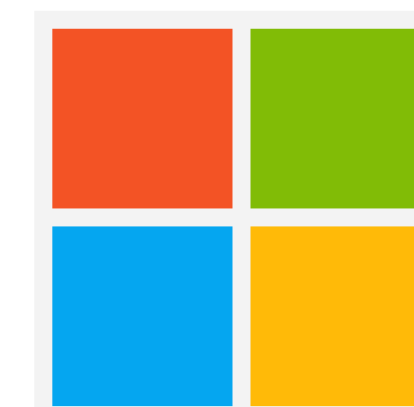


# Decision Making for Social Good Applications

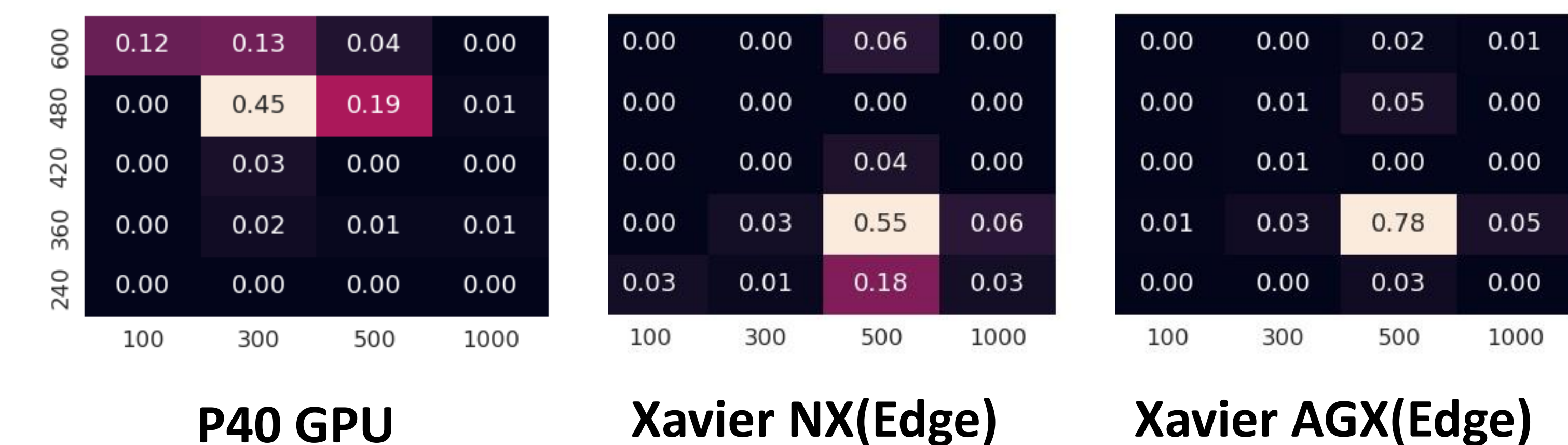
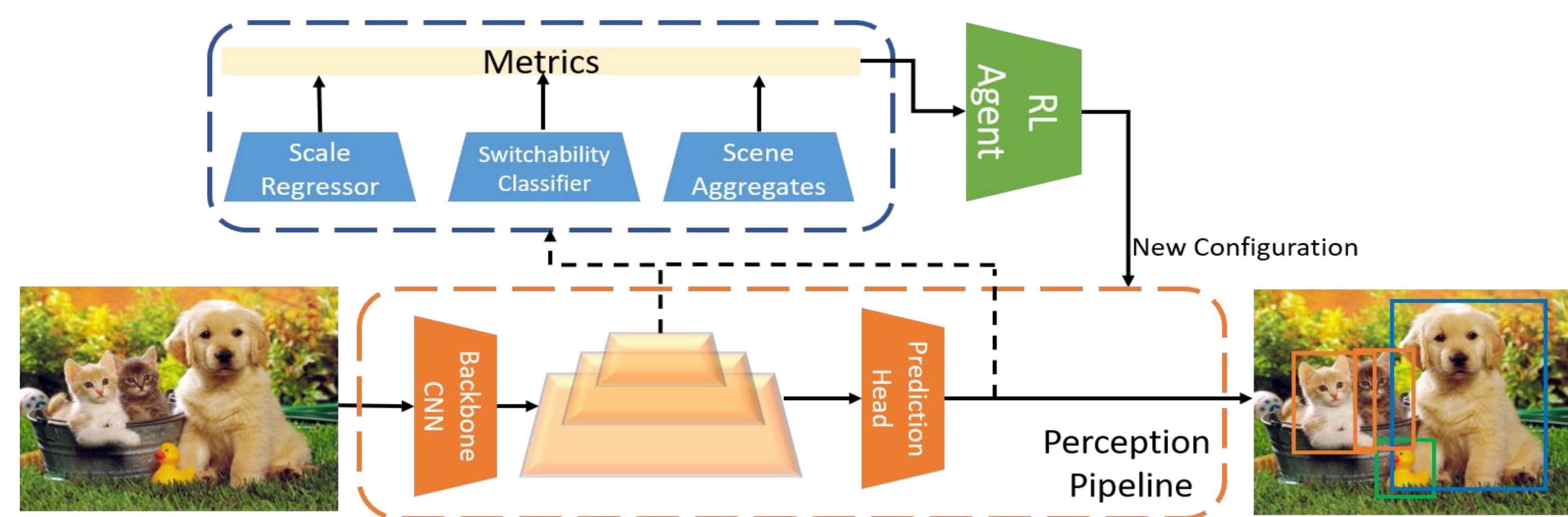
Vaibhav Balloli

Advisors: Akshay Nambi, Tanuja Ganu



## Learning Runtime Decisions for Adaptive Real-Time Perception

## Project HAMS



### Problem

- Real-time perception pipelines are a delicate balance of accuracy and latency. Most solutions prioritize either, which is insufficient when considering real-time performance. Multiple optimal configurations can exist depending on hardware, scene context, etc.

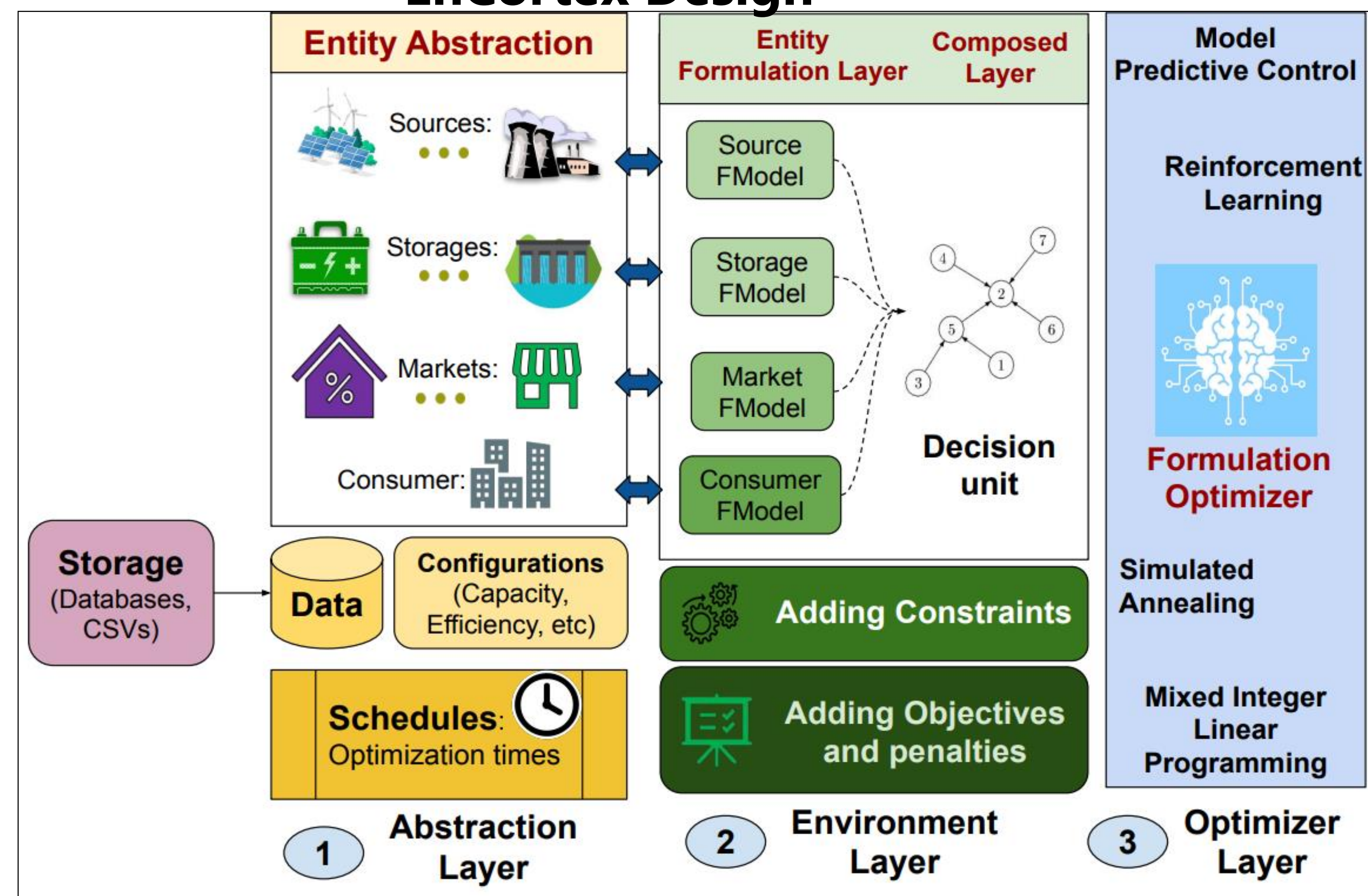
### Contributions

- An RL Agent(Bandit) is trained to pick the best set of configuration every few frames, where the reward is the accumulated streaming performance of the model
- Adjoining heatmaps show how configuration choices differ on different hardware(P40 – server class GPU, Xavier – Edge)

## EnCortex: Decision Management in New-age Energy Systems

## Project Vasudha

### EnCortex Design



### Problem

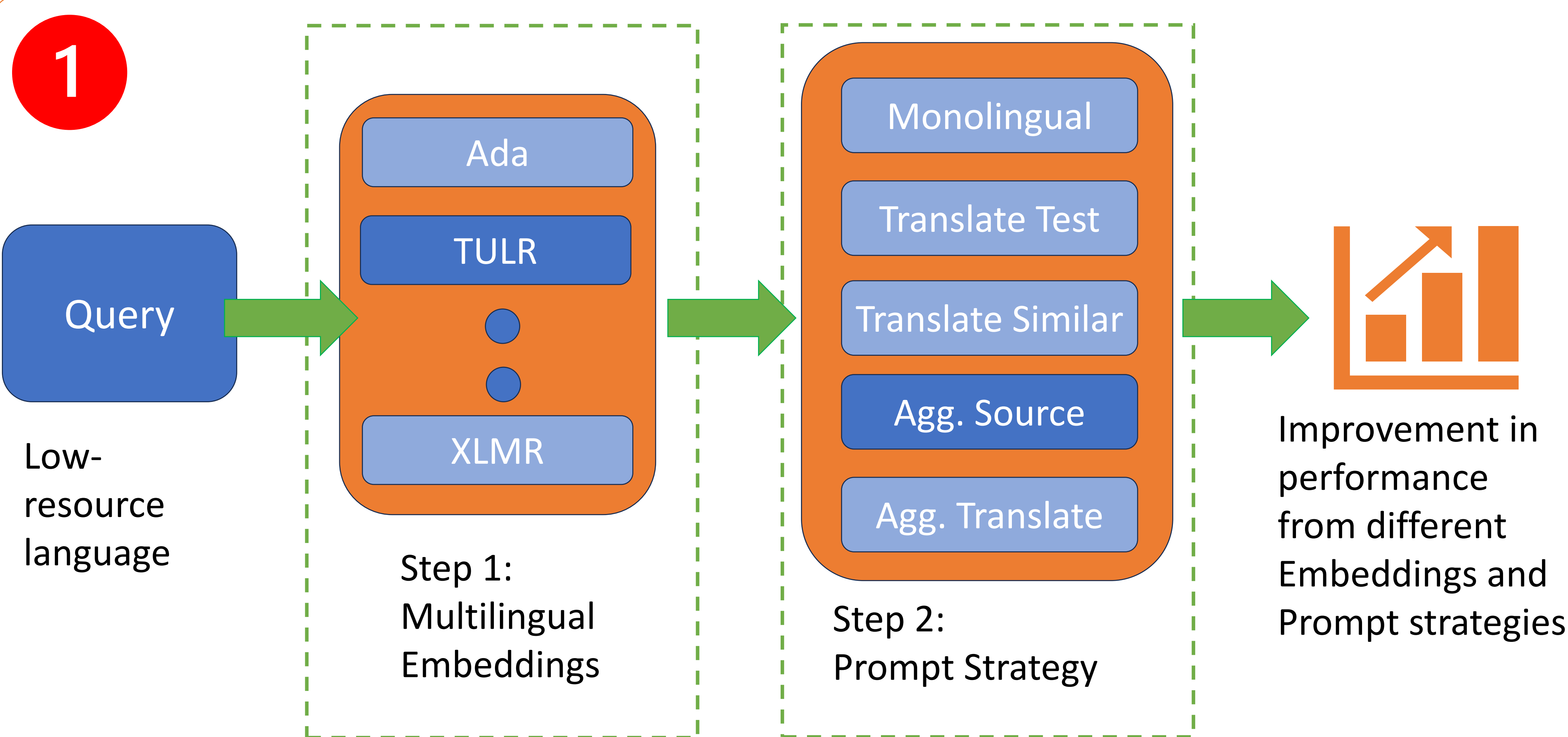
- Modeling modern energy systems is complex – (a) uncertainty in data, (b) dynamic regulations and contracts, (c) Lack of industry standard

### Contributions

- EnCortex provides ability to model, optimize, deploy and scale modern energy systems to improve
- Integrates algorithms like MILP, Robust Optimization methods and Reinforcement Learning
- Integrates seamlessly with the Azure environment – AzureML, SQL, etc. making it easy to deploy

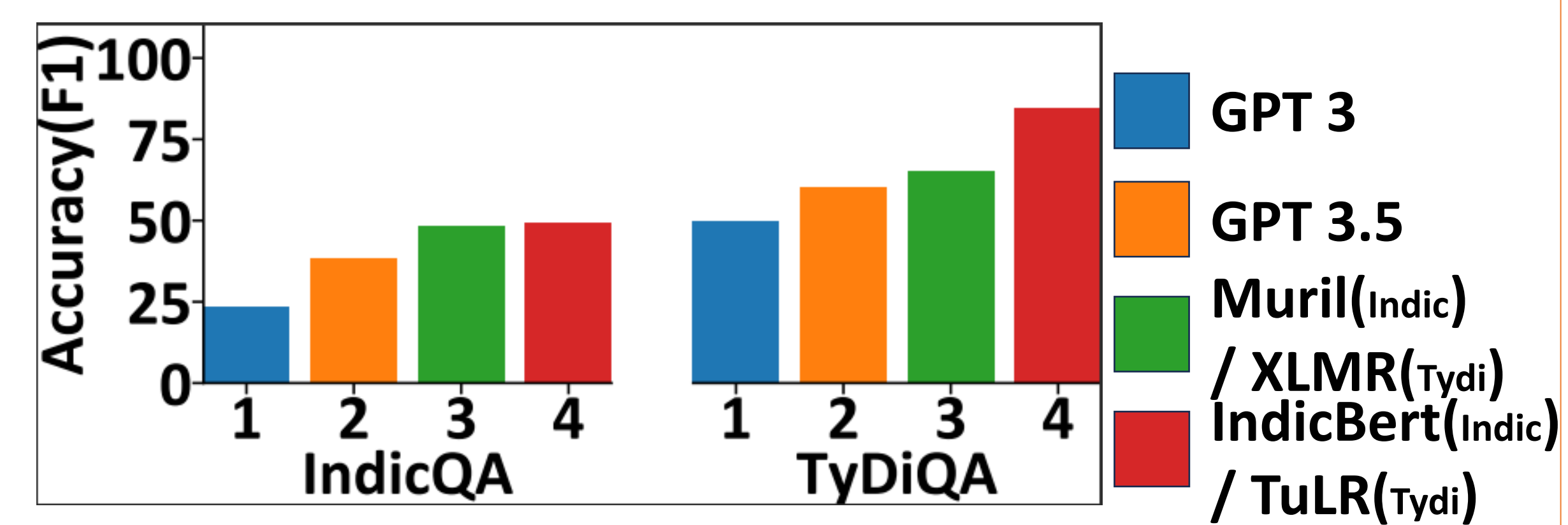
## Learning Strategies for Polyglot LLMs

## Project VeLLM



### Problem

- GPT-x models performance in tasks like QnA on non-English languages lacks in comparison to SOTA models.



### Contributions

- (a) Hybrid GPT Generation using Multilingual Embedding using Retrieval Augment Generation (b) Prompt strategies that are a combination of prompt tuning, translation and aggregation.
- Different strategies exist that boost performance. A bandit is introduced to select the optimal strategy from step 1 that uses human/GPT feedback as input

