DAGSI Research Topic

1. **Research Title:** Reinforcement learning guided by analogical graph neural networks (GNNs)
2. **Individual Sponsor:**

   Ms. Kara Combs (AFRL/RYAR)
   2241 Avionics Cr.
   Bldg. 620, Rm. 301
   WPAFB, OH 45433-7333
   Kara.combs.1@us.af.mil

3. **Academic Area/Field and Education Level**

   Computer, electrical, industrial, mechanical, or related engineering disciplines (MS or PhD level)
   Computer science or related disciplines (MS or PhD level)

4. **Objectives:** To investigate and develop cutting-edge methodologies that leverage graph neural networks (GNN) within the framework of (deep) reinforcement learning. These models can be enhanced by transferring knowledge across diverse environments that emphasize a graphical structure that is otherwise difficult to accurately represent.

5. **Description:** Graph neural networks can enhance the generalizability of (deep) reinforcement models by representing complex relational structures as graphs. Analogies can be derived from similarities between graphs to help drive the reinforcement learning agent toward rewards. This approach can computationally provide cognitive flexibility found in biological intelligence that allows automated agents to quickly adapt to new tasks and environments in a real-world setting. This approach enhances the explainability of interpretable graph-based representations that focus on the relationships and dependencies between various learned tasks. Ultimately, the integration of (deep) reinforcement learning and analogical graph neural networks can improve the utility and flexibility of automated systems.

6. **Research Classification/Restrictions:** Unclassified
7. **Eligible Research Institutions:** Any university in the State of Ohio

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