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Generative AI in games development

GDEV60001 Games development project

Contents

[Abstract 2](#_Toc994750692)

[Introduction 3](#_Toc215494269)

[Aims and Objectives 3](#_Toc778078765)

[Literature Review 3](#_Toc723446788)

[Research Methodologies 3](#_Toc148673192)

[Results and Findings 4](#_Toc1637311717)

[Discussion and Analysis 4](#_Toc391519786)

[Conclusion 4](#_Toc1676471671)

[Recommendations 4](#_Toc292677407)

[References 5](#_Toc1012789634)

[Appendices 6](#_Toc1297779985)

[Appendix 1 – xxx 7](#_Toc1686213210)

# Abstract

***An overview of the project***

This is a summary of the whole report’s contents. Readers may decide whether to read the whole report based on the abstract and therefore it should provide enough information for them to understand what the dissertation is about, including the results of the investigation.

The abstract is written last, even though it is presented at the beginning. It should describe the work that has been carried out, not the work that will be carried out.

# Introduction

***What is the reason you are doing this project?***

This gives the background to the investigation. It puts your investigation into context and gives the reader some idea of the value and importance of your work. It tells the reader why this is an important subject to investigate.

# Aims and Objectives

***What will you be doing?***

You should have a clear statement about the purpose of your study (aims) and how you are going to achieve those aims (objectives). State what you are trying to achieve and how you will achieve it. This is a crucial part of the report as it will be judged on whether your aims and objectives have been achieved.

# Literature Review

***How are other people doing it?***

This section will inform the reader of the current thinking in your specific topic. It will place your research in context and show how you are building upon previous knowledge and any areas of contention should be highlighted. This section might also include information about which data bases you used, which search terms, etc. Ensure you cite your sources of information within the text and add an accurate reference list at the end of your work.

XXXXXXXXXXXXXXXXXXXXXXXX

Two to three sources for each

<https://liedra.net/misc/Flick_Worrall-Ethics_of_Creative_AI.pdf>

What is GAI

Generative artificial intelligence (GAI) is a section of artificial intelligence (AI) that focuses on the creation of human-like material (Peñalvo & Ingelmo, 1970). AI has been around “since the start of digital computation, articulated by others in Alan Turing’s seminal paper on Computing, machinery and intelligence” (Batty, 2025). GAI has been discussed by the artificial intelligent research community for years now and specifically what AI made material should be classed as GAI. The trend was for only high-quality material to be classed as GAI, however in recent years the evolution of AI through the use of publicly accessible large language models (LLMs) such as GPT 4, DALL-E 2 and copilot (Feuerriegel et al., 2023) have made higher quality material to be easier and more accessible which brought GAI into the public eye.

The current versions of GAI search for existing data on the internet to use as a base for the desired output that it has been requested to create. This means that GAI is capable of mimicking humans and their creativity by using thousands of existing examples to create something that, in effect, an amalgamation of pre-existing work that is close to what is needed to be. This is the same process used by other forms of AI such as ChatGPT, through the use of LLMs which are taught in varies ways such as supervised training which is where the model has access to the desired outputs so it knows what types of output is being asked for or reinforced learning where the model is given rewards or penalties dependant on if it fails or succeeds (Dhamani et al., 2024). Chatbots like ChatGPT use the same methods for the generation of material but differ on what problems they solve. Chatbots are designed and trained to provide human-like responses to questions while GAI refers more to the creation of poems, stories, art and code. Chatbots are still a form of GAI, however it is only a section that provides a different use case.

The games industry uses a variety of types of AI, some of the most used are pathfinding and decision-making AI. In terms of generative AI, procedural content generation (PCG) has become far more popularised and mainstream other the years. Games use PCG in different ways, some will build entire maps through mostly the use of PCG then have people go through and touch up the final details as was the case for Marvel’s Spider-Man (Jahani, 2023). PCG is a tool that generates randomized content dependant on variables and filters. An example of this would be how Tom Clansy’s Ghost Recon Wildlands used PCG to create road networks that went through and liked towns and other areas of the game (*Artificial Intelligence in video games,* 2025). This tool as used to save time on development as for open world games lots of manpower is required to place all the roads by hand. This meant that by using PCG the development team, Insomniac Games, could pay meet their deadlines easier.

Some games and additions to games have used various types of GAI to improve aspects of the game. One notable instance of this is with a mod for Skyrim. This mod uses AI to simulate natural and real time conversations with non-player characters (NPCs). This mod uses the same ground work as AI like ChatGPT allowing it to give “life” to the NPCs by having them aware of previous conversations and actual events happening in the players world (Nexus Mods, 2023).

When communicating to Chatbots or other AI formats the AI takes the conversation as an input then searches through its database for a response that it has learned. Some AI also have the capability to search through the internet in order to acquire the answer needed then word it using their database of correct responses. It should be noted that most AI only take in the current line as an input however advancements in the past decade have made using more of the conversation as context generalised for AI. Models like the “LSTM sequence to sequence model (Sutskever et al., 2014) use this type of neural generation to maximise the probability of a response” (Li et al., 2016). With such advancements the next steps are for AI to keep a conversation going as certain phrases and answers will naturally end a conversation. This in and of itself is not an issue unless the objective of the AI in question is to hold full conversations as is with Chatbots. This means that certain commonly used human phrases such as “I don’t know” has to be replaced with other answers that leave room for the user to respond. Without this distinction the AI would merely be answering questions not holding a “human-like” conversation.

Reinforced learning (RL) is one of the AI learning methods used to achieve this outcome. The Idea is to use heuristic approximations to reward the AI if it produces a conversation that aligns with the desired outcome (Li et al., 2016). RL is one of the more commonly used AI learning methods as it allows the AI to acquire an understanding of what is desired. Another method of AI learning is, a type of machine learning (ML), supervised learning (SL). When a response is given the reason behind this response can be hard to see especially in isolation, so by using multiple instances of the same or similar machines the reason can be easier to grasp (Martínez-Plumed et al., 2019). For instance if an answer was given it could be an anomaly or noise, however this can be discounted if the other instances come up with similar results. This is the same concept used in science when experiments will be repeated, and results plotted on graphs in order to see which results are anomalous and can be discounted. This is especially important in ML as if wrong results are counted as correct that will be enforced using the RL and cause issues later when this data is built upon.

1k

What are the benefits

https://www.sciencedirect.com/science/article/abs/pii/S095058492500196X

What are the disadvantages

What are peoples thoughts on GAI

4k words

# Research Methodologies

***How will you carry out your investigation?***

This section is important because if you undertake inappropriate methodology your results and findings will be disputed. The reader needs to know what you did to find out information so they can make a judgement about the suitability of your methodology.

In this section, you state what you have done to achieve your aims, what you did to find the information you need, and, why you did it.

The methodology section can include.

* Research paradigm used, in other words, the type of research you used and why.
* Sample Strategy - if you are using one you should provide a full explanation of who you used in your sample and why.
* Materials and equipment used.

Justify your decisions by referencing back to best practice.

# Results and Findings

***What have you found out?***

Sometimes this section can be merged with discussion and analysis

It tells the reader what you have found out from your investigation. It is objective; there is no interpretation of results in this section (that comes in the discussion). It objectively states the findings of your research. If you have done primary research this is where you present your findings. You may include tables and graphs, but also need to explain the results in words. Any raw data should be included as an appendix.

# Discussion and Analysis

***How has the project gone?***

This covers the interpretation of the findings, evaluation of the significance of the findings and a general discussion of the investigation. What do your findings mean? In this section you should consider questions such as:

* What has your investigation shown?
* Did it achieve its objectives?
* What theory/literature does it support or contradict?
* What are the most plausible explanations of your findings?
* Are there any possible criticisms of the investigation?

The discussion should also:

* Build on the material in the introduction and literature review
* Evaluate the adequacy of your methodology
* Suggest design features that may have affected the results
* Include whether the results would be different under different conditions

# Conclusion

***What conclusions have been reached?***

What has your investigation led you to conclude?

A conclusion:

* Demonstrates that you have achieved what you set out to do
* It provides the reader with a sense of closure on the topic

It might be worth going back to the aims and objectives or your introduction and making sure your conclusion is in line with what you said you would be doing.

# Recommendations

***What would you do in the future?***

Use your findings and analysis to make recommendations. You may recommend that further investigation is undertaken if you realise that there were gaps in your methodology or anomalies in your findings. Alternatively, you may advise that some actions be considered.

# References

Make sure references are given correctly. See Staffordshire University [Refzone](https://libguides.staffs.ac.uk/refzone/harvard) for more information.

We are using Harvard Referencing.

**Referencing guides**

<https://www.citethemrightonline.com/category-list?docid=CTRHarvard>

<https://libguides.staffs.ac.uk/ld.php?content_id=31264350>

<https://libguides.staffs.ac.uk/ld.php?content_id=9572296>

You may want to use Mendeley for your references

<https://www.mendeley.com/>

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# Appendices

Appendices is information referred to in the main document. It is not included in the word count.

Do not put results here: only the raw data should be presented in an appendix. Other materials that may be included in an appendix includes, for example, blank questionnaires, copy of written tests used.

Remember do not include anything in an appendix that has not been referred to in the text.

## Appendix 1 – xxx