Artificial Intelligence for Games – Project Research Workbook

This workbook will help you focus your research for your project.  
Once you have answered these questions, use this information in your Technical Design Document.

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| Briefly describe the application, game or simulation you are researching.  (This is your initial idea to focus your research. The application described in your design documents or your final build may end up being different from this description) |
| The simulation I am aiming to create is a maze solving simulator.  The idea of this project will be to take in an image of a maze that the user will either draw or upload from somewhere else.  Once the image is imported, the user will have the option of either stepping forward to watch the pathfinding algorithm solve the maze; or instantly let it solve the maze.  Information will be given to the user such as steps required, maze size and solve speed.  The path will be instantly calculated instantly, but a little character will be used to represent this path for each step.  The user can also use the toolset provided to create and edit their own maze on the fly, as well as generate a maze with a certain percentage of walkable space. |

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| What pathfinding algorithm will you implement.  List some (at least one) online or class resources that will assist you in implementing this algorithm.  Examples may include YouTube videos, blogs, textbooks, or class resources |
| A\* is the most suitable algorithm for this project.  <https://www.youtube.com/watch?v=-L-WgKMFuhE&t=6s> and in class lectures will be extremely helpful in implementing and understanding the algorithm.  The reason A\* is the most suitable is due to how flexible it can be with the pathfinding. Since there will always be 1 start position and 1 end position, this makes A\* the best choice as it does not waste time and resources checking every single node.  It is also easily modifiable. If for whatever reason the user decides to change the base costs of nodes, they can. This will result in the pathfinding AI solving certain setups differently. An example of this is straight up avoiding diagonal movement. |

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| Describe how this pathfinding algorithm will be used by the agents in your application.  For example,   * Will the player-controlled character find a path to the last click? * Will AI agents follow a target? * Will the destination be updated dynamically (if so, at what interval), or only when the agent reaches its current destination   Reflect on (and describe here) how these choices influence the design and development of your application. |
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| What AI strategies could be used. (For example, state-machines, blackboards, decision trees, etc)  Pick two strategies and list a brief description of how they work, along with some resources that could assist you in implementing these strategies. (Examples may include YouTube videos, blogs, textbooks, or class resources) |
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| What is a Technical Design Document, and why is it useful?  List the major topics or points of discussion (at least 5) commonly included in technical design documents. |
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| List the libraries, APIs, algorithms, or assets (i.e., any pre-existing component) that you will use, or might consider using, when implementing your application.  For each component, include a brief statement listing it’s functionality, suitability, and technical impact on the project. |
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| What are the licensing arrangements or restrictions for the pre-existing components you have identified?  (Identify the licence of each component) |
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| Identify a possible audience for your application, game or simulation.  What platform(s) are you targeting? |
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| Describe the real-world environment you will be simulating.  Dscribe any real-world aspects that are present in the game world, and how their real-world behaviour will influence your simulation.  For example, does your program have animals that will head towards water when thirsty? Or, will you implement prison guards that head towards the source of a noise? |
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| Try to describe the complexity of your project.  For example,   * How complex are the AI behaviours you have chosen? * How many classes are needed to simulate all your entities? * How deep is the inheritance hierarchy? * Which algorithms are the most complex or difficult to implement? |
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| Identify any tools that may help you in your implementation.  For example, graphical applications for asset development, debuggers or IDEs. |
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| List any other additional information that may aid in the design of your project. |
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