HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM

RESEARCH PROJECT #: HPCMP-HIP-24-003

Explainable Artificial Intelligence (AI) for Multi-Domain Combat Simulation

About ERDC-ITL:

US Army Engineer Research & Development Center's Information Technology Laboratory lead research and development in informatics, computational science, and computational engineering with an emphasis on high-performance computing, computer-aided and interdisciplinary engineering, computer science, systems engineering, and instrumentation systems.

RESEARCH LOCATION: Vicksburg, MS

PROJECT DESCRIPTION:

The purpose of this project is to research and demonstrate the use of explainable Artificial Intelligence (XAI) for reinforcement learning (RL). This research will be applied to interpret behaviors and strategies used by RL agents in a Multi-Domain Military Simulation Environment.

The main outcome of this effort will be to provide a written evaluation of XAI for explainable decisions within the application area of reinforcement learning for mission engineering. Explainable reinforcement learning is a cutting-edge research area that has not been explored thoroughly for Defense. Due to the XAI field in combat simulation being a recent research area, the intern will have unique research experience. Under the guidance of a mentor, the intern will conduct theoretical investigations on XAI technique specifically designed for explaining RL agents, participate in hands-on research on learning RL agent behavior in combat simulation, and use HPC for data analysis generated by RL agents.

Week 1: Mentor will provide the intern an overview of the planned project and any introductory information needed to understand what it is about. A reasonably detailed description of the core technical problem project will address. Building "work in progress" document and evolving it appropriately throughout the development cycle including results and analysis added in the last stage of the cycle.

Week 2: Setting up HPC account, required tools, and combat simulation application.

Week 3: Learning mission scenario, deployment of agent in combat simulation environment.

Weeks 4 – 6: Implementation of XAI technique specifically designed for explaining RL agents.

Weeks 6 – 8: Researching to what extent XAI techniques be used to gain insight regarding the behavior of RL agent.

Weeks 8-10: Document result, analysis, conclusion, and future research.

ANTICIPATED START DATE:

May 2024 – Exact start dates will be determined at the time of selection and in coordination with the selected candidate.

QUALIFICATIONS:

Prospective candidates should have basic programming skill, python preferable.

ACADEMIC LEVEL:

Degree received within the last 60 months or currently pursuing:

- Associate's
- Bachelor's
- Master's

DISCIPLINE NEEDED:

- Computer, Information, and Data Science
- Mathematics and Statistics
- Engineering
- Physics
- Science & Engineering-related