COSC480: Reinforcement learning for scene navigation using a game engine

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Aims

The primary aim of this project is to develop and implement an AI agent which can learn from its environment without supervision. A measurement of success is to have an agent navigate a 3-D scene in a game engine. The agent would be trained using reinforcement learning algorithms and image data from the agent's viewport, i.e. information that would normally be available to a human player.

If there is enough time available towards the end of the project period, an additional aim is to have the agent complete other vision based tasks within the virtual world. An example of this would be being able to pick up reward items, and avoid harmful elements.

Objectives

I choose to divide the objectives of this project into three portions—theoretical research, development and deliverable preparation.

Theoretical research:

- Preliminary research and understand the problem domain.
- Gain an understanding for deep learning and reinforcement learning.
- Familiarize myself with current approaches to the problem.

Development:

- Algorithm development: experiment with various RL algorithms. At this stage it is not necessary to run these experiments in Unreal. A good place to start would be to utilize the OpenAI gym platform or Deepmind playground. These are open platforms which provides the facilities for agent training.
- Level creation using Unreal Engine.
- Test the developed algorithm on a level created with Unreal Engine.

Deliverable preparation:

- Interim report writing
- Presentation preparation
    - Creating presentation PPT
    - Presentation rehearsal
- Final report writing
- Editing and proofreading for final report

Provisional timeline:

Semester 1:

Academic weeks	**Milestone**	**Deliverables**
Week 1 (27th Feb)	Project selection	
Week 2 (6th March)	Preliminary research	
Week 3 (13th March)	Preliminary research	Project aims and objectives
Week 4 (20th March)		
Week 5 (27th March)		
Week 6 (3rd April)		
Week 7 (10th April		
Mid-semester break		
Week 8 (24th April)		
Week 9 (1st May)		
Week 10 (8th May)		
Week 11 (15th May)		
Week 12 (22nd May)		
Week 13 (29th May)		
Exam period and semester break		