EMERGENT PLAY

The dynamic of uncanniness in experimental gaming interactions

RMIT UNIVERSITY

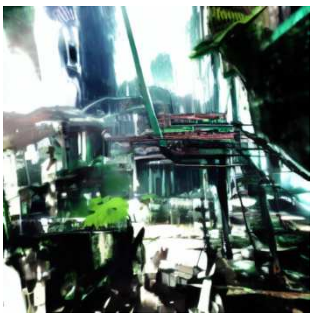
Introduction

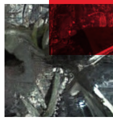
Artificial Intelligence (AI) is a mysterious "black box" that fascinates the creatives and scientists alike. That "black box" is the AI's latent space, an abstract multidimensional space rich with a vast amount of data (Bergmann, n.d.). Within it, data points are plotted based on how closely they relate to each other to represent a concept. Most popular generative models, such as GAN (Generative Adversarial Network), ChatGPT, or MidJourney, learn to map those data points from their latent space back into the original space that is visible and makes sense for humans. It happens usually through texts or images, effectively generating new data instances that resemble those in the training dataset (Asperti, 2023). Due to the unobservable, sheer complexity of the latent space's multidimensionality, nobody, including AI scientists and engineers, can explain with certainty how the AI arrives at its final output. The generated AI image can resemble the data used to train the AI, yet it will never be an exact copy of the training data. **No matter how insignificant they might be, slight imperfections, errors, or other digital rendering artefacts will emerge within the output.**

In this context, we can say that AI exhibits emergent property — something arises out of more fundamental entities. Something novel or irreducible (O'Connor & Wong, 2002). In other words, AI produces something larger than the sum of its parts through the interpolations between datapoints inside its latent space.

Its emergent property can sometimes cause the AI to hallucinate and generate strange, uncanny effects, visuals, and textures in image generation AI or incorrect, out-of-context, nonsensical texts in large language models (LLMs).

The phenomenon of blurring the line of concrete representations refers to modernists' approach to abstractions, of which pioneering philosophers, artists and designers try to break down reality into its bare essence (Childs, 2017; Davis, 2012). Moreover, the blurred boundary that resists absolute meaning or truth echoes Derrida's theory of différance, in which he argued that meanings assert themselves only as being different from other signs. Therefore, absolute meaning is impossible as meanings are constantly in flux and are relatively defined by their interconnection to other signifiers (Derrida & Spivak, 1997). In this context, AI's emergence property reveals the underlying working of its latent space, or its truth, while also modulating its output based on the interpolations of relative multidimensional datapoints that elude our understanding. The teetering between the edge of the known and unknown, truth and relativity, produces uncanniness — the feeling of being challenged by something beyond ordinary understanding.





Referring to the above, through this project and creative output, we aim to induce this uncanniness in both ways: by exposing the inner structure of AI's latent space through the player's direct interactions with our game prototype **Topology Unknown**'s control system and generative output, and by displaying visual glitches and imperfections of the AI's output as the result of the interpolations between encoded data points of known objects and abstract concepts. By crossing the uncanny threshold, we question the boundaries of our understanding and possible outcomes of the gamified interactions with AI. Building the game prototype **Topology Unknown** as our research outcome, we want to provoke the player's curiosity for the AI technology and its potential, inviting them to immerse themselves within AI's uncanny emergence, to explore, and to gain an understanding of the nature of its data-rich latent space.

Uncanniness

The common understanding of uncanniness is defined in Mori's The Uncanny Valley [From the Field], describing the endless eerie feeling derived from observing a humanoid figure that does not fully mimic a real human being (Mori et al., 2012). Within the context of game studies, the approach to uncanniness in this project is associated with the wider, Freudian concept that is outlined in Tamás Csönge's article Medium Specific Uncanny in Contemporary Video Games (Csönge, 2023).

For him, the effect of the uncanny emerges from other medium-specific occurrences, triggered when the object in the simulated game world has significant discrepancies compared to its real-world counterpart, "something that is familiar behaves in a strange or reduced way" (Csönge, 2023). Csönge argues that uncanniness emerges when players notice the algorithmic and restricted nature of the simulation that is the game, which should have been concealed deep inside the game system. Uncanniness also emerges from the appearance of unintended errors and glitches in the game system's processes.

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We build on the shoulders of giants. Each scientific and creative breakthrough is made at the edge between previously known work and the uncharted territory. That edge of the known and unknown is the edge of uncanniness, where the latter is beyond our current understanding, yet feels so familiar and so close. Uncanniness was expressed with each emergence of new technology: the train was “an iron horse”, the telephone was “a talking wire”, the aeroplane was “a metal bird” (McCracken & Goody, 2024; Schivelbusch, 2014; Stevenson, 1947), to name a few.

The universal sentiment for discovery is one of the major drives that propel humanity forward: it provokes our innate curiosity for newness. This is echoed in the design of many games, particularly in their map design. Within the game design practice, procedurally generative maps have existed for decades. Genres such as dungeon crawlers, roguelike, or sandbox games have used this approach to captivate the feeling of novelty and discovery for the player (Sousa et al., 2023). In those games, the scenery and map layout change with each play session or are randomly and procedurally generated as the player approaches the edge of their currently explored world. However, their maps are traditionally generated based on a manually coded set of rules and algorithms that the game designer controls. Our research revealed an opportunity to synergise AI with game design methodology, utilising the technology in both the game map design process and the game map generation system. By leveraging AI’s emergent property to generate the map as the player interacts procedurally, an uncanny landscape is unfolded with every frame resembling the immediate adjacent frames, but without the understanding and coherence of the entire length of spatial context. Our game prototype, **Topology Unknown**, offers a platform to explore innovative visual design expressions and gameplay, as well as the agency and interactions between the designer, player, and the game/computer/AI.

Research Questions

Games, unlike other forms of media, are inherently interactive, thus allowing players to engage in the experience more dialogically, formulating a two-way exchange based on feedback loops, action and reaction to agents within the system. In this context, games are generally considered as interactive works where player choices are pre-fixed (monologic). In contrast, dialogic works allow more open, emergent, contingent communication and meaning negotiation (Kac, 2004). A few games have attempted to open dialogical interactions with the players by breaking the fourth wall. One notable example is Doki Doki Literature Club! by Team Salvatore (Dan Salvatore, 2017), where the game characters become self-awared of their existence in a video game and communicated directly to the player. However, principally, formal elements of games always include rules that define the game’s concepts, procedures, and allowable player actions (Fullerton, 2019). Most of these are immutable designs, meaning that they will not change because of a clear set of criteria that the game designer can fully control. Given the emergent nature of AI and how our prototype is designed for dialogical interactions, we ask: how does AI’s emergent property influence the dialogical nature of play, interactive experiences, and the relationship between players and the game/computer/AI? What are the implications regarding player/computer agency, and how might this project challenge the traditional game map/level design principles and processes resulting from such interactions? Who will hold the agency in the game: the designer, the player, or the game/computer/AI? What would the project reveal about the potential of AI as a creative medium for novel creative

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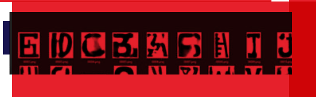
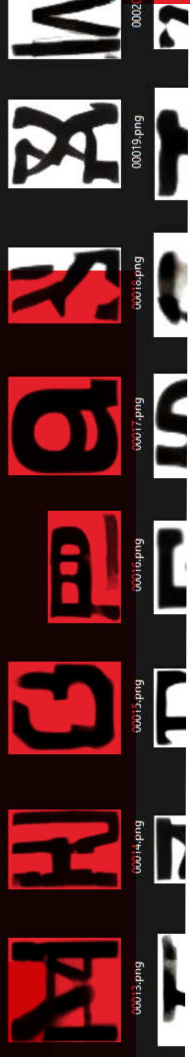
Origins and inspirations

Every new technology comes with new affordances and potential for new creative approaches. Given how recently AI technology has gone mainstream and how new AI technology breakthroughs pop up every few months, it is safe to say that the full potential of AI is yet to be discovered. The inspiration for the project showcasing AI as a creative medium originated from conceptualizing The Unstable-2 typeface, which is an experimental typeface designed with the AI model Stable Diffusion as the project preceding **Topology Unknown** (Pham, 2024). The intent was to exploit the uncanniness in the imperfections of AI's emergent property to explore wild novel forms tamed by typography. The result was a glimpse of a new aesthetic, with strange design flourishes, pixelations, and residue artefacts of the process that would otherwise be impossible through available digital tools. This exploration suggests a symbiotic relationship between humans and AI that leads to new creative possibilities needs further exploration (Pham, 2024). Furthermore, experimental approaches to AI's emergent property are underutilized, promising new artistic expressions and perspectives across all creative fields and practices.

Within the game design context, AI's generative nature synergizes well with the creation of a procedural generative game map. A procedurally generated game map is a popular means of making large-scale game worlds that would otherwise take too much effort and time to be designed manually. The game designer defines the procedural process of generating the map, essentially relinquishing some direct control over the outcome to the designed generative system. Well-designed generation algorithms create predictable but randomised results, which evoke a sense of discovery for the players and keep the game experience fresh as they explore a new, familiar yet non-identical world each time they play (Sousa et al., 2023).

AI's emergent property promises a novel approach to procedural game map design and challenges the existing approach to the process. There are a few existing methods for creating procedural generative maps. Rule-based generation and noise-based generation are the most popular ones in video games (Ping & Dingli, 2020)





Rule-based generation

A map using rule-based generation is defined by a set of rules, sub-rules, and their internal processes. How parts of the game world are constructed and connected to one another is dictated by hard-coded rules similar to grammar trees, programmed by the game designer. These methods usually require designers to build a lot of small and modular parts of the game map before manually combining them (Ping & Dingli, 2020). This procedural generation method is frequently used in traditional role-playing games and dungeon crawler games, such as the Diablo franchise or Darkest Dungeon.

Noise-based generation

Noise-based generation is used when the game designer requires more randomised results or to generate maps at a large scale procedurally. Usually, a variety of noise algorithms, such as Perlin noise, simplex noise, and Voronoi noise, can be used together to create complex generations and avoid the emergence of repeating patterns (Ping & Dingli, 2020; Srivastava, 2024). Digital games with large generative worlds like Minecraft or No Man's Sky frequently utilise noise-based generation to create massive worlds that would have been impossible to make by other manual means (Srivastava, 2024).

Example-Based Generation & Deep Learning

The lesser-known Example-Based Generation method is based on the designer's attempt to make sketches to show the basic idea of his design and then add details from existing map examples using system methods (Ping & Dingli 2020). Deep-learning neural networks (Generative AI), such as Generative Adversarial Networks (GANs), are utilised to take an image or the designer's sketch as input and generate another image (i.e., the map) based on the input and the learned examples. For example, mapping the height map is a common technique for terrain generation. By matching the height field from real terrain into a user-defined sketch, a new terrain containing complex detail can be produced (Ping & Dingli, 2020).

Latent space walking & mapping

Generative AI has introduced affordances for new medium-specific techniques, including latent space walking. Latent space walking exploits the latent space's interpolative nature by continuously sampling a point in latent space and incrementally changing the latent representation. The result is a series of outputs with pseudo-animation quality, providing a glimpse of the data points, their nuances, and their dimensions through interpolations (Schaerf, 2024).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Latent space
versus
Cartesian space

AI's latent space provides a unique challenge of being observed and visualized. It is the AI's internal abstract representation of data captured in a multidimensional space(Bergmann, n.d.). Data points that are related or similar to one another are positioned closer to each other in the latent space. For example, we do not need to remember every detail of a dog's appearance to recognize it on the street. Instead, we keep an internal representation of the general appearance of a dog or a certain "dog-ness." Similarly, the latent space tries to provide the AI with a compressed understanding of the world through a spatial representation of the data (Asperti, 2023; Pham, 2024).

As humans, our senses and experience are confined to the 3-dimentional Cartesian understanding of the world. We cannot comprehend a graph that plots points along thousands of dimensions within the latent space (Bergmann, n.d.). Thus, we need an uncanny threshold to bridge that gap of understanding. Data scientists try to address this by using dimensionality reduction techniques to map high-dimensional latent space data to a 2-dimensional or 3-dimensional graph (Bergmann, n.d.).

Topology Unknown utilizes the same technique in two-folds. On the one hand, the prototype generates 2-dimensional image snapshots as visual representations of a data point. On the other hand, it maps latent space walking and visualize the generative AI's latent space into an understandable Cartesian 3-dimensional space for the player to directly traverse through. While both Example-Based Generation and **Topology Unknown** employ generative AI to create procedural maps, unlike the former, where the AI algorithm generates a single final image output before being transformed into a static 3D world, the final output of the latter is the visual representation of the AI's latent space itself. The prototype achieves this by continuously generating and changing its landscape as the player's movements are mapped to the interpolation between datapoints via the latent space walking technique.

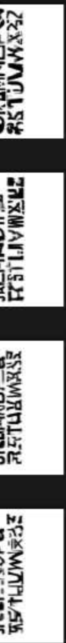
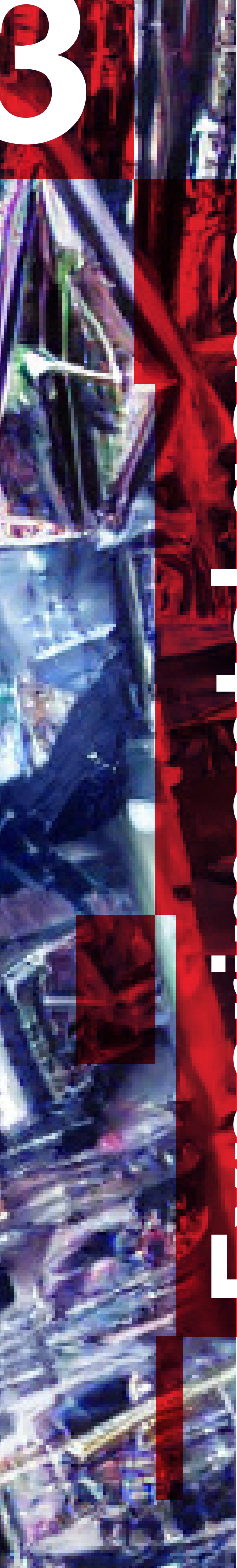


Figure 1. Hong Nhat Pham.
Unstable-2 typeface, 2023



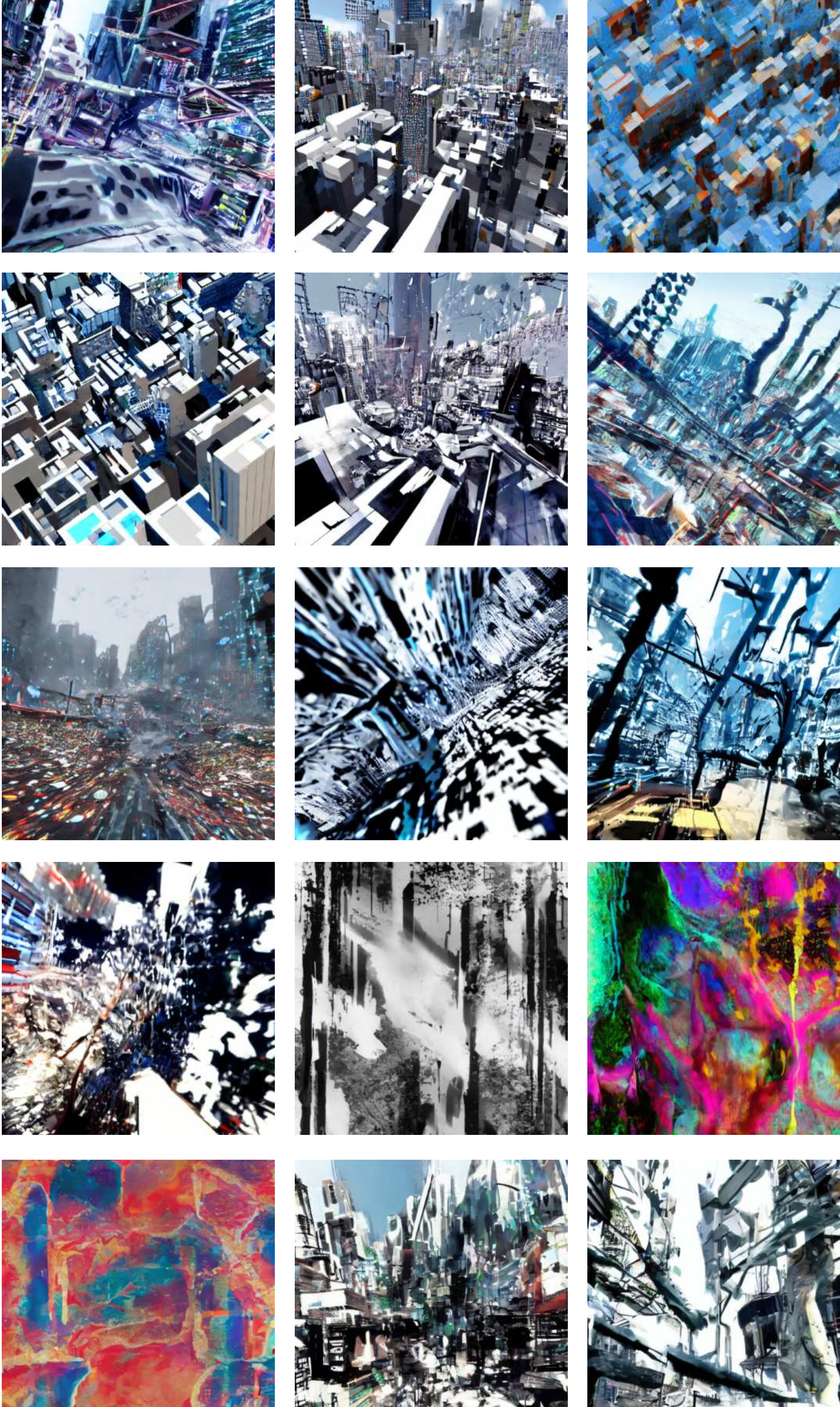
3 Experimental game



Play is an intrinsic activity that we all do voluntarily and occasionally. Entertainment would probably be the top of most people's minds when it comes to the reason for why we play but play also contributes greatly to individual development and group culture (Sutton-Smith, 2001). Through play we learn how the world works, how our actions affect our surroundings, and what the causal reactions of them are. In other words, play helps us to grow and develop our adaptation (Sutton-Smith 2001).Thus, play can also be the bridge that helps us to learn and explore the unknown AI landscape, and a game driven by generative AI can be the medium that lets play happen. Our research project utilizes play to allow us, as game designers and artists, and players, to experiment and learn about the AI's latent space and its potential, informing us about our relationships and agency with generative AI.

The prototype gaming experience has two main components. The main one is a first-person view walking simulator (a game sub-genre), where players take the role of explorers on the AI's black box expedition to traverse and map out this uncanny and unsolvable multidimensional landscape. Unlike traditional first-person view games and traditional generative game map design, where the map is persistent and constant once generated, **Topology Unknown**'s map is unstable, abstract, and continuously generated, in which the player's controls directly influence how the AI generates the landscape in real time. This is achieved by mapping players' movements to the latent space walk technique, driven by the nature of AI's emergent property. Therefore, the AI landscape will never be the same when viewed from different angles, moments, or play sessions: no two players will experience the same visuals and landscape. After traversing a set amount of distance, the game ends and presents the player with the second component of the prototype.

The second component is an interactable 3D map of the player's paths. The map is drawn by keylogging methods to record the player's movements and gaze via the game controller or keyboard and mouse. The traversed paths are then mapped into a Cartesian 3-dimesional space, dotted with snapshots of the AI output at the intervals of that moment in time and space. Similar to how past pioneers have charted foreign lands onto maps, this component demonstrates and maps AI's black box nature by simplifying and condensing AI's multidimensional data within its latent space to an understandable Cartesian 3-dimensional space and visuals. This component provides a closure to the experience while letting the player visualize their traversed landscape from a different, more distant point of view. This approach also reveals and helps the public better understand AI through a simplified slice of the prototype's internal working, the AI generation process, and its latent space itself.



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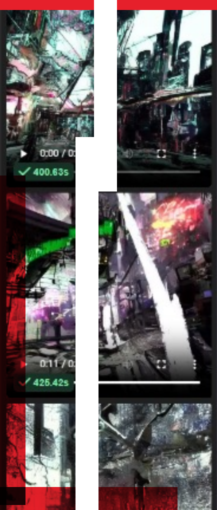
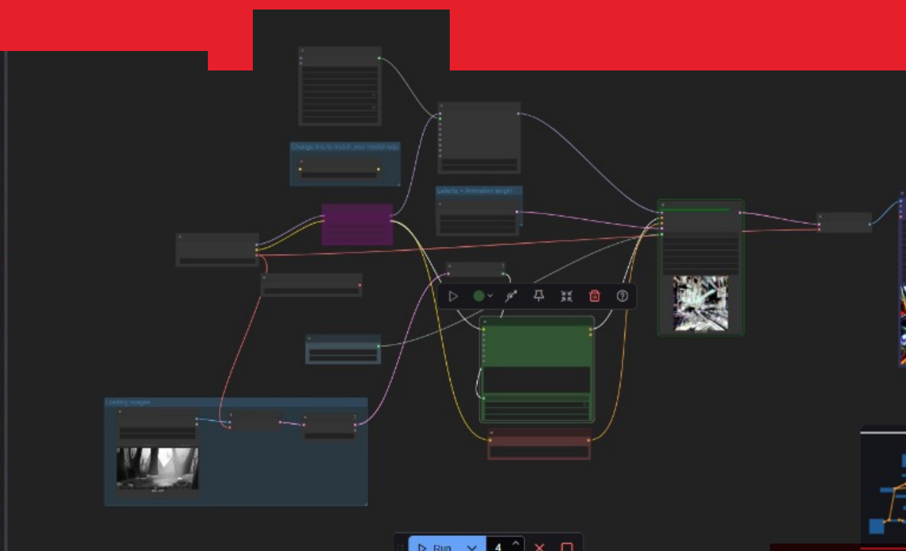
Technology stack and process

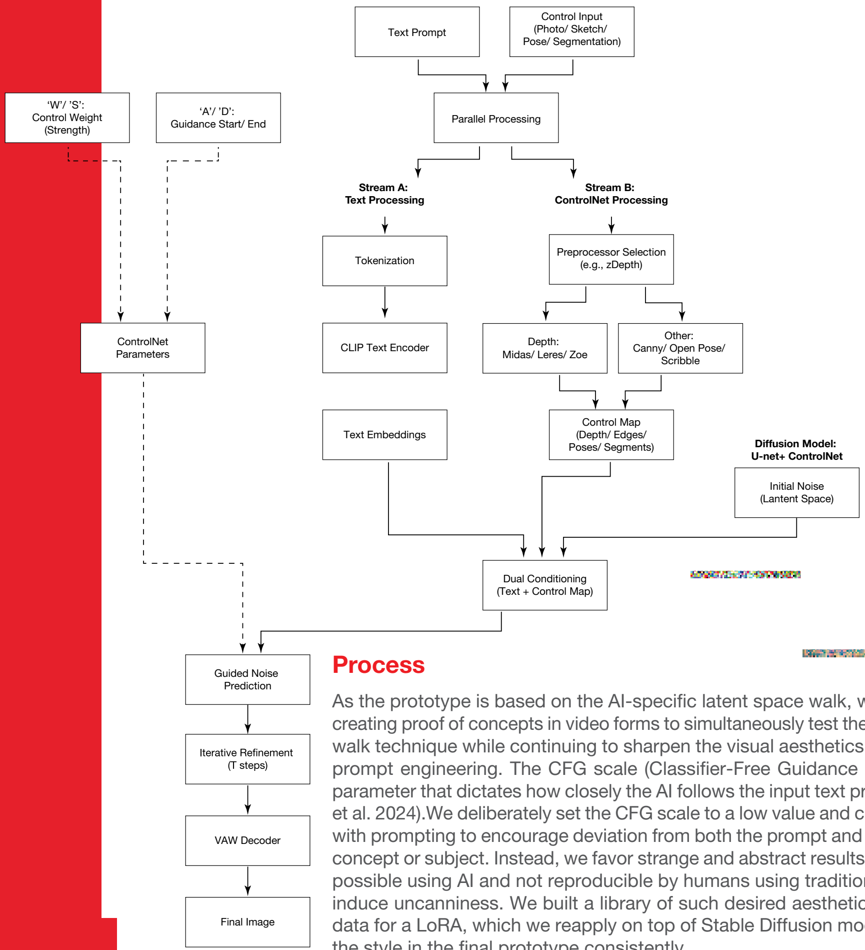
Figure 2: Tom Nguyen. Flow chart of the prototype's AI implementation. 2025

Stable Diffusion is our generative AI model of choice for **Topology Unknown**. It is an open-source diffusion AI model capable of generating images with great control over the process. Unlike proprietary models like Midjourney, Gemini or ChatGPT, Stable Diffusion allows the fine-tuning of numerous parameters aside from the usual text prompt to control how the AI generates an image. Further fine-tuning can also be achieved through the usage and training of Low-rank adaptation (LoRA) – a small and light-weight model that trains on a small selection of additional datasets outside the main Stable Diffusion model to transfer its learned dataset onto the latter efficiently (Quinn et al. 2020). LoRA was used in this project to train the model to generate the desired visual aesthetic consistently.

ComfyUI is crucial to the prototype's visual development. It is the front-end interface of Stable Diffusion that allows the design of the AI generative process through its node-based system (see Figure 2). The completed setup of ComfyUI effectively describes the inner workings of the AI model through a flow chart made up of different nodes. The flow chart was then translated into Python code and commands as part of the final interactive prototype.







Process

As the prototype is based on the AI-specific latent space walk, we started by creating proof of concepts in video forms to simultaneously test the latent space walk technique while continuing to sharpen the visual aesthetics direction via prompt engineering. The CFG scale (Classifier-Free Guidance Scale) is the parameter that dictates how closely the AI follows the input text prompts (Shen et al. 2024).We deliberately set the CFG scale to a low value and combined this with prompting to encourage deviation from both the prompt and the concrete concept or subject. Instead, we favor strange and abstract results that are only possible using AI and not reproducible by humans using traditional means to induce uncanniness. We built a library of such desired aesthetics as training data for a LoRA, which we reapply on top of Stable Diffusion model to output the style in the final prototype consistently.

The final prototype was custom-built using Python, acting as the interface between the AI and the player. The prototype first generates an initial snapshot following the given settings and prompt as the game's starting point. The frame goes through a depth-estimator via ControlNet, a neural network architecture that adds fine-tuned spatial conditioning controls (Zhang et al., 2023). The process returns a depth map, which is then influenced by gaming conventional movements WASD keys to generate a new depth map. For example, if the player press "W", the new depth map will shift forward in comparison to the previous map. Finally, the prototype generates a new snapshot based on the new depth map, and the process repeats itself until the game ends at the player's discretion. Pressed keystrokes are also captured within the prototype to draw out the player's traversed path in Cartesian 3-dimensional space at the end of the game.

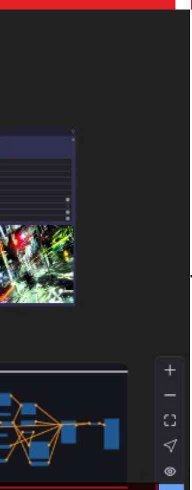
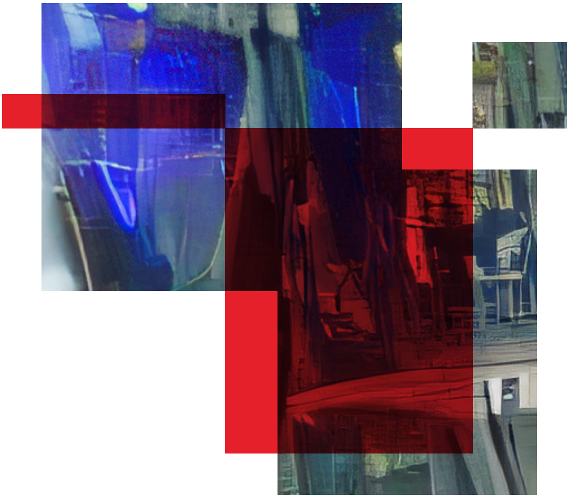


Figure 3: Hong Nhat Pham. Screenshot of ComfyUI during the visual development of the project. 2025

5 Discussion



Our experiments with **Topology Unknown** suggest that when generative AI becomes a co-player, the nature of play shifts from executing designer-set choices to navigating through a new relation between human and machine. Player movement disturbs the latent space, and the space responds with new angles, contours and directions, influencing the focus and intention. This action-reaction entanglement results in a unique perceptual rhythm (Costello 2018) of reciprocity. The player's exploration continually meets the system's emergent proposals. Unlike traditional level design, where rules, assets, and layouts are stabilized before runtime (Fullerton 2019), the mapping in our project is procedural throughout: the process of creating the world itself is the primary designed object. In practice, this redistributed agency produces surprise in a form of determined chaos consistent with accounts of emergence as novelty (O'Connor & Wong, 2002).

The player in **Topology Unknown** is a being-in-

the-world thrown into a landscape that refuses total legibility (Heidegger et al., 2008). Each step discloses the world differently, making the paths indeterminate and putting the player in a state of constantly redefining themselves through movement, reading the AI's choices and answering with actions. The uncanniness, bringing the sense of something simultaneously intimate and strange, fits Freud's perception of the Unheimlich as a return of the familiar in defamiliarized form (Bartnæs, 2009). The system's images feel almost known because they are interpolations across recognizable visuals but without offering any final ground. Derrida's différance helps name this further, as he observed, meaning is not located in a stable asset but deferred across successive frames and gestures (Derrida & Spivak, 1997).

Considering mapping as a method, we observe that a map is not an artifact but a generative and performative process, not just depicting the territory but bringing it as the acts of attention and action (Kitchin & Dodge, 2007). **Topology Unknown** translates wayfinding to world-founding, suggesting that the path the player makes is the map he later inspects, simultaneously adding meaning to the journey. The interactive trace constitutes a phenomenological record of perception-in-motion based on the interaction of the player and the unpredictable machine (Merleau-Ponty & Landes, 2013). By changing the protocol of the interaction with the AI, we designed a possibility of a dialogue that closely explores the realms of symbolic and metaphysical connections to the system. The act of renegotiation reveals a possibility of inhabiting ambiguity in the game-like/gamified surroundings.

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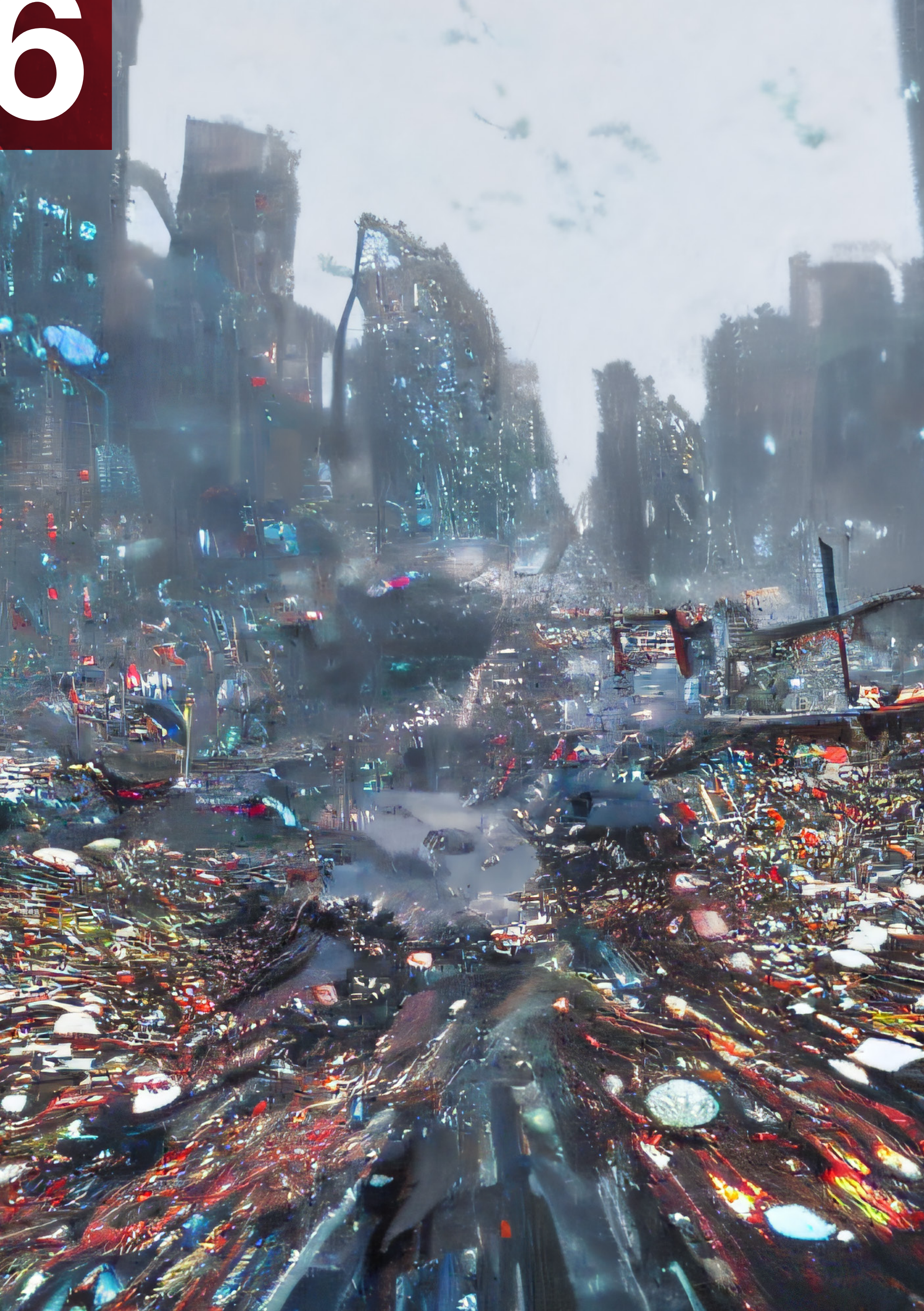

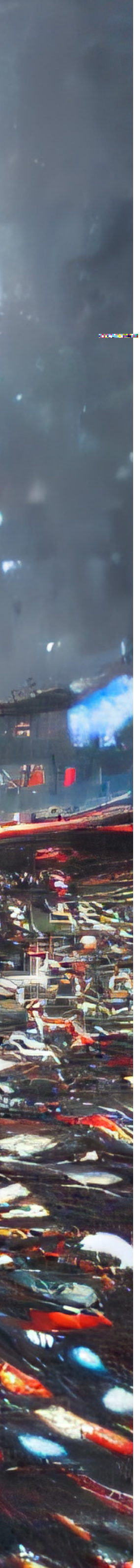

Final thoughts

Topology Unknown demonstrates that when generative AI becomes a co-player rather than a backstage tool, play transforms into a conversational choreography of perception and responsiveness. When, in this case, agency is redistributed, the world is not merely traversed but continuously (re)composed in the act of moving through it. In game design terms, the reorientation of the process itself reframes level design from the stabilization of assets before runtime to the cultivation of a living creation, where the triggered latent space responds to the user's actions. The result is a determinate chaos, full of surprises, yet coherent in providing uncanny results that underline sense and meaning more than the choice itself. The patterns of interaction with uncanniness draw possibilities for further studies of users' perception of emergent and experimental play.

By treating mapping as a performative and artistic act of co-creation, the player's traces become both artefacts and arguments: phenomenological records of perception-in-motion that render the system. Furthermore, recognizing **Topology Unknown** as an epistemic instrument for AI literacy helps observe how the meaning emerges based on perceptual negotiations – beyond assets and pre-written narratives.

The implications of this project extend beyond this prototype, rethinking human–machine creativity, which focuses on the patterns and protocols, not necessarily clearly planned outcomes. It defines and composes relations, deepening cultural understanding of how AI transforms and organizes data and what contexts and symbolic readings emerge in the process. Furthermore, the presented prototype offers almost unlimited genre experimentation possibilities in the context of game design, which could reveal how different inputs and interactions produce various narrative textures.

Summarizing the discoveries of this project, first and foremost, We observed that distributed agency, having moved from the designer to a triad designer/player/AI, produces conversational play with further possibilities of researching on human-machine connections through playful acts. In this context, embracing uncanny affordances as the introduction to the interpretative act of communication, rather than defects, expands possible pedagogical approaches to game aesthetics. This approach also opens the possibility of discussing process-first design as the generative engine featuring aesthetics and interaction patterns. Using this method, these narratives contributed to perceiving AI cartography as a performative, epistemic instrument, making the system thinkable and building AI literacy.

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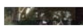

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