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Media Engineering and Technology
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Artificial Intelligence, Winter Semester 2021/2022

Project Description (Deadline: 30/01/2022 11:59 pm)

Introduction:

Text-based adventure games were big in the early days of computer gaming on personal computers – especially, in the 1980s and 1990s. This was mainly due to their storytelling without much reliance on graphics, etc. Famous examples include Zork (https://en.wikipedia.org/wiki/Zork) and Rogue (https://en.wikipedia.org/wiki/Rogue_(video_game)). The latter even gave rise to its own genre of computer game (https://en.wikipedia.org/wiki/Roguelike). Wikipedia describes the roguelike computer game as:

> ***"Roguelike (or rogue-like)*** *is a subgenre of role-playing video games characterized by a dungeon crawl through procedurally generated levels, turn-based gameplay, grid-based movement, and permanent death of the player character. Most roguelikes are based on a high fantasy narrative, reflecting their influence from tabletop role playing games such as Dungeons & Dragons." (*https://en.wikipedia.org/wiki/Roguelike*)*

There is considerable overlap between artificial intelligence and game development. Here, we focus on the storytelling, as aforementioned. The projects aim is to create an **Environment**, i.e. the world in which the game is played (this does not have to be fantasy but can be anything), in which the game takes place. The **Actuators** of the game are simplified here as they are only text-based responses to the player's input. This means that one must specify the actions which the agent can make in some way. Likewise, the **Sensors** are simplified as the agent only perceives what the player inputs as text. This means specifying what the agents reacts to and in which way it will respond. There should also be a measure of **Performance**. This, of course, depends on the "goal" of the game.

Goals of the Project:

The goal is for you to use the concepts introduced in the class with some simplification to design an AI (artificial intelligence) system. Text-based adventure games in this sense offer a nice little simplification of the class contents. At the heart, one if working on a rational agent (*PEAS Description*). Though, you can use a lot of the other topics introduced in the class so far, *search*, *planning*, *knowledgebases*, etc. The main aim is to think about the program as a type of AI.

This is – after all – very much still an artificial intelligence exercise. Unlike what a lot of media reports around deep learning are suggesting, many applications which include learning still operate with the models discussed in class in the background. Due to the text-based nature of the task, the problem comes close to such applications as natural language generation (https://en.wikipedia.org/wiki/Natural_language_generation), natural language understanding (https://en.wikipedia.org/wiki/Natural-language_understanding) or conversational AI (https://en.wikipedia.org/wiki/Chatbot). These are all in themselves or as part of larger AI systems (e.g. AI Assistants at Home, Robot Systems, Computer Games, etc.) modern applications of AI.

Written Assignment:

Please submit a paper which is between 15 – 20 pages long. The paper should have standard format and sections (see lecture slides 18/12/2021). The paper is supposed to be "scientific" in its character. Therefore, please try to give the paper a central question. This could include:

> *Is the system autonomous?*
>
> *What would be the difference in the game between a utility-based and a goal-based agent?*
>
> *What if one used different performance metrics?*
>
> *Etc.*

The paper should follow standards of referencing, formatting, content, and style. If there are any questions about this, please ask your tutor or lecturer.

Programming Task:

The main aim is for you to show that you can apply what you have learned in class to a practical exercise of considerable complexity. Please submit the code of the programme and a README file which explains to the person who does the grading how to run this. There is no requirement to use a specific programming language, but you should use comments to indicate which part of the code does what (e.g. "#This is where the state-space is described", "This is the A* heuristic function"). As the paper and the code are meant to illustrate the functioning of an AI system, the code should also make explicit links to the paper (e.g. "See section 3.1" can be put into the code).