Human-in-the-loop Optimization

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Overview

- Human, AI and FoW

- Crowdcur Demonstration

- Team-Planner Demonstration

- BDaL virtual tour

Human-in-the-loop (HIL) Systems

Human workers are treated as mere agents used to pursue the broader AI Goals.

Bring Humans Back to the **Center** of HIL AI Systems

Imagine all the People and AI in the future of work (FoW)

Intellectual challenges of FoW

- Challenge 1: Capturing human capabilities
- Challenge 2: Stakeholder Requirement Specification
- Challenge 3: Social Processes
- Challenge 4: Platform Ecosystems and Computation Capabilities
- Challenge 5: Benchmark and Metrics
- Challenge 6: Ethics

Externally Funded Active Projects

- **Streamlining Task Deployment on Crowdsourcing Platforms (NSF CAREER, 2020-2025)**
  - A middle layer that sits between multiple stakeholders in a crowdsourcing ecosystem to aid requesters in deploying crowdsourcing tasks **(Challenge 2, Challenge 4)**

- **A Humans-in-the-loop Optimization Framework for Designing Derived Attributes in Data Science (NSF CISE Core 2020-2023)**
  - An iterative framework to guide amateur human workers even with limited domain expertise to suggest new attributes for data exploration and predictive modeling **(Challenge 3,Challenge 4)**

- **An Optimized Human-Machine Intelligence Framework for Classification (NSF Core 2018-2021)**
  - An iterative and hybrid human machine intelligence framework for single and multi-label classification that optimizes both human factors and machine computation. **(challenge 1, challenge 4)**

- **Human AI Agile Symbiosis (ONR : 2018-2022)**
  - A framework to enable proactive, context-dependent decision support with enhanced operational capability under uncertainty, time pressure and resource constraints**. (Challenge 4, Challenge 5, Challenge 6)**

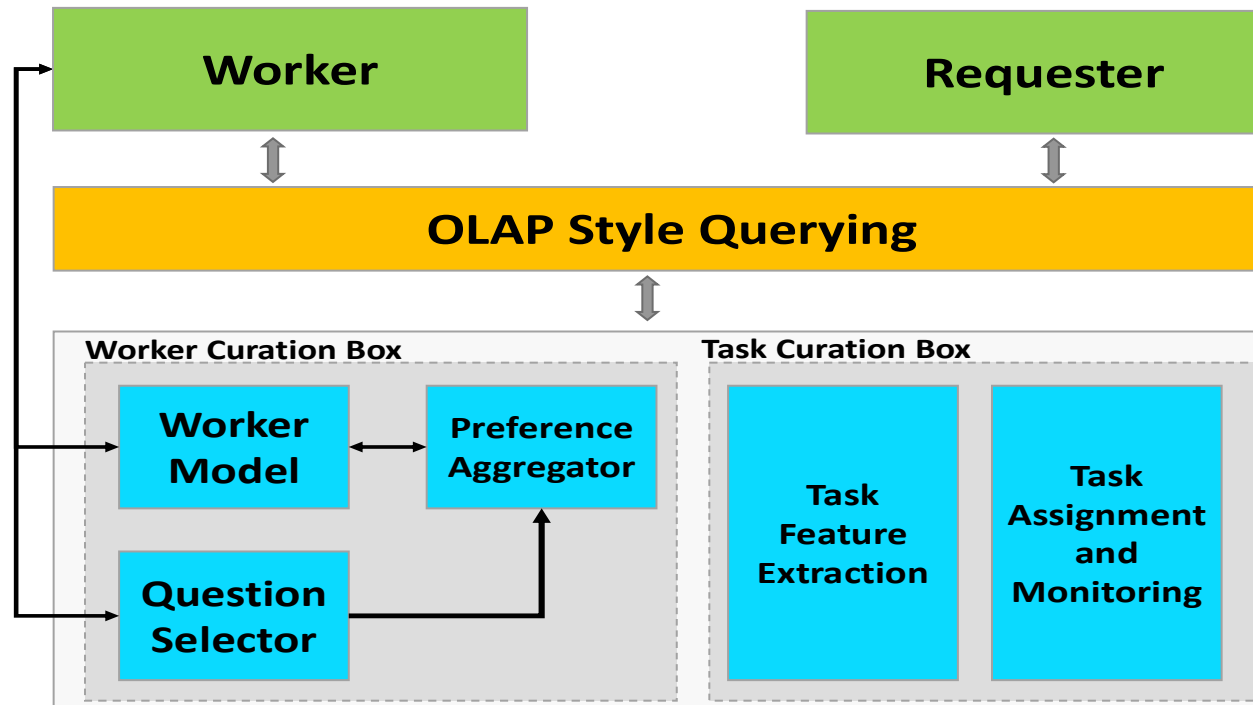The Future of AI in the FoW will be **less supervised**

CrowdCur: A Web-based Plug-in on Micro-gig Platforms (Semi-supervised learning + Data Mining)

ACM Special Interest Group of Management of Data : SIGMOD 18

Involved students : Mohammadreza Esfandiari (PhD, Graduated Summer 2020), Kaval Patel (MS, Graduated Fall 2018)

CrowdCur

Worker

Requester

OLAP Style Querying

Worker Curation Box

Task Curation Box

Worker Model

Preference Aggregator

Question Selector

Task Feature Extraction

Task Assignment and Monitoring

Demonstration
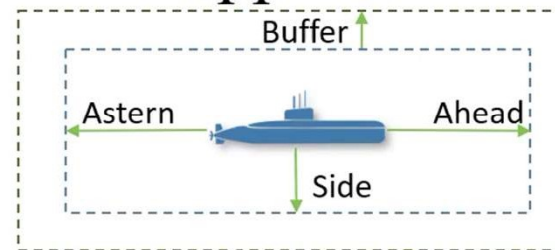
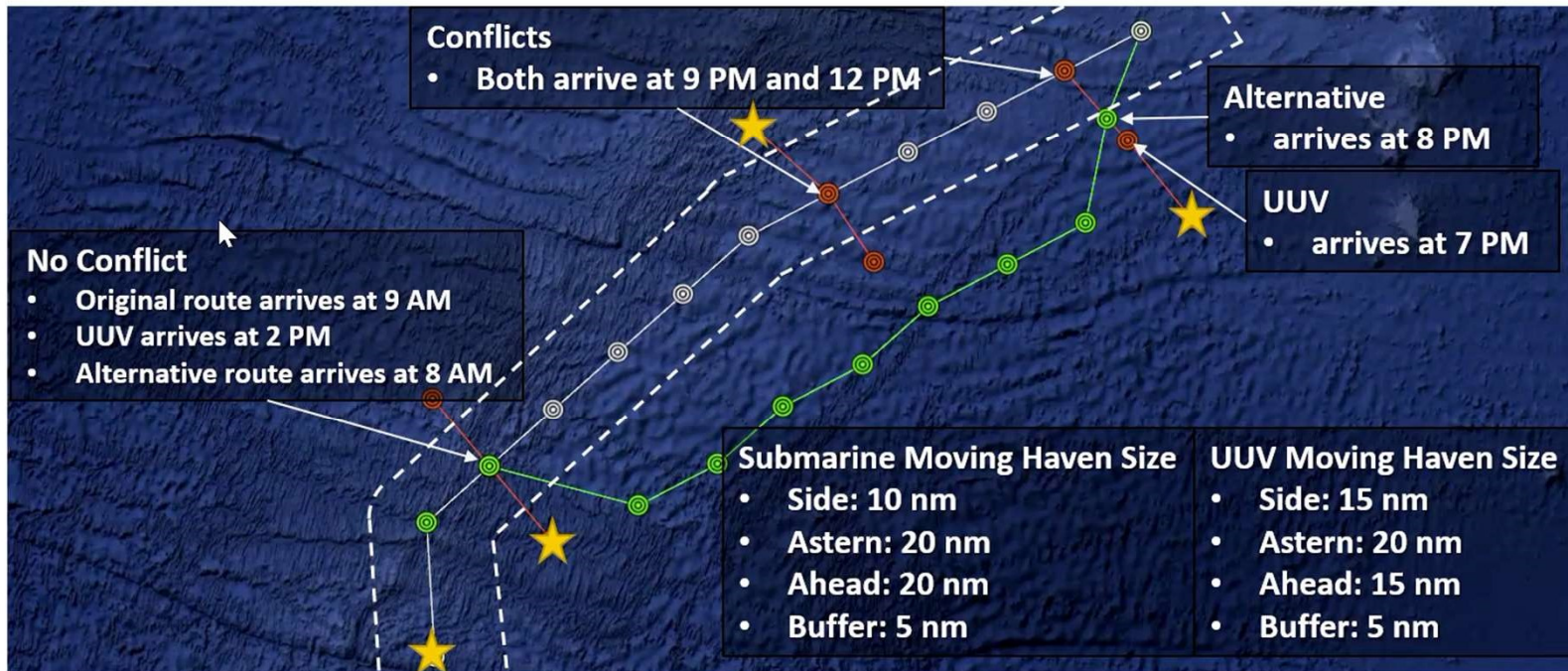# Team-Planner: Tool for human operator (Reinforcement Learning)

Human-AI Agile Symbiosis
Team Decision Making in Naval Applications

Contributors:

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Buffer

Astern — Ahead

Side

⭐ = Source

Conflicts
- Both arrive at 9 PM and 12 PM

Alternative
- arrives at 8 PM

UUV
- arrives at 7 PM

No Conflict
- Original route arrives at 9 AM
- UUV arrives at 2 PM
- Alternative route arrives at 8 AM

Submarine Moving Haven Size
- Side: 10 nm
- Astern: 20 nm
- Ahead: 20 nm
- Buffer: 5 nm

UUV Moving Haven Size
- Side: 15 nm
- Astern: 20 nm
- Ahead: 15 nm
- Buffer: 5 nm

Welcome
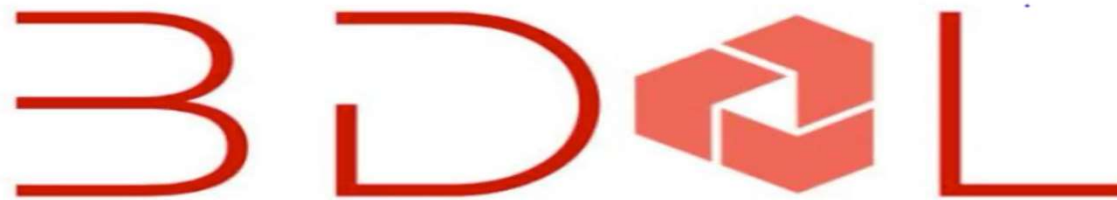
Big Data Analytics Lab

The Big Data Analytics Lab (BDaL), is an interdisciplinary research laboratory, that focuses on large-scale data analytics problems that arise in different application domains and disciplines. One of the primary focus of our lab is to investigate an alternative computational paradigm that involves "humans-in-the-loop" for large-scale analytics problems. These problems arise at different stages in a traditional data science pipeline (e.g., data cleaning, query answering, ad-hoc data exploration, or predictive modeling), as well as from emerging applications.

We study optimization opportunities that come across because of this unique man-machine collaboration and address data management and computational challenges to enable large-scale analytics with humans-in-the-loop. Our focus domains are social networks, healthcare, climate science, retail and business, and spatial data. The research projects at BDaL are funded by the National Science Foundation, Office of Naval Research, National Institute of Health, and Microsoft Research.

NJIT

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THE EDGE IN KNOWLEDGE

Thank You!