

Computer generated car design

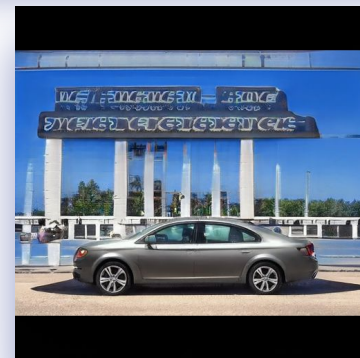
Steps to deeming the system creative by Lennert Bontinck

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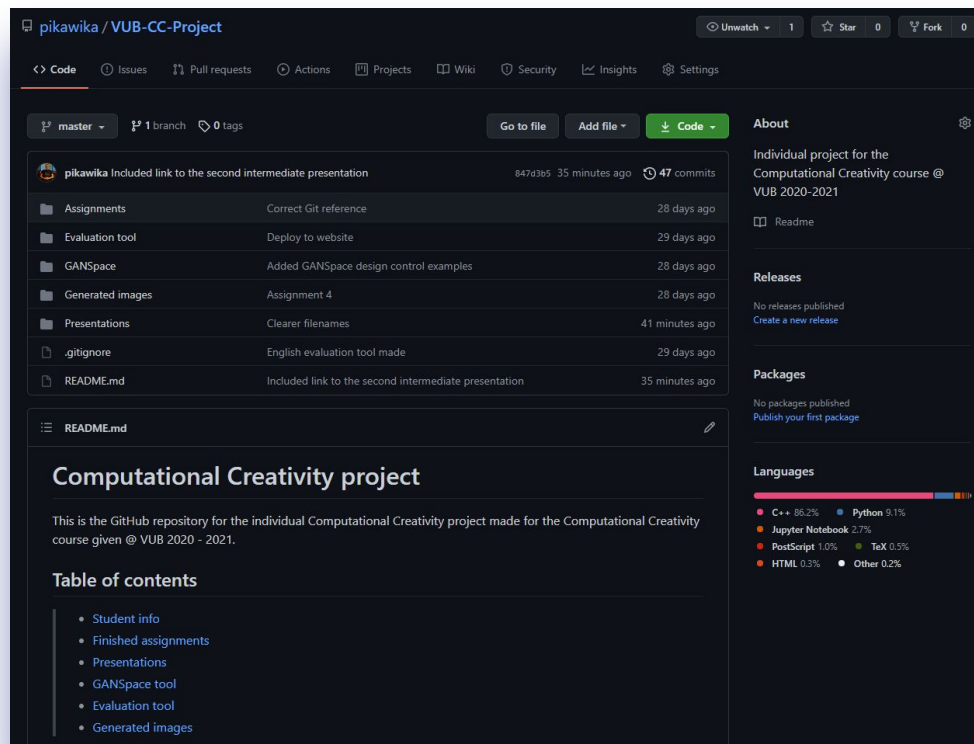
Remember my project?

- Pre-trained StyleGAN2 model
 - Create images of cars
- Extended GANSpace tool
 - Have control over the GAN
 - Modify tool for project
- Generative vs creative
 - Situate system in a creative framework
 - Exhaustive discussion on the internal and external evaluation



Status update

- Pre-trained StyleGAN2 model ✓
- Extended GANSpace tool ✓
- Generative vs creative 🛠️
 - Situate system in a creative framework 🤔
 - Exhaustive discussion on the internal and external evaluation ⌚



The screenshot displays the GitHub repository page for `pikawika / VUB-CC-Project`. The repository is on the `master` branch and has 47 commits. The file list includes:

File	Commit Message	Time Ago
Assignments	Correct Git reference	28 days ago
Evaluation tool	Deploy to website	29 days ago
GANSpace	Added GANSpace design control examples	28 days ago
Generated images	Assignment 4	28 days ago
Presentations	Clearer filenames	41 minutes ago
.gitignore	English evaluation tool made	29 days ago
README.md	Included link to the second intermediate presentation	35 minutes ago

The README.md file is selected, showing the following content:

Computational Creativity project

This is the GitHub repository for the individual Computational Creativity project made for the Computational Creativity course given @ VUB 2020 - 2021.

Table of contents

- Student info
- Finished assignments
- Presentations
- GANSpace tool
- Evaluation tool
- Generated images

The right sidebar shows repository statistics: 1 star, 0 forks, and 0 releases. It also includes sections for 'About', 'Releases', 'Packages', and 'Languages'.



Choosing the “right” framework

- Not as easy as it seems
- How to build a CS (Ventura, 2017)
 - Generalise CS components to more easily represent CC system
- The CSF (Wiggins, 2006)
 - Formalise concepts of Boden's (2003) philosophical theory of creativity
 - Focus on what programs do
- ...



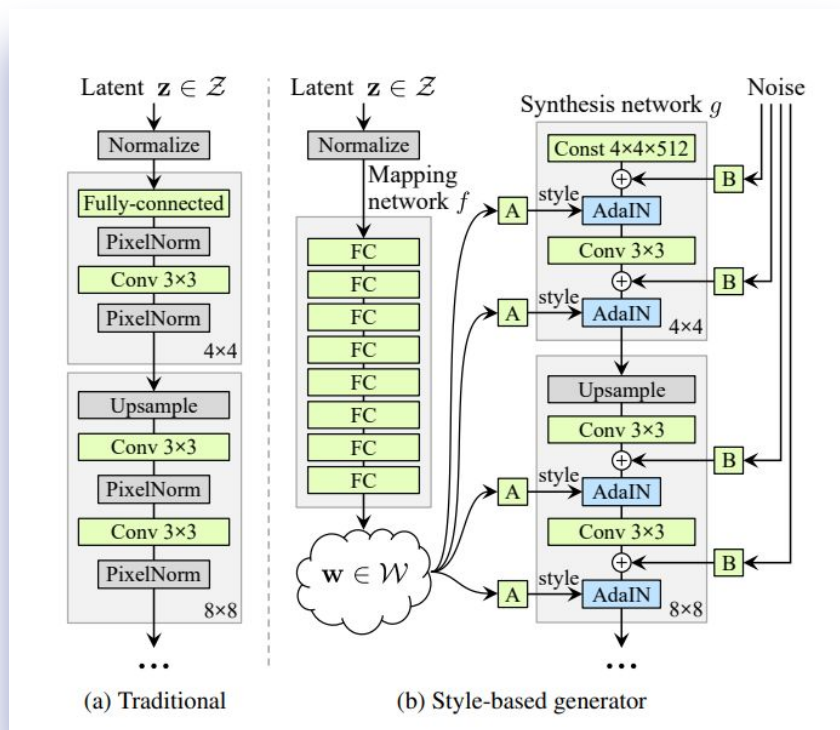
About Boden's philosophical points

- P(ersonal) vs H(istorical) creativity
 - Historical can't be enforced
 - Non-historical might even be more interesting
- Exploratory vs transformational
 - The generator transforms based on discriminator
 - Latent space exploration



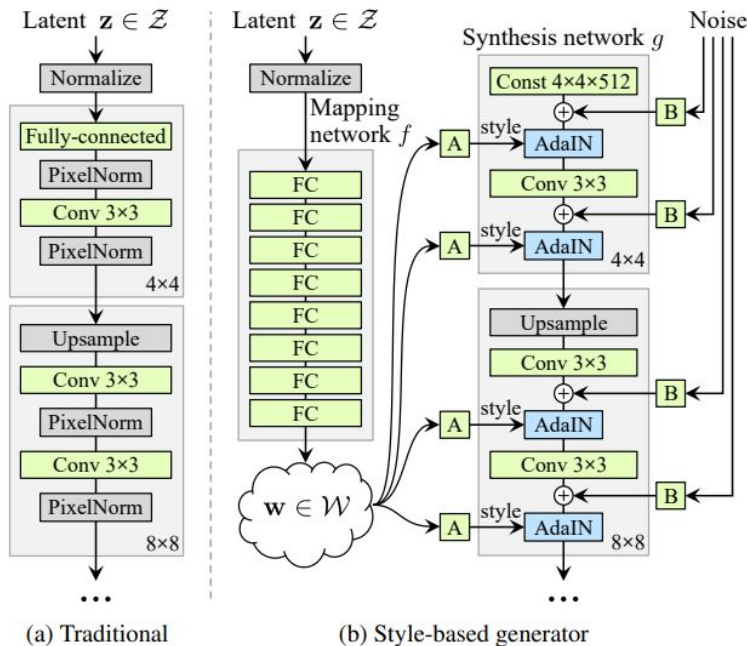
Description in the CSF (1)

- The universe (U)
 - Technically: all RGB combination of pixels
 - Generator: all images deemed “real” by the discriminator
 - Thus: images containing cars
- Conceptual space (C)
 - The set of all images the generator can make based on different seeds (noise input) with its latest transformers
- Clearly, $U \subset C$



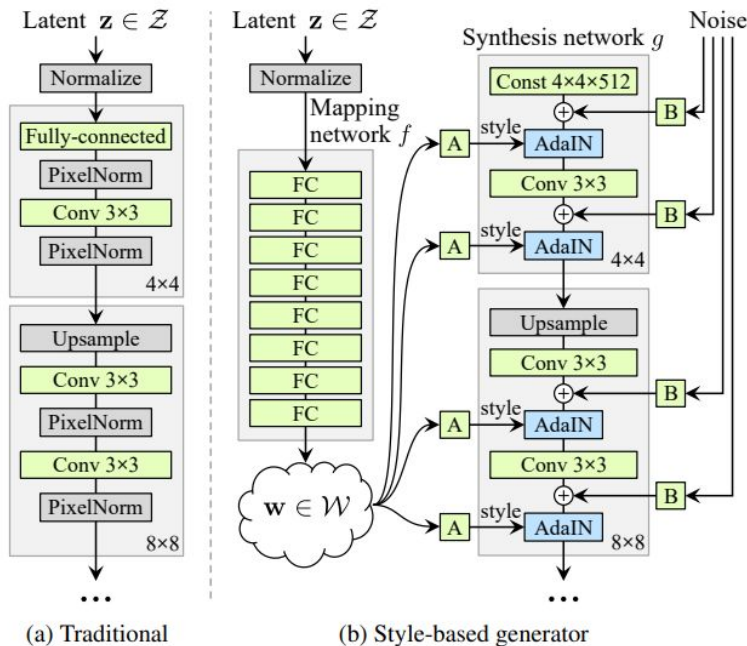
Description in the CSF (2)

- Remember $C = [[R]](U)$
 - Thus R , the rules constraining the space, are the same rules defining the *state* of the generator
- The rules T
 - Rules that introduce randomness and noise as restrictions on latent spaces
 - GANSpace uses these to “explore the conceptual space”



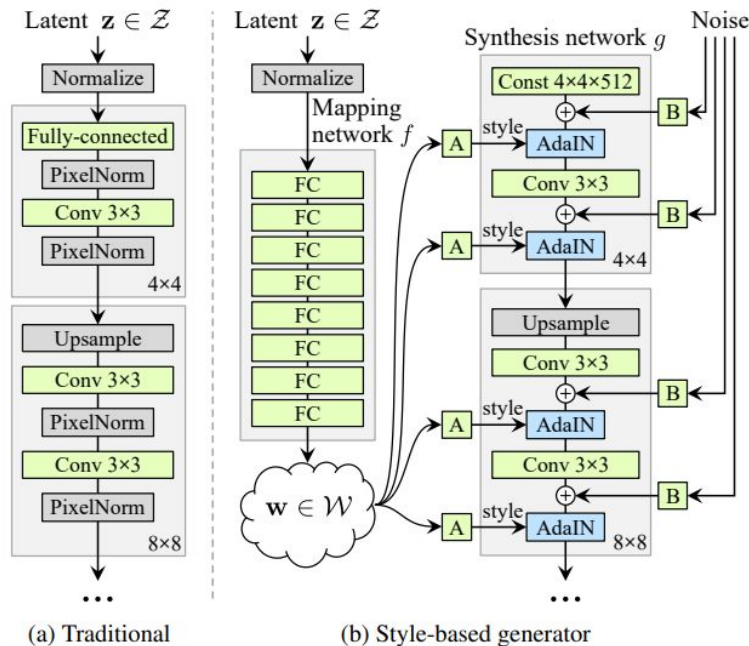
Description in the CSF (3)

- The rules E
 - The rules that define the discriminator can be used to assess the quality of the generator image
 - A similarity checking system can test for P-creativity



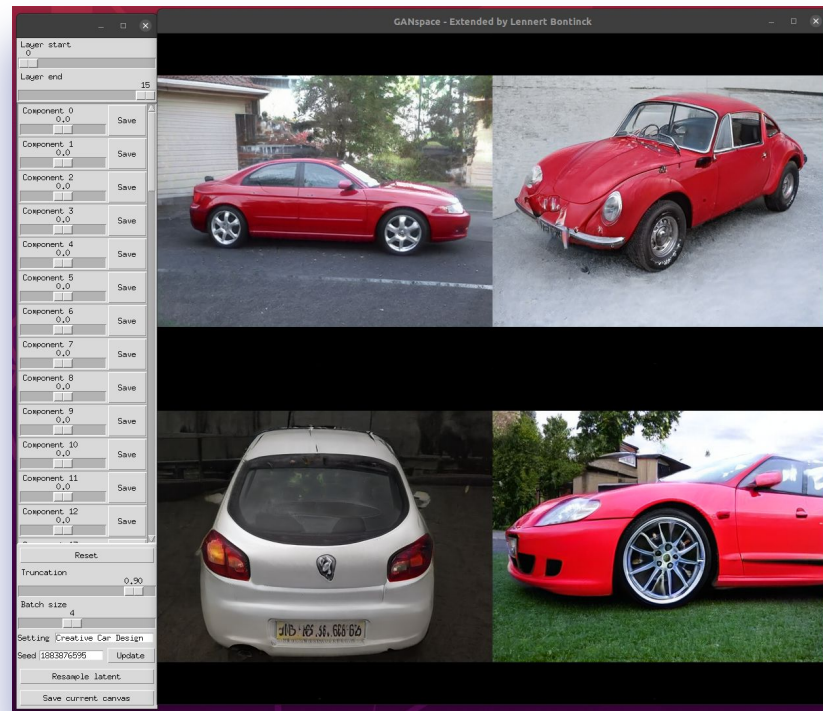
Description in the CSF (4)

- Is the output of F^\diamond infinite?
 - Limited by output of 512x512 images
 - Limited by StyleGAN2 seed limit
 - Limited by GANSpace 512 dimensioned vector for latent space exploration
- Thus: $e_c = \langle R, T, E \rangle^\diamond(\{T\})$ is also finite
- Note: GANSpace could possibly bypass some of StyleGAN2's rules, making $e_c \notin C$



Defending transformational creativity



- Remember R: the rules constraining the space, are the same rules defining the *state* of the generator
 - StyleGAN changes the rules of the generator based on exploration that yields more output accepted by E, thus while training, R is changed
- GANSpace can (manually) explore T, modification might allow it to transform T, latent space restrictions in particular



What's next?

- Describe the system using “How to build a CS” (Ventura, 2017)
- “The study and support, through computational means and methods, of behaviour exhibited by natural and artificial systems, which would be deemed creative if exhibited by humans.” (Wiggins, 2006)
 - external validation!

You are rating a computer generated car design



Quality	● 1 (-) ● 2 ● 3 ● 4 ● 5 (+) An image is considered of good quality if it doesn't contain graphical glitches or artifacts as explained in the introductory video.
Colors	● 1 (-) ● 2 ● 3 ● 4 ● 5 (+) Colors of an image are considered good if they are viable in real life. Remember, some color combinations may be ugly to you but still realistic. An image has bad colors if it has purple grass, red shadows...
Creativity	● 1 (-) ● 2 ● 3 ● 4 ● 5 (+) Whether you find the image creative is a subjective manner, if you recognize (elements of) existing cars please leave them in the notes section. Remember some of the examples given in the introduction video.
General impression	● 1 (-) ● 2 ● 3 ● 4 ● 5 (+) An overall rating on how pleased you are with this car design. This is subjective, feel free to leave reasoning in the notes.



Questions about Computer generated car design?

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