

# GENERATION OF TRADITIONAL JAPANESE PATTERNS FROM NATURAL PATTERNS WITH STYLEGAN

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## PROBLEM

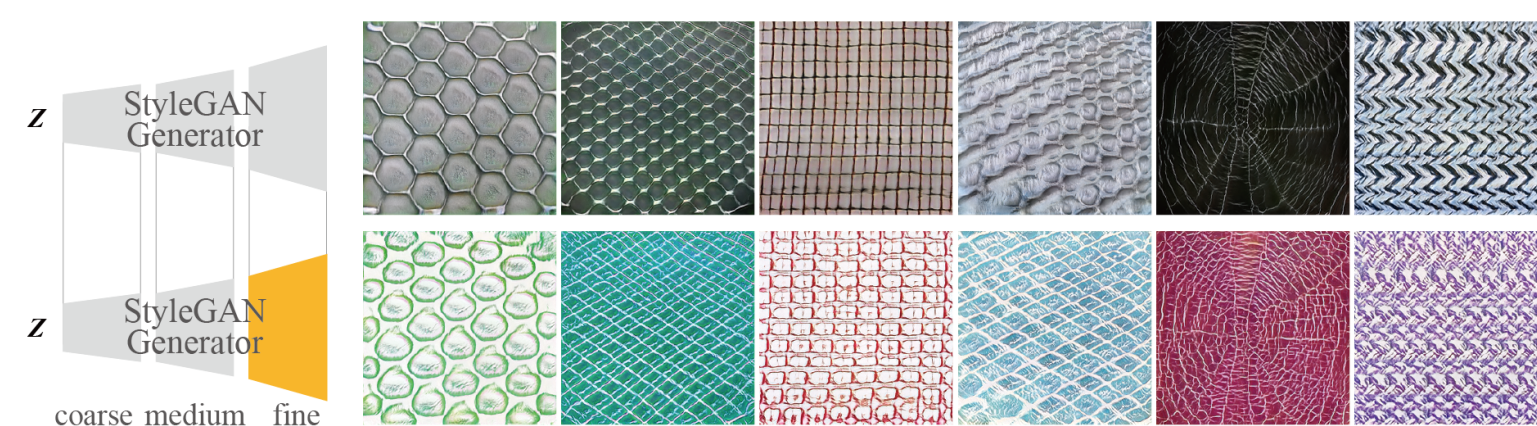
- We aim to generate traditional Japanese patterns (wagara) images with the artificial neural network.
- GANs require large datasets; however, there is no or limited wagara data.
- Also, patterns have characteristics that natural images (e.g., human faces) do not have.

## METHOD

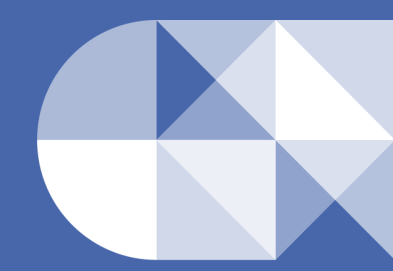
- We used the DTD dataset [1] as a source dataset and the wagara dataset (constructed from [2, 3]) as a target dataset.
- We trained StyleGAN2 [4, 5] on the source dataset, and transfer learning was performed on the target dataset following layer swapping [6].
- We used source parameters at the coarse and medium levels, and target parameters at the fine level.

## RESULTS

- Our method successfully generated patterns of repeating structures with wagara-like styles and colors. The following image compares the natural patterns generator and the wagara generator.



- In the future, we plan to create fabrics with the generated designs.



Sony CSL



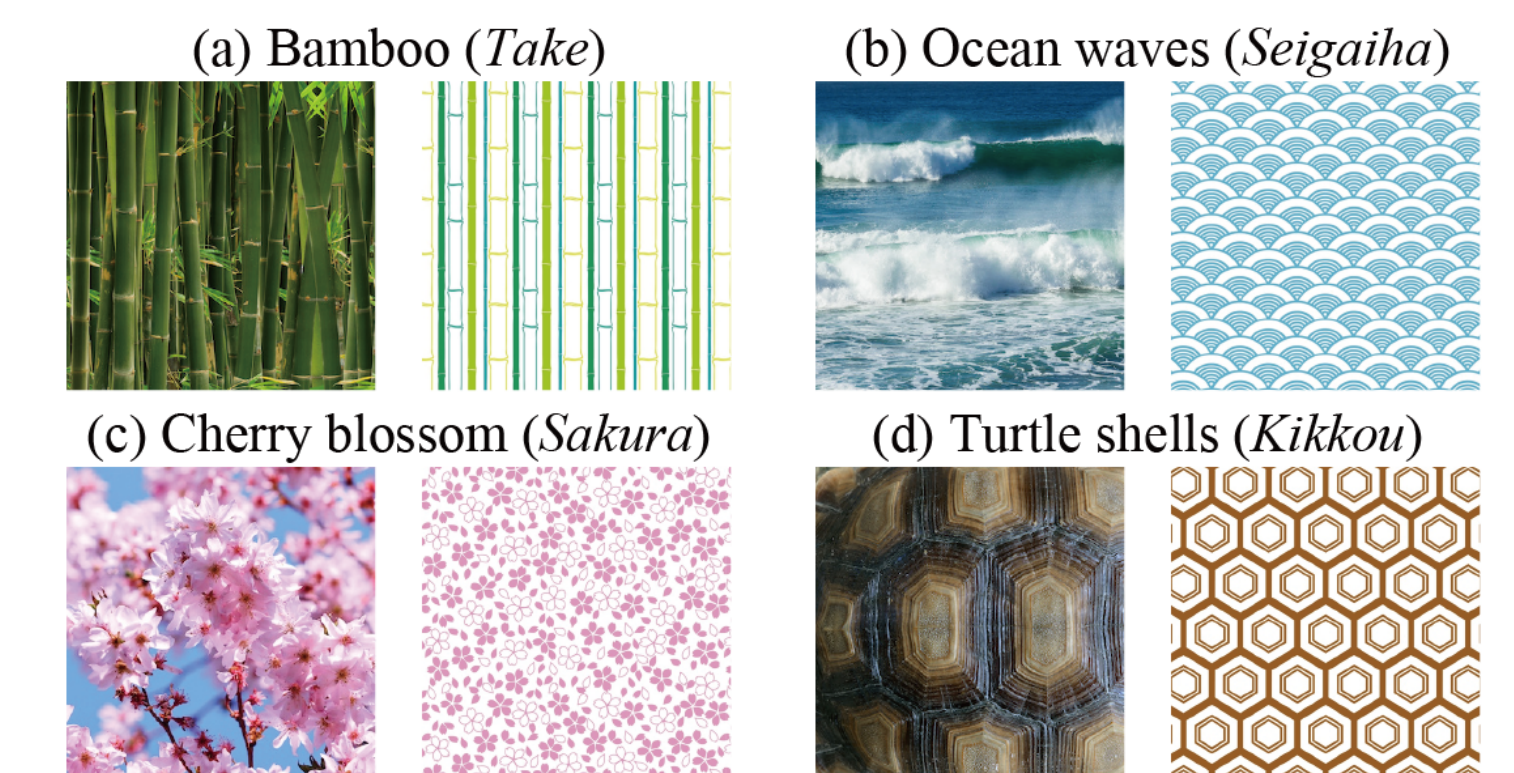
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# WE GENERATED TRADITIONAL JAPANESE PATTERNS (WAGARA) IMAGES FROM NATURAL PATTERNS USING STYLEGAN2 AND LAYER SWAPPING.



## OUR APPROACH

- Wagara is inspired by patterns and textures in our daily life or created with motifs (e.g., plants and animals). Based on this inspiration, we used a dataset of patterns and textures in the wild as a source dataset.



Photos are from Adobe Stock, and wagara images are from [2, 3]

## LIMITATIONS

- The evaluation is difficult because wagara is not well defined.
- Some lines that should be straight are curved, and some areas that should be uniform in color are uneven.

## REFERENCES

- [1] Mircea Cimpoi, Subhansu Maji, Iasonas Kokkinos, Sammy Mohamed, and Andrea Vedaldi. 2014. Describing Textures in the Wild. CVPR.
- [2] Yoshio Jogan. 2009. Japanese Pattern Parts & Patterns. Sotetsusha. (in Japanese).
- [3] Yoshio Jogan. 2010. Japanese Pattern Parts & Patterns Vol.2. Sotetsusha. (in Japanese).
- [4] Tero Karras, Samuli Laine, and Timo Aila. 2019. A Style-Based Generator Architecture for Generative Adversarial Networks. CVPR.
- [5] Tero Karras, Samuli Laine, Miika Aittala, Janne Hellsten, Jaakko Lehtinen, and Timo Aila. 2020. Analyzing and Improving the Image Quality of StyleGAN. CVPR.
- [6] Justin N. M. Pinkney and Doron Adler. 2020. Resolution Dependent GAN Interpolation for Controllable Image Synthesis Between Domains. NeurIPS Workshop.

## ACKNOWLEDGEMENTS

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QR CODE TO WEBSITE WITH FULL PAPER