Integrating AI in Gaming: A Journey through Ancient Egypt with "Egyptian Hero" Game

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Abstract

This research investigates the integration of artificial intelligence (AI) tools in the design and development of video games, focusing on creating a platform game called "Egyptian Hero" inspired by ancient Egyptian civilization. By leveraging state-of-the-art generative AI techniques like ChatGPT for asset generation, ChatGpt for code generation, and Sincode for debugging, the researchers successfully transformed the classic "Super Mario" platformer game into a visually stunning and culturally authentic Egyptian-themed experience. AI tools enabled the creation of 2D-pixel art assets capturing Egyptian motifs, symbols, and aesthetics, as well as the generation of HTML, CSS, and JavaScript code for the game mechanics. Through an iterative process of generating, debugging, and refining the game components, the research demonstrates the potential of AI to streamline video game development, foster cultural representation in gaming, and enable non-coders to participate in the creative process. The outcomes validate the hypothesis that AI can enhance human work efficiency, particularly in tasks, such as asset creation, code generation, and debugging. This research paves the way for further exploration of AI-human co-creation in gaming design and the democratization of game development through AI-powered tools.

Keywords:
Artificial intelligence, Machine Learning, Generative AI, Video Games, Gaming

ملخص البحث :

يتناول هذا البحث دمج أدوات الذكاء الاصطناعي (AI) في تصميم وتطوير ألعاب الفيديو، مع التركيز على تطوير لعبة منصات تسمى «البطل المصري» مستوحاة من الحضارة المصرية القديمة من خلال الاستفادة من أحدث تقنيات الذكاء الاصطناعي التوليدي مثلMidjourney لتوليد أصول اللعبة، و ChatGpt لإنتاج الكود، و Sincode لتصحيح اخطاء الكود، نجح الباحثان في تحويل لعبة المنصات الكلاسيكية «Super Mario» إلى لعبة مبهرة بصريًا و تجربة مصرية أصيلة ثقافيا، كما مكنت أدوات الذكاء الاصطناعي من إنشاء أصول فنية 2D-pixel تلتقط العناصر والرموز والجماليات المصرية، بالإضافة إلى إنشاء رمز HTML و CSS و JavaScript لميكانيكا اللعبة. من خلال عملية متكررة لتوليد مكونات اللعبة وتصحيحها وتحسينها، يوضح البحث قدرة الذكاء الاصطناعي على تبسيط تطوير ألعاب الفيديو، وتعزيز التمثيل الثقافي في الألعاب، وتمكين غير المبرمجين من المشاركة في العملية الإبداعية. تثبت النتائج صحة الفرضية القائلة بأن الذكاء الاصطناعي يمكن أن يعزز كفاءة العمل البشري، لا سيما في المهام، مثل توليد الأصول، وإنتاج التعليمات البرمجية ، وتصحيح الأخطاء. يمهد هذا البحث الطريق لمزيد من الاستكشاف للإبداع المشترك بين الذكاء الاصطناعي والإنسان في تصميم الألعاب وإضفاء الطابع الديمقراطي على تطوير الألعاب من خلال الأدوات التي تعمل بالذكاء الاصطناعي

Research problem:

- Lack of comprehensive understanding and practical guidelines on how to effectively integrate AI technologies into the game development pipeline.
- Traditional game development methods rely heavily on manual processes, such as asset creation, level design, and gameplay programming, which can hinder the ability to rapidly prototype, iterate, and explore new ideas.
- leverage AI technologies to generate authentic game assets and enhance gameplay mechanics in a historically and culturally inspired game like "Egyptian Hero".

Research Importance:

- Integrate AI technology in gaming to enhance the gaming experience and open up new possibilities for creating immersive and realistic virtual worlds.
- Investigate the potential of AI-based generators in the development of games.
- Automation and machine learning in game development, so that game developers and designers can create content more efficiently, minimize time and effort, reduce costs, and expand their creative horizons.

Research Objectives :

- Exploring and addressing the challenges of using AI in gaming by developing the "Egyptian Hero" platform game, a visually stunning and culturally authentic gaming asset inspired by ancient Egyptian civilization.
- Pave the way for AI-human co-creation in the space of Gaming design.
- Design more immersive video games that have an Egyptian identity.
- Reduce the costs of the asset-making pipeline, a major concern for gaming teams of character designers.

Research Hypotheses:

The research assumes that:

- Rather than requiring programming expertise to develop a game, artificial intelligence will allow talented people to experiment with designs and structures and produce new works of art.
- AI is clarity used to enhance human work efficiency in gaming, especially for tasks like adjusting game balance; and fixing bugs, primarily within creative development and quality control tasks.
- Utilizing automation and machine learning in game development, Game designers and developers can create content more efficiently, reduce costs, and extend their creative horizons.

Methodology of Research:

This paper follows the descriptive approach to clarify the concept of Integrating AI tools in developing and designing immersive games. Throughout the research process, the researchers documented their observations, challenges, and insights, paving the way for further exploration and refinement of AI-assisted game development techniques.

Introduction:

The video game industry has witnessed tremendous growth and evolution over the years, driven by technological advancements and the ever-increasing demand for immersive and engaging gaming experiences. Designing and developing video games is a complex process that requires teams of artists, designers, and programmers to create every aspect of the game, from characters and environments to gameplay mechanics and narratives. Understand various elements such as gameplay mechanics, visual aesthetics, and user experience. However, one of the most promising areas of innovation in this field is integrating artificial intelligence (AI) into game design and development processes, for generating game assets. Game assets encompass a range of visuals designed specifically for games, including concept art, character models, environments, and other illustrations. Generative AI automates content creation. It can generate original elements that complement the game's aesthetics, such as characters, landscapes, music, and storylines. (Sankalp Singh Yadav, 2024)

Also, integrating AI tools into gaming design has made it easier for even those without any coding experience to incorporate AI tools into gaming design. By leveraging AI tools, game designers can enhance player engagement, create realistic and dynamic environments, and improve overall game mechanics. (Flora Amato a, 2019)

This research paper explores the integration of AI in game design, with a particular focus on developing a platform game called "Egyptian Hero" Inspired by the classic Super Mario franchise, "Egyptian Hero" reimagines the iconic platformer through the lens of ancient Egyptian culture. By leveraging state-of-the-art generative AI techniques, the project aims to create a visually stunning and culturally authentic gaming experience that transports players into a world reminiscent of ancient Egypt, it demonstrates how AI can generate pixel art assets that capture the essence of Egyptian civilization, from characters and environments to obstacles and collectibles.

The game retains the core gameplay mechanics of the original “Super Mario”, where players control a character navigating through levels filled with obstacles and enemies. However, the iconic Italian plumber is replaced by a protagonist adorned in traditional Egyptian attire, and the familiar coins, pipes are swapped for Ankh key, Egyptian columns, and ancient Egyptian symbols. This transformation not only infuses the game with a rich cultural identity, but also showcases the potential of AI-generated art in breathing new life into beloved gaming experiences.

Theoretical Framework:

Artificial intelligence and Generative AI

Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any

machine that exhibits traits associated with a human mind such as learning and problem-solving. (FRANKENFIELD, 2022)

Machine Learning: A branch of artificial intelligence that is broadly defined as the ability of a machine to focus on using data and algorithms to enable AI to imitate intelligent human behavior. (Berkeley, 2020)

Generative AI: A subset of artificial intelligence technology, that is capable of generating seemingly new, meaningful content in varied formats such as text, images, programming codes, or audio based on user prompts from training data. (Feuerriegel, 2024)

Game design: An iterative activity creating optimal experience in games through game mechanics, storytelling, game aesthetics and technologies. (Bazhenova, 2023)

What are the "Game Assets"?

(a) The visual displays, text, animation, video, artwork, and other elements that the player can see in the game (such as the game's plot, backstories, and lore, as well as transcripts of any gameplay); characters that appear in the game or are described in it; and the game's levels, locations, and maps).

(b) Audio components of the game, such as speech tags, soundtracks, musical compositions, sound effects, and dialogue.

(c) The tactile components include movements, vibrations, and feedback forces. (Stuart Irvin W. T., 2023)

Generative AI in Gaming

There are many exciting opportunities to create distinctive, flexible, and customized gaming experiences with generative AI in game design. Some Key ways that generative AI might enhance game design are as follows:

- Procedural content generation: Generative AI is making an impact in enhancing the realism of in-game graphics and animations. Games can have higher visual fidelity thanks to the usage of generative AI, which can produce excellent textures, animations, and visual effects. This technology allows game creators to create realistic visuals and intricate animations that engross players in vibrant, visually spectacular gaming environments.
- Dynamic Storytelling: AI algorithms can analyze player behavior and interactions within a game to dynamically adjust game mechanics, difficulty levels, and narrative paths. With the game-changing according to the player's choices and actions, this feature enables more dynamic and captivating gameplay experiences that make for an incredibly immersive and interactive gaming experience. (INGBAE, 2024)
- Open Worlds: With little to no human input, generative AI may create large, complex game worlds that give players a sensation of never-ending discovery, immersing players in rich and visually stunning gaming worlds. (Xiang le, 2023)

History of Artificial Intelligence in Gaming

One of the first arcade video games, Pong, is credited for popularizing artificial intelligence in its most "primitive" form. In 1972, Atari released this game at the time, which was a basic table tennis game. The AI in Pong was simply moving the paddle back and forth to try to

hit the ball based on the arranged patterns. No learning was involved in this AI; the movement was extremely predictable and repetitive. Although it was simple, this game was revolutionary at the time, and it showcased the potential games had in the future.

A more sophisticated AI was introduced to us in the 1978 game Space Invaders. The game's concept was straightforward. It had an extraterrestrial row that moved back and forth before gradually descending onto the player. Similar to Pong, this AI was programmed to obey certain rules. The distinction in addition to features like acceleration and sporadic motions as the number of aliens dropped. It also presented players with a challenge and provided an unanticipated dimension. This game had a significant improvement over Pong's AI, despite the minor tweak.

Early AI video game examples are crucial because they show that, despite the limitations of the technology available at the time, AI is capable of creating entertaining and difficult games. These early instances of artificial intelligence in video games are significant because they paved the way for further advancements in the field. These games achieved things like emphasizing the harmony between difficulty and accessibility by establishing the fundamentals of artificial intelligence and fabricating the appearance of intelligence and adaptability within a predetermined set of guidelines. For obvious reasons, a game cannot become excessively difficult or incredibly easy, and the basis for this was set by early titles like Pong and Space Invaders.

Even if these "ancient" games may appear basic and archaic in comparison to newer games, we shouldn't overlook their influence on gaming both now and in the future. These are the games that set the path for the sophisticated artificial intelligence (AI) algorithms found in the popular current games we play today. Among the first games that managed to establish the path for modern gaming standards are Space Invaders and Pong. (Assaf., 2023)

Advantages of using Artificial Intelligence in Gaming

- **More efficiency:** AI tools can streamline and accelerate various aspects of game development, including asset creation, code generation, and debugging.
- **Improved creativity:** AI can generate unique game assets, characters, environments, and storylines, potentially inspiring new creative directions.
- **Democracy of the development of the game:** AI tools enable non-coders and individuals to participate in game creation without extensive technical expertise.
- **Fast prototype ring:** AI ensures a fast generation of game elements, facilitating faster iteration and experiments in the design process.
- **Cultural representation:** AI can help create cultural authentic assets and environments. (Bazhenova, 2023)

Disadvantages of using Artificial Intelligence in Gaming

- **Unpredictability:** AI-generated content can be inconsistent, broken, or unplayable, requiring careful human supervision and healing.
- **Lack of human creativity:** While generative AI can automate certain tasks, it lacks the creativity and vision of human game designers. It works best as a tool to augment human design. Moreover, AI-generated art may not be as flexible and adaptable as human-made

art, which can hinder a developer's ability to respond to changing design needs or user feedback. (MYKHAILO ZHYLIN, 2024)

- **Ethical concerns:** There are risks of unintentional copying or plagiarizing existing game assets, sounds, or designs when using AI-generated content.
- **Limited flexibility**: AI-generated art may not be as adaptable as human art, potentially hampering the ability of developers to make specific adjustments or react to user feedback.
- **Technology dependence:** Excessive dependence on AI tools could undermine traditional skills and knowledge in game development. (AMITVIKRAM NAWALAGATTI, 2018)

Practical Framework

The practical aspect of the research involved several steps such as Game Planning, Game Conceptualization, Code Generation, Code Debugging, Asset Creation, Asset Integration, Game Testing, and Deployment as follows.

The research would contribute valuable insights into the evolving landscape of game development and the potential for AI to revolutionize creative processes in the gaming industry. It allows for a thorough examination of the game development process, of using AI tools instead of traditional animation programs.

Overall Game planning

Select the game type: We selected the genre 'Platform Games'. These games center on a player-controlled character navigating obstacles and defeating enemies. Platformers are considered a subset of action games. (Minkkinen, 2016) We adapted the "Super Mario"[1] game using ancient Egyptian symbols and renamed it "Egyptian Hero".

Audience: Platform games are played predominantly by young children at varying stages of physical, emotional, and social development

Number of players: Some Platform games are played by a single person; others by two players of adults or children.

Figure (1) Explains the "Super Mario" platform game in which the player must overcome obstacles by jumping.[1]

To build an “Egyptian Hero” video game Using Generative AI we took the following steps:

1- Generate the full description of the game

First, we prompted the general ChatGpt [2] with the following question (Give me a super-detailed description of the “Super Mario Bro.” game including the game components, User interaction, styling, detailed Game flow, Visuals, and Audio cues).

The results appear reasonable, so we summarized them into one level as follows to simplify the game and facilitate the code generation for the game to be created “Egyptian Hero”

1. Game Components

Characters: “Mario” The main protagonist, controlled by the player.

2. User Interaction

A. Controls

- **Directional Pad**: Move Mario left or right.
- **Space bar Button**: Jump, **B Button**: Run.

3. Styling (Visual Style)

- **Graphics**: 8-bit pixel art, characterized by bright, colorful environments.
- **Character Design**: Distinct and easily recognizable sprites for Mario, and enemies.
- Mario: A small image styled to fit within the game area.
- **Pipe Generation:** Green-colored pipes appear at regular intervals, creating obstacles for Mario that move from right to left across the screen.
- **Platforms**: Fixed and moving platforms, gaps, pipes, and environmental hazards.
- **Background:** The game area has a sky-blue background to simulate the sky.

4. Detailed Game Flow:

Initialization:

- The game initializes by positioning Mario at a certain height within the game area.
- Mario’s initial position, gravity, and jump height are set.

Game Start:

- The game begins and Mario starts falling due to gravity.
- Pipes start appearing from the right side of the screen and move towards the left.
- Each jump momentarily counteracts gravity, allowing Mario to move upward.

Collision Detection:

- The game constantly checks for collisions between Mario and the pipes or the ground.
- If a collision is detected, the game ends, and a "Game Over" message is displayed.

Game Over:

When a collision occurs, the game stops. The player is alerted that the game is over and can be restarted. The game is designed to be simple yet challenging, providing an engaging experience for players as they try to achieve the highest score possible by navigating Mario through the pipes. The player is given an option to restart the game.

2- Generate the game code

Generative AI can speed up the content creation process, introduce new ideas, and enhance gameplay mechanics. ChatGpt is able to help developers write code, which can help increase the speed of the development process. After we asked the ChatGpt for an accurate description of the “Super Mario” game. We asked it in the same chat to generate HTML, CSS, and

JavaScript code for a very basic video game according to the previously described game. HTML, CSS, and JavaScript are some of the most classic languages for game development.

- **HTML** language for creating the game structure. It stands for Hyper-Text Markup Language. It is used to design games and provide the fundamental skeleton of the game. It tells browsers how to display text, images, links, and other elements.
- **CSS** or Cascading Style Sheets, is the language that transforms a basic HTML structure into a user-friendly and visually appealing game look. It's a simple language that controls how HTML elements (like text, images, and buttons, spacing) are displayed in a game. With CSS, you can change the font size and color, add backgrounds, and control the layout.
- **JavaScript** is used to implement the game logic and functionality. It adds interactivity to games and features like animations, interactive forms, and dynamic content to game applications. (sahilali, 2024)

The ChatGpt generated the code but it initially gave unsatisfactory results, after we ran the codes. Then we told it to add game objects, player movements, controls, collision detection between the player and platforms, enhance initialization, start the game function, Level design, etc.

We noticed that it gave code into pieces, a bunch of code for every improvement we needed, and we don't have any experience in coding, so we asked ChatGpt again "Where do we paste the above code snippets into the original game code?". It told us where to paste every bunch of code in. so we grabbed all of these codes and pasted them where it told us to test the code after countless chats and a lot of back and forth with the ChatGpt for regenerating the code to make enhancements because of missing some features and functions in the game. The game worked properly. Finally, we copied the full codes generated by ChatGpt , and pasted them after editing on the Code pen [3] AI application to run it and see the results that have an elementary structure as shown below.

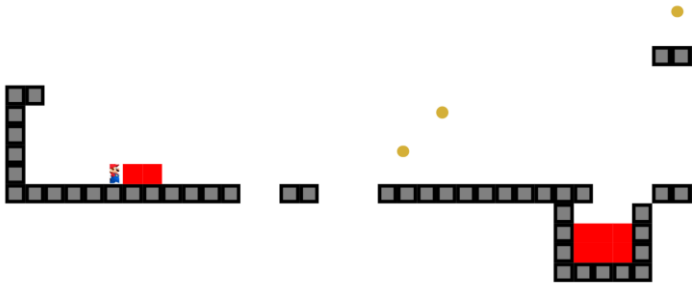


Figure (2) The output result of the game after running the ChatGpt code

3- Debugging the code

It is crucial to note that ChatGpt codes cannot be fully independent and may have limitations in accuracy and reliability. To ensure the generated material is in line with the planned design and gaming experience, they need Debugging input, supervision, and direction. So, we can't spot the problem to fix.

Therefore, we use a tool known as Sincode [4] that Uses AI to run and detect bugs in games, offering solutions to fix code with problems. It automates testing processes, swiftly uncovered issues, and enhances the overall quality of the code.

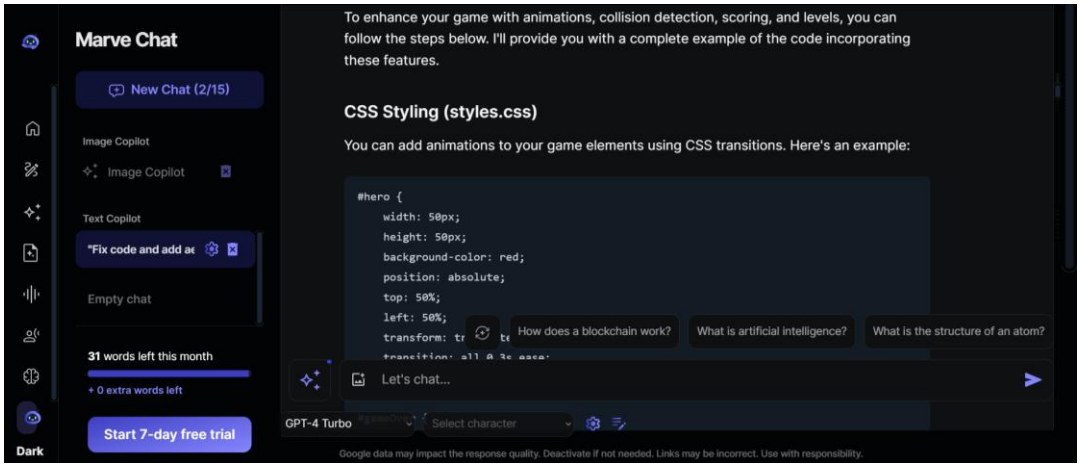


Figure (3): Sincode interface during debugging the game code

We use AI tools to debug video games. Therefore, we asked it to make the game visually appealing, add dynamic elements, a scoreboard, and fix the code problems. After multiple attempts to enhance the code quality, we ran the codes after many enhancements to the game.

Figure (4): Screenshot of "code pen" AI tool during running the code after updating new code.

4- Generate AI Game assets

AI-generated game assets are gaining popularity due to their ability to create realistic worlds, characters, and animations faster than traditional methods.

The advent of text-to-image AI generators such as ChatGpt , Github copilot, and Bing image creator has the character design process in developing the game revolutionary. These instruments fundamentally reject the traditional stages of character design by enabling creators to render composite optic concepts straightaway from textbook descriptions. In the past character design usually had several stages, such as conceptualization, sketches, refinement, and completion. Nevertheless, with AI-powered tools, designers can straightaway enroll detail text prompts and find well-nigh now fully actualised character designs.

At the beginning of the development process, Midjourney was planned to be used for generating all the visual assets Egyptian civilization-themed. These tools use machine learning to create high-quality, diverse assets that fit the desired art style.

We aim to build a game with ancient Egyptian identity, so drawings should reflect the type of game being used. It is imperative to use graphics that reflect the Egyptian civilization, starting with the background graphics, character features, clothing, the general mood of the game, and symbols used in the game.

We use Egyptian-themed game assets such as:

- **Protagonist character:** The main character in a game that the player controls and interacts with the game world through. (WHAT ARE ASSETS IN GAME DESIGN?, 2023). With the characters, after deciding to go with a 2D Pixel art look. Researchers assumed a design "full body shot for an Egyptian male character from side profile for a game inspired by Flappy Bird, full body shot, has Egyptian clothes (white skirt, pleated petticoats, wrap-around skirts which were known as Shendyt, precious gems, and jewels, The Names on their heads features blue and gold bands, an uraeus snake figure at the front, and rings in the back)" and the results were as follows:

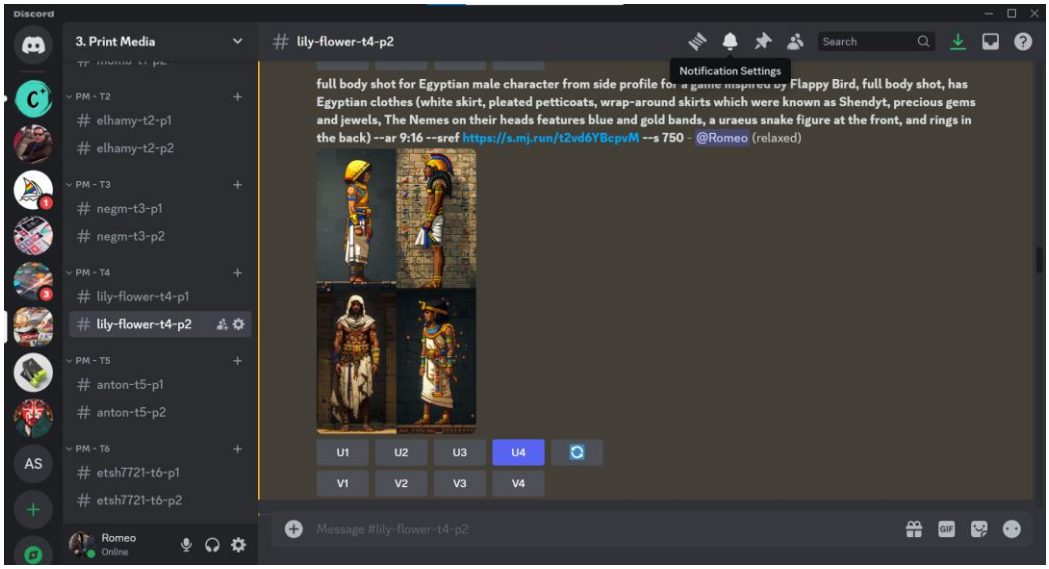


Figure (5): The Midjourney interface after entering the prompt

We selected the fourth image as the main character of our game "Egyptian Hero", then upscaled it, and removed their backgrounds to be transparent by Remove.Bg [5] AI tool as shown below.

Figure (6): Screenshot of removing background from images by AI tools

- **Game Background:** Game backgrounds help to adjust the mood and tone of the game, and can also provide important information about the environment. For the video game "Egyptian Hero", our approach was to build a habitat to represent ancient Egypt's civilization in 2D Pixel art.
- **Background elements:** The game background elements are often part of Game Environment Design. So, we add Pyramids, the eye of Horus, and sand to complete the game's general atmosphere.
- **Add collectibles for games:** Any player doing a mission should have a motivation to push them to progress, increase their points, and complete the level, so the picks, that the player will receive should be defined. (TIM NAGLÉ, 2021). We add Ankh keys as collectibles for the “Egyptian Hero” game.
- **Obstacles:** They are game elements that hinder the player from taking the shortest route between two places. They create Movement Limitations in how players can perform Movement or Maneuvering in Game Worlds. We generated Egyptian columns to act as obstacles in the “Egyptian Hero” game like pipes in the “Mario” game.
- **Enemies:** The enemy in video games can be defined as the target and object of attack within the game, representing a threat or opposition to the player or protagonist. The depiction of enemies in video games is a significant aspect of game design and storytelling, influencing the gameplay experience and narrative elements. (Brandon Valeriano, 2016). We set Egyptian Scarab as an enemy for the main character “Egyptian Hero”.

We use AI text-to-image “ChatGpt ” to create high-quality, diverse assets that fit the desired “Pixel art” style as follows.

Figure (7): shows 2D-pixel Egyptian-themed assets generated by “ChatGpt ” to our video game “Egyptian Hero”

5- Regenerate the code and alter the original game assets with ancient Egyptian game assets.

Now, it is time to replace the Mario character, pipes, background elements, coins, enemies, and canvas background with Egyptian game assets. Therefore, we create a URL for every image we want to replace in the game. We can conclude this process in three steps:

- First, we went to Imgur [6] website to upload our images and obtain the images' URLs as shown in Figure (8).
- We get back to ChatGpt to put the images' URLs in ChatGpt and specify which image corresponds to which as follows:
  Background canvas: https://imgur.com/a/LQ4cOul
  Egyptian Hero: https://imgur.com/a/GOJCzGL
  Collectibles: https://imgur.com/a/7tcq06n
  Column (1): https://imgur.com/a/G4bIaG8
  Column (2): https://imgur.com/a/Kolohs7
  Horus Eye: https://imgur.com/a/mEh5dUy
  Scarab Enemy: https://imgur.com/a/A4DmSfx
  Sun: https://imgur.com/a/HIeOYQr
  Palm tree: https://imgur.com/a/DaTopic
  Ending Gate: https://imgur.com/a/rw0HHnW

Finally, they asked Sincode to regenerate the code with the updated image links, and ChatGpt generated the new code with the updated links.

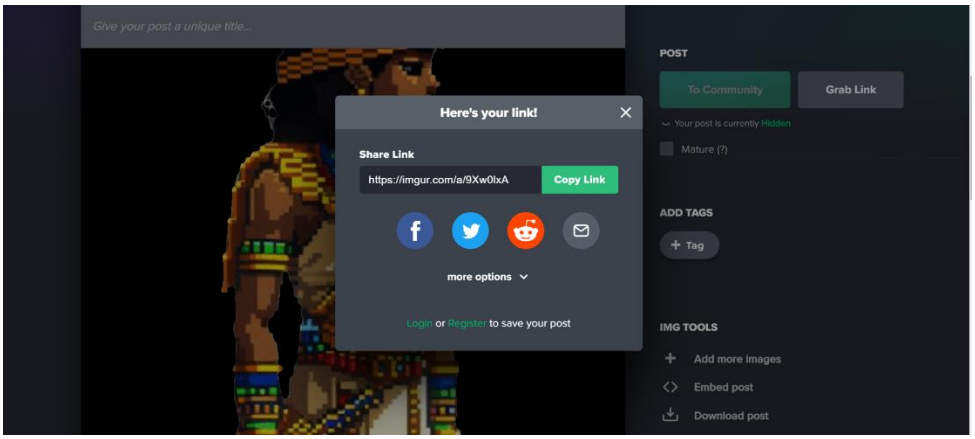
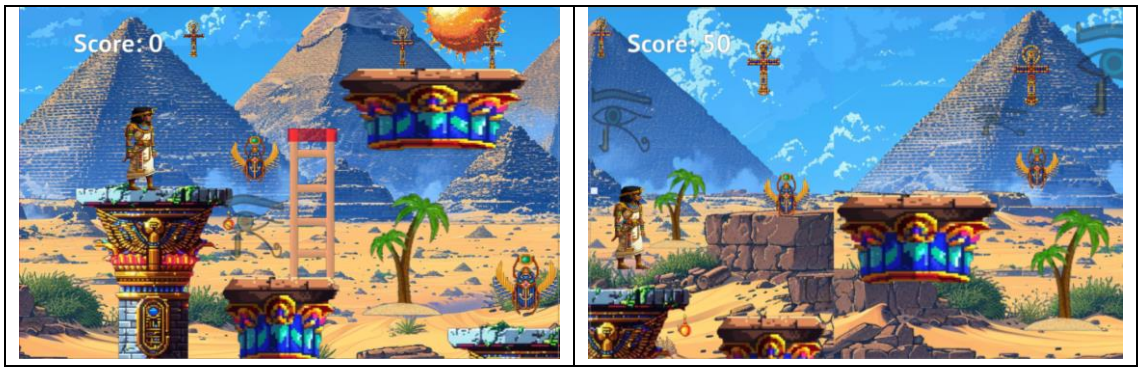


Figure (8): Screenshot of Imgur site interface during getting our images' URLs

6- Re-run the code and download the game

We copied and pasted the final codes into codepen, and successfully recreated the game look from "Super Mario" to "Egyptian Hero" with Egyptian civilization symbols as shown in Figures (9,10,11,12)



Figures (9,10,11,12): The final version of the "Egyptian Hero" game

To save our game, We are going to create an empty folder on a computer for the game and create three text documents to add the codes generated into, the first is called <index.html> to set up a basic HTML structure, the second is <style.css> to add some basic styles, and the last is <script.js> to start getting the canvas element and the 2D rendering context, then open these text documents with "Notepad" and save every code (Html, CSS, JavaScript) on its text document.
Finally, we can open the game from <index.html> file.

Despite the benefits of AI-generated game art, there are still disadvantages to the technology that must be considered for game design as mentioned in the theoretical framework.
In summary, Generative AI offers exciting possibilities for game design, but it is not a silver bullet. It works best as a tool to enhance and augment human creativity, not replace it entirely. Developers must be cautious about the limitations and challenges of this technology.

Conclusion

This research paper discusses Artificial intelligence techniques and what they can produce from different design solutions. This research project successfully demonstrated the integration of AI technologies in designing and developing the "Egyptian Hero" game, a platform game inspired by ancient Egyptian culture. By leveraging state-of-the-art generative AI tools, the researchers were able to create a visually stunning and culturally authentic gaming experience without any prior coding expertise.
The key outcomes of this research include:

- Effective use of AI-powered tools like ChatGpt , ChatGpt , and Sincode to generate game assets, code, and debug the application, respectively. This showcased the potential of AI to streamline the game development process and enable non-coders to participate in the creative process.
- Successful transformation of the classic "Super Mario" platformer into an "Egyptian Hero" game, infusing it with rich Egyptian motifs, symbols, and aesthetics through AI-generated assets. This highlighted the ability of generative AI to breathe new life into beloved gaming experiences.
- Validation of the hypothesis that AI can enhance human work efficiency in gaming, particularly in tasks like asset creation, code generation, and debugging, allowing designers and developers to focus on the creative aspects of game design.

- They were paving the way for further exploration and refinement of AI-assisted game development techniques, fostering the collaboration between human creativity and machine intelligence in the gaming industry.
- The integration of AI in the "Egyptian Hero" game development showcased the immense potential of this technology to revolutionize the gaming landscape. By automating content creation, enhancing gameplay mechanics, and streamlining the development process, AI has the power to democratize game design, enabling a wider range of creators to bring their visions to life. This research serves as a stepping stone towards a future where AI and human designers work in tandem to craft immersive, culturally-rich, and technologically-advanced gaming experiences.

As AI technology continues to advance, the gaming industry is poised to further evolve, delivering more intelligent, intuitive, and personalized experiences to players worldwide.

Results:

The researchers effectively developed a platform game named "Egyptian Hero" by incorporating different AI tools into the game design and development process. The main outcomes include:

- **Game conceptualization and details:** ChatGpt generated an elaborate description of the game based on the "Super Mario" game, serving as the foundation for "Egyptian Hero."
- **Code creation:** Using Sincode, HTML, CSS, and JavaScript code was iteratively enhanced and debugged to develop a basic video game initially generated by ChatGpt.
- **Game incorporation**: The Egyptian-themed assets seamlessly replaced original assets in the code resulting in visually appealing gameplay with cultural authenticity.
- **Playable content:** The final version of "Egyptian Hero" successfully ran locally featuring Egyptian-themed assets and gameplay mechanics inspired by the classic "Super Mario."

Recommendations

As the research acknowledges, there are potential ethical concerns surrounding the use of generative AI, such as in-advertent copying or plagiarism of existing assets. Investigating these ethical considerations further and developing strategies to mitigate risks, such as training AI models on diverse and properly licensed datasets is recommended.

Expand to other game genres and cultural contexts, would further demonstrate the versatility of AI-assisted game design and promote cultural diversity in gaming experiences.

Develop AI-native game engines: Integrating generative AI capabilities directly into game engine software could streamline the development workflow and empower a broader range of creators to design rich gaming experiences leveraging AI's capabilities seamlessly.

Establish guidelines and best practices: As AI integration in game development becomes more widespread, establishing industry guidelines, standards, and best practices around responsible and ethical AI usage could benefit both developers and players.

These recommendations aim to build upon the research findings, address potential limitations, and further unlock the transformative potential of AI in revolutionizing the gaming industry while prioritizing ethics and cultural diversity.

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4. Code Pen is an online community for testing and showcasing user-created HTML, CSS, and JavaScript code snippets. It functions as an online code editor and open-source learning environment, where developers can create code snippets, and test them without downloading any software. (Silva, 2020)
5. Sincode is an AI-powered tool designed to streamline the debugging process and significantly reduce the time and effort needed to find and fix bugs manually. It provides potential solutions, making it easier to fix issues and maintain high-quality code, and supports a variety of programming languages, making it versatile and adaptable to different projects and development environments. (Ellis, 2023)
6. Remove.Bg is a free AI-powered automatic tool that automatically removes background from images.
7. Imgur is an online content hosting site where you can view and share content such as images, GIFs, memes, videos, and reviews. You can communicate with other Imgur users by posting public comments or sending private messages, GIFs, or emoji's. (Sharma, 2023)

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