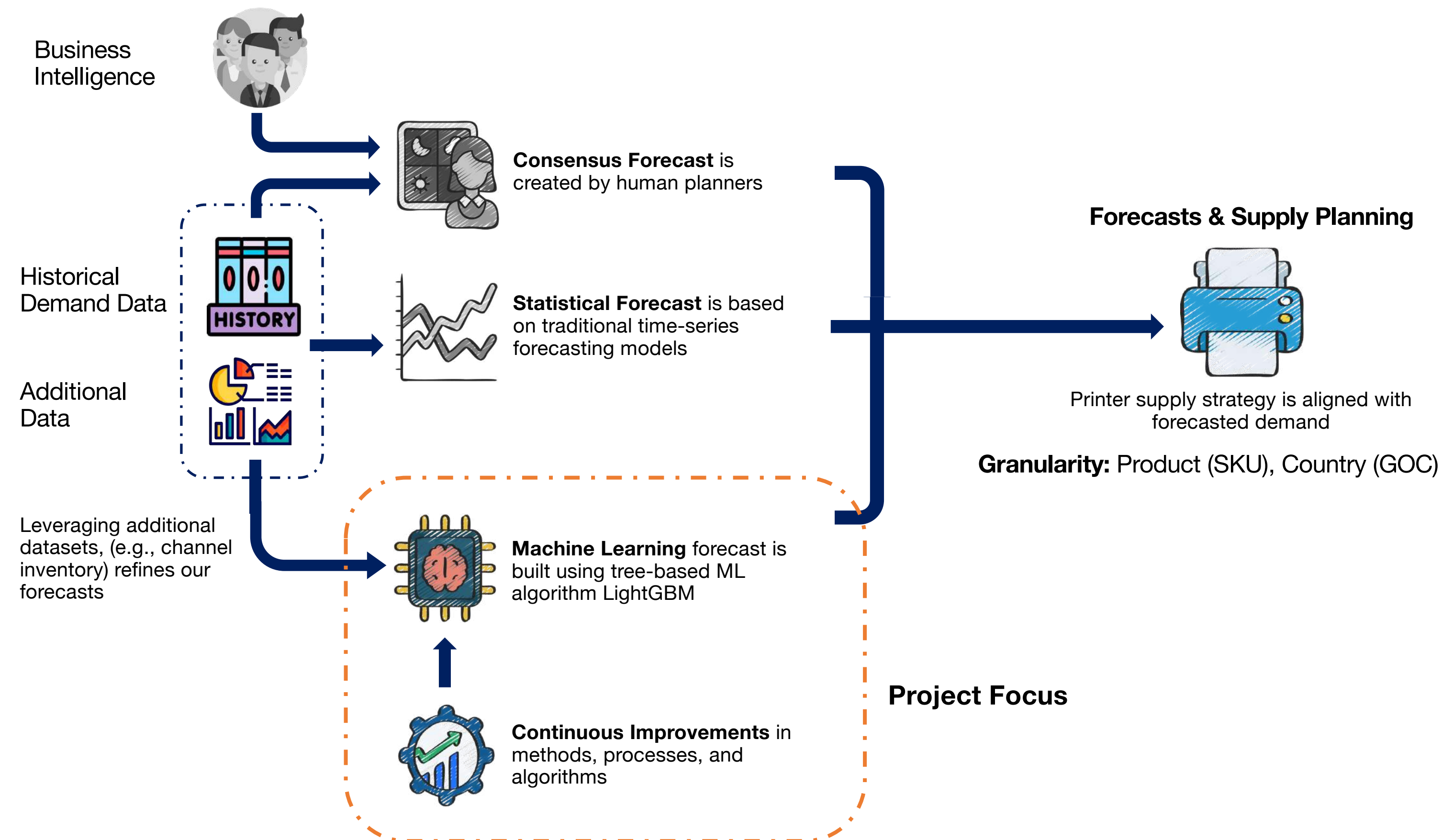
CREATING NOVEL METHODS IS *HARD*

CONSTANT SOUL SEARCHING

Solution:
Find your niche.
For me, it is "Applied Machine Learning".

THE REASON TO ENGAGE IN RESEARCH IS TO STRETCH YOUR BRAIN AND CAPABILITIES LIKE NEVER BEFORE

MY CURRENT WORK

Forecasting Demand using Machine Learning at HP

My Current Research (1)

Business Intelligence

Historical Demand Data

Additional Data

Leveraging additional datasets, (e.g., channel inventory) refines our forecasts

Consensus Forecast is created by human planners

Statistical Forecast is based on traditional time-series forecasting models

Machine Learning forecast is built using tree-based ML algorithm LightGBM

Continuous Improvements in methods, processes, and algorithms

Project Focus

Forecasts & Supply Planning

Printer supply strategy is aligned with forecasted demand

Granularity: Product (SKU), Country (GOC)
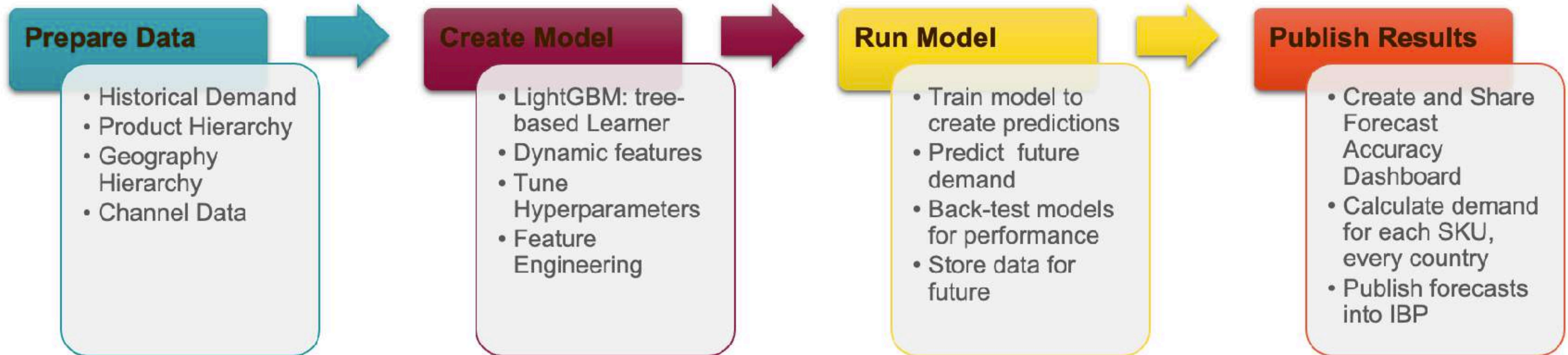
Too much inventory leads to **overage costs**

Too much inventory leads to **underage costs**

Key Challenges:

- More accurate forecasts

- Forecast adoption by planners
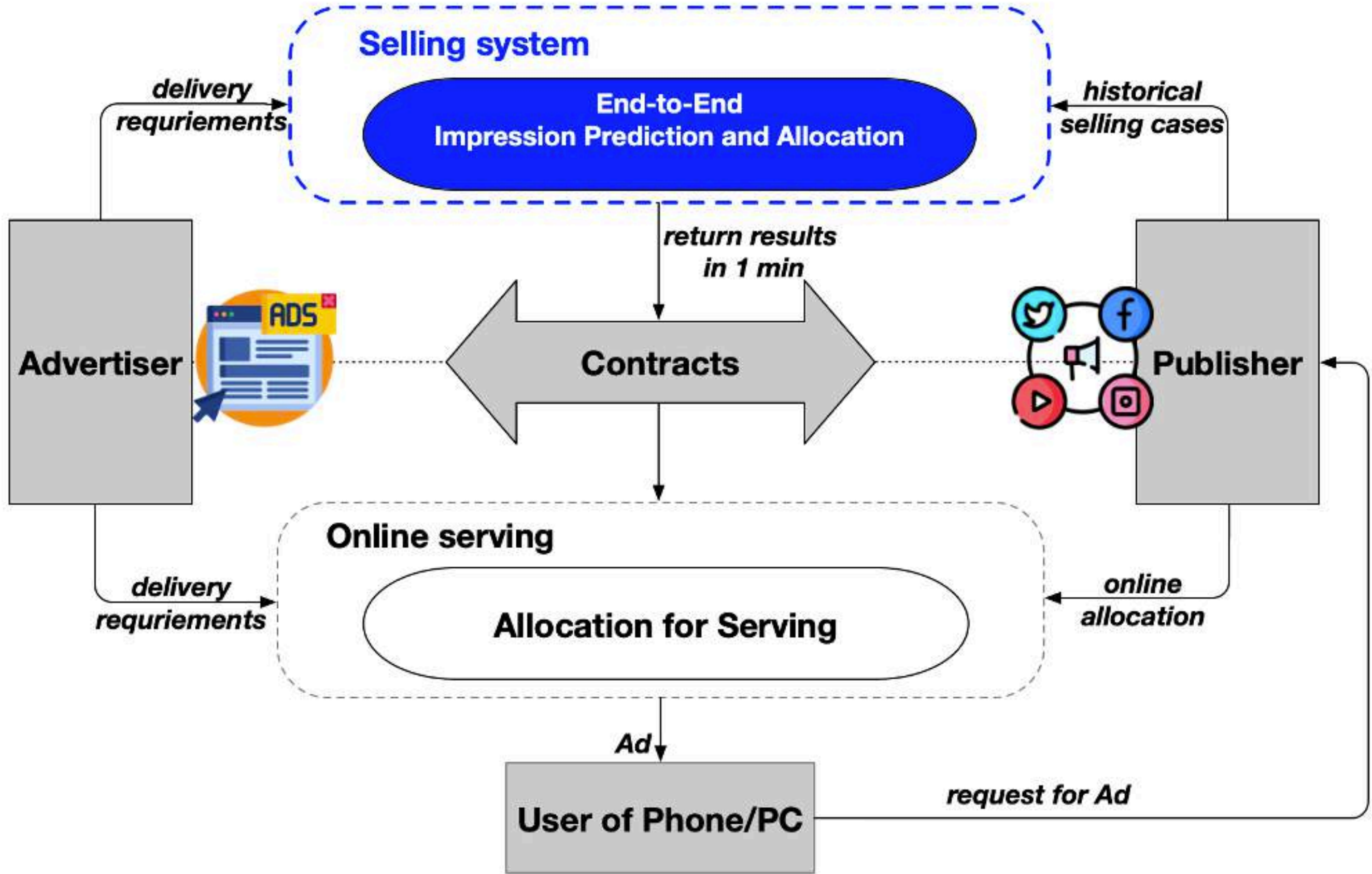
- Measuring impact of improved forecasts

Solution: Enterprise-level Forecasting Pipeline

My Current Research (1)

Prepare Data
- Historical Demand
- Product Hierarchy
- Geography Hierarchy
- Channel Data

Create Model
- LightGBM: tree-based Learner
- Dynamic features
- Tune Hyperparameters
- Feature Engineering

Run Model
- Train model to create predictions
- Predict future demand
- Back-test models for performance
- Store data for future

Publish Results
- Create and Share Forecast Accuracy Dashboard
- Calculate demand for each SKU, every country
- Publish forecasts into IBP

End-to-End Prediction and Allocation for Ads

My Current Research (2)

Guaranteed Delivery Ads are ads measured on impressions, not clicks

There are existing contracts between publisher (Google/Amazon/Alibaba) and advertiser (Maruti Suzuki/Mahindra)

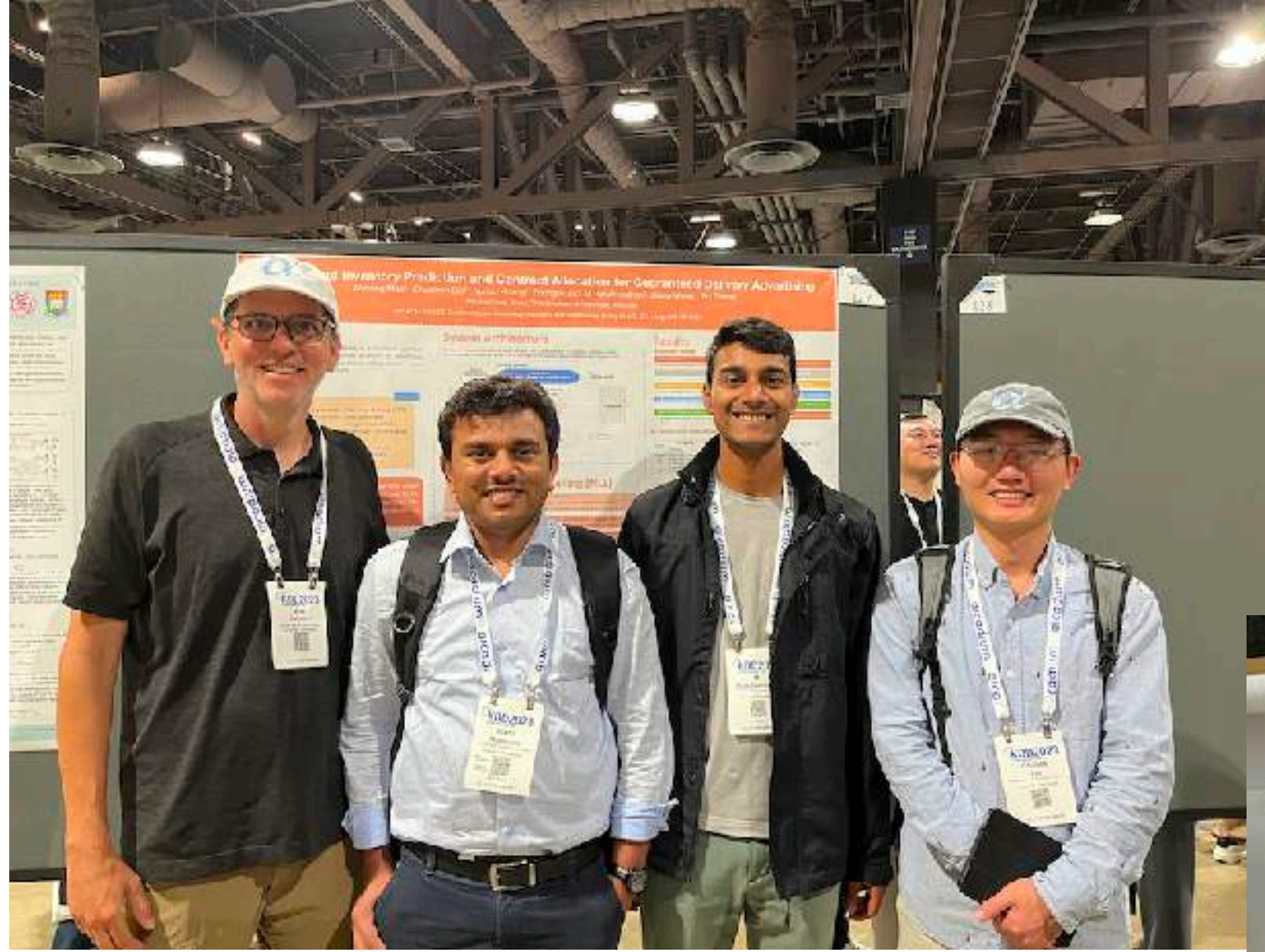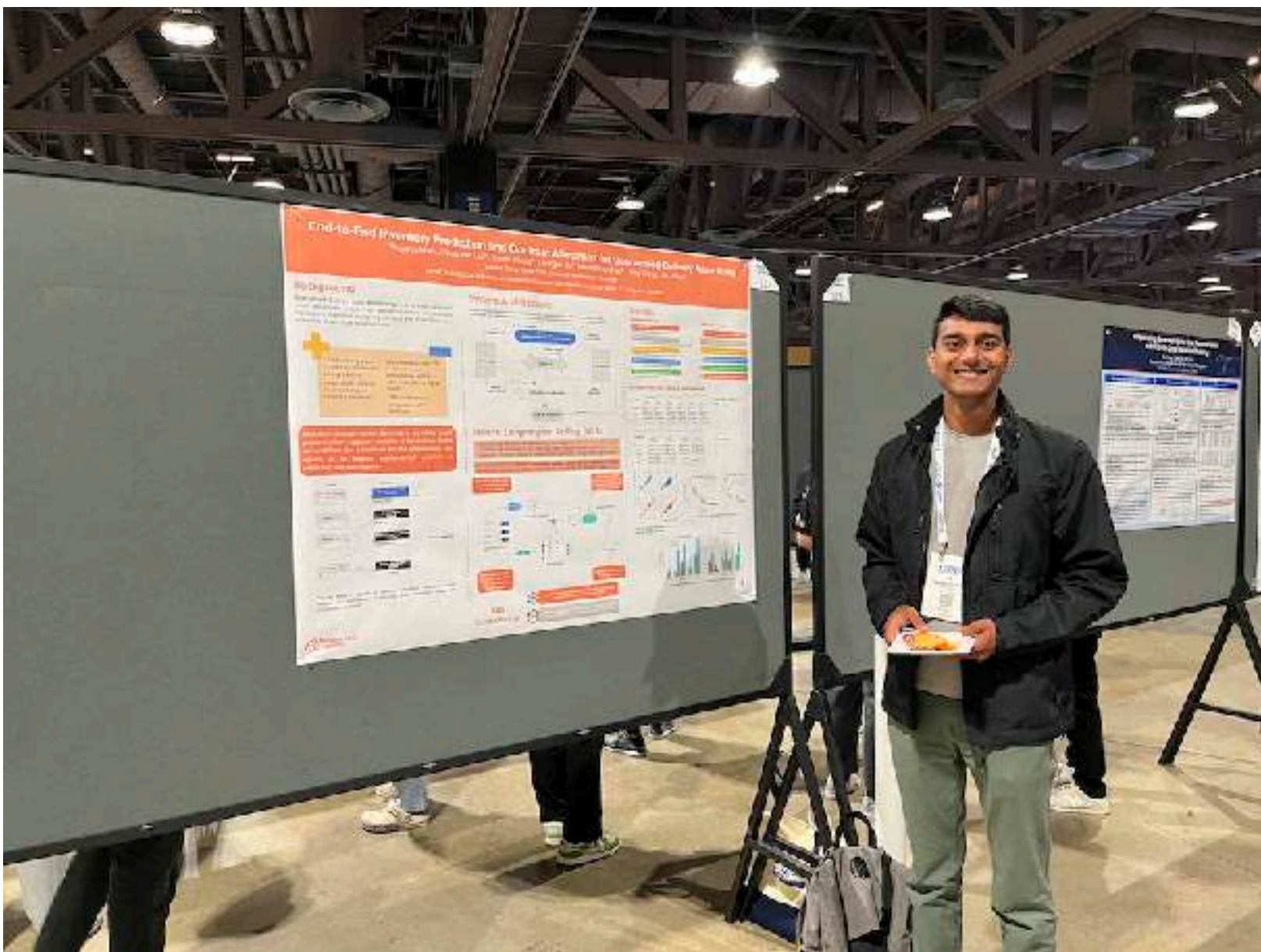**Objective:** Maximize publisher revenue satisfying most contracts

Details: https://www.harsh17.in/kdd2023/

Alibaba

Solution: Neural Langrangian Selling Model

My Current Research (2)
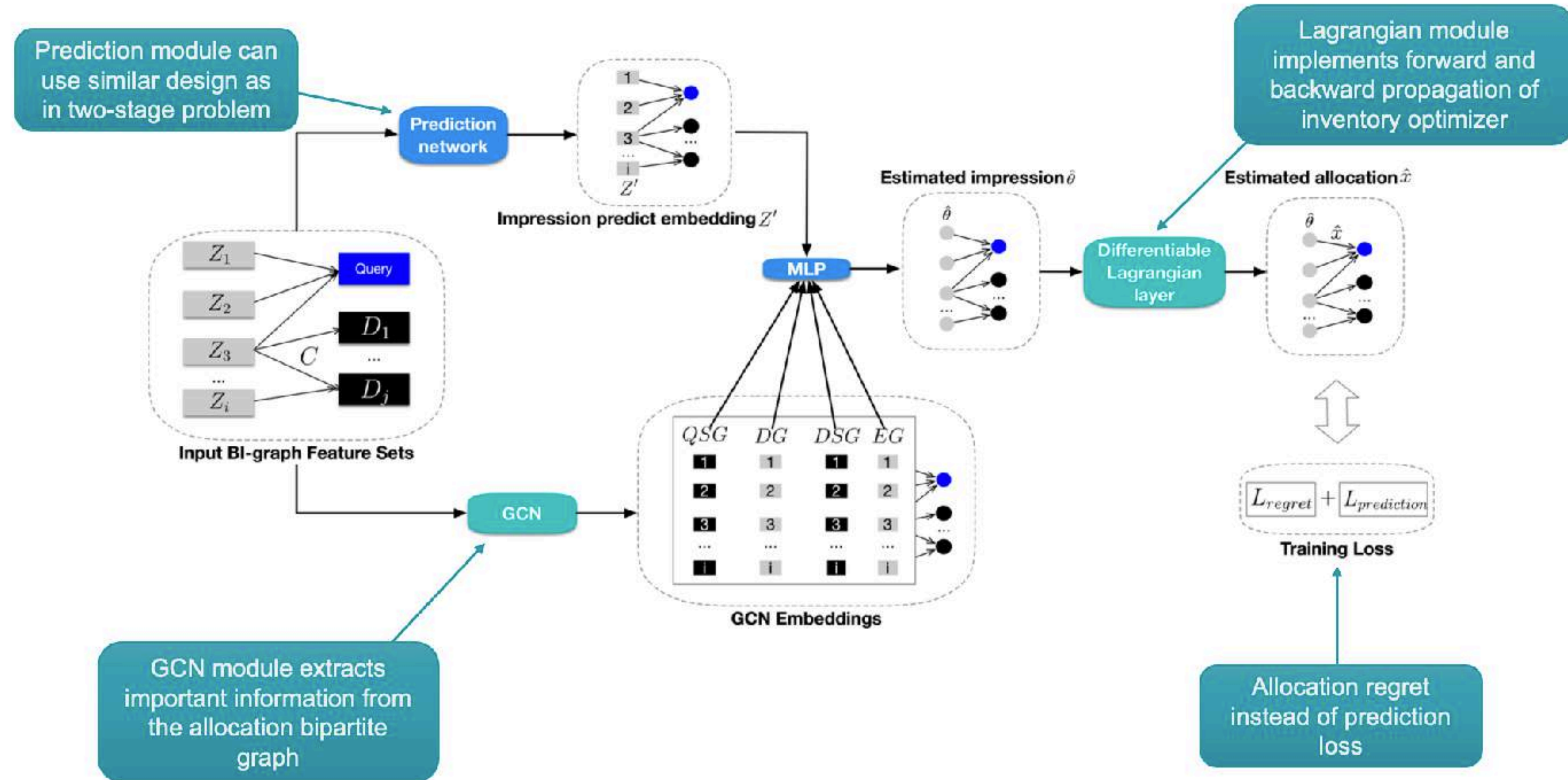
Research is FUN!

THANK YOU!

ANY QUESTIONS?

Consider research as a career option if:

🐈 You are genuinely curious

🫳 Want to be an expert in something

🕊️ Value freedom over certainty

You can also reach out to me via:

1. Email: harshvar@utk.edu or hvsc1708@gmail.com or i16harshvardhan@iimidr.ac.in

2. Website: https://www.harsh17.in/

3. LinkedIn

Sincere thanks to Prof Ajit Phadnis for giving me this opportunity.

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