Pixel Fixer

Smart Pixel Art Corrections

Legend says most pixel artists will be driven insane over time because they'll notice banding everywhere. EVERYWHERE.

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1. INTRO

Context

- **Pixel art** is a digital artistic style where every pixel is deliberately placed. It has a unique aesthetic and is widely used in **video games**, **digital art**, and even **non-fungible tokens**.
- Our **perception** shapes how we interpret pixel art. Even tiny artifacts can break the effect.
- Artists created rules to fix common imperfections, but manual work needs time and skill.

Research Question

How to design semi-automated techniques to correct common pixel art imperfections?

We address two types of artifacts:

- **Banding** [1, 2]: we say it occurs when two different colored segments are 2+ pixels long, adjacent along the longer edge, and have aligned endpoints.
- **Pillow-shading** [1, 2]: shading in concentric layers that follow the shape's outline (almost) perfectly. Has banding nearly everywhere.

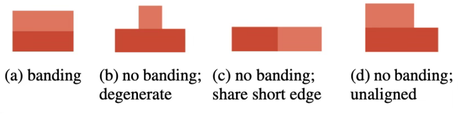
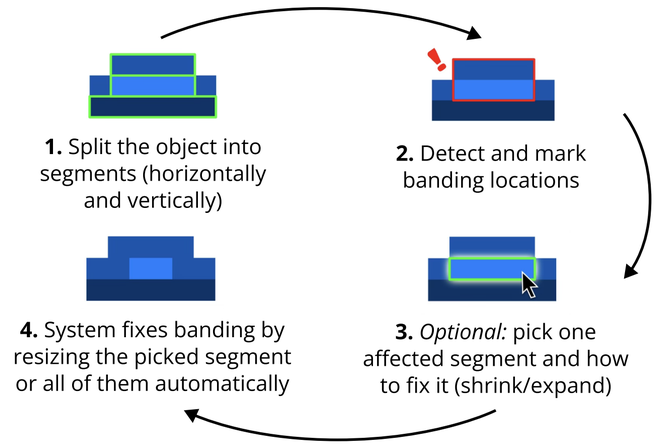


Fig. 1: *Examples of banding and non-banding segments*

Fig. 2: *Pillow-shading example*

2. BANDING CORRECTION

Method



Results

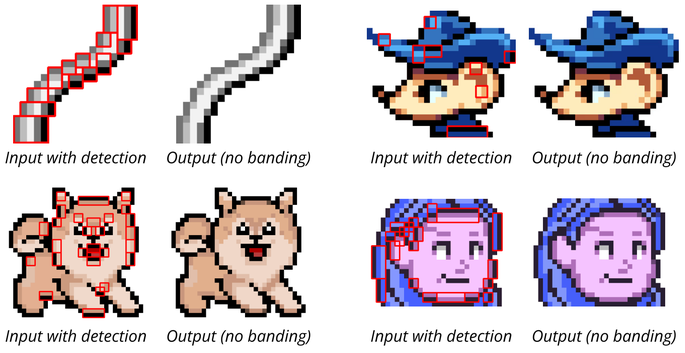
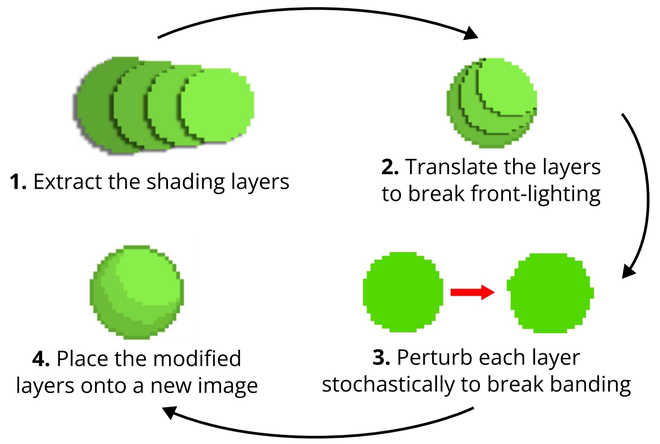


Fig. 3: *Our banding correction results; top inputs are designed by Michael Azzi [2]; bottom inputs are designed by Mateo Nasse*

3. PILLOW-SHADING CORRECTION

Method



Results

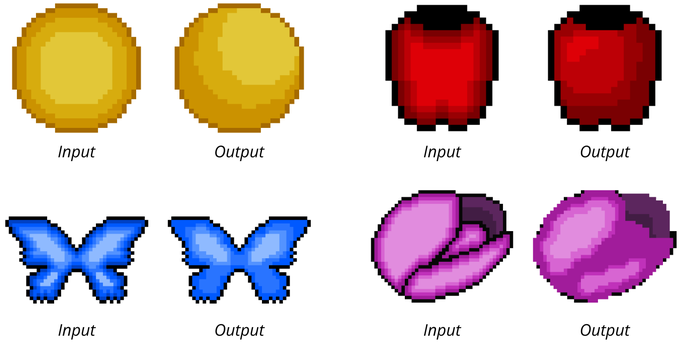


Fig. 4: *Our pillow-shading correction results; all inputs are original designs*

4. CONCLUSION

Our methods can improve pixel art while reducing manual work.

Applications

- In animation contexts [3], our pillow-shading method can **automatically adjust shading** between frames.
- Our banding correction pipeline **can be extended** to other areas, such as converting vector art to pixel art [4].

Limitations

- Pillow-shading artifacts must be **isolated**. Also, the algorithm can't keep symmetries.
- Banding correction often **needs user input**.

Future Work

- **Reduce user interaction** for banding correction.
- Extend to **diagonal segment banding**.

References

[1] D. Silber, *Pixel art for game developers*. Boca Raton: CRC Press, 2016, ISBN: 978-1-4822-5230-9.

[2] M. Azzi, *Pixel Logic: Pixel Art Tutorials*, 2022 Edition. www.pixellogicbook.com, 2022.

[3] M.-H. Kuo, Y.-L. Yang, and H.-K. Chu, "Feature-Aware Pixel Art Animation," en, *Computer Graphics Forum*, vol. 35, no. 7, pp. 411–420, Oct. 2016. [On-line]. Available: https://onlinelibrary.wiley.com/doi/10.1111/cgf.13038.

[4] T. C. Inglis, D. Vogel, and C. S. Kaplan, "Rasterizing and antialiasing vector line art in the pixel art style," en, in *Proceedings of the Symposium on Non-Photorealistic Animation and Rendering*, Anaheim California: ACM, Jul. 2013, pp. 25–32, [On-line]. Available: https://dl.acm.org/doi/10.1145/2486042.2486044.