

A handful of pixels of blood

A Historical and Technological
Perspective on Understanding
Video Game Graphics



Table of Contents

- 01 Context
- 02 Method
- 03 Findings
- 04 Implications



AMIGA COMPUTER GE BASIC US HNN
G-VE RUM GÄRLEM 38378 SPÖRIC ALICE EEE
DEBOA.

BRADDOCK

0

SIERRA
BOXING



THOMAS

0



ROUND

1

02 Method

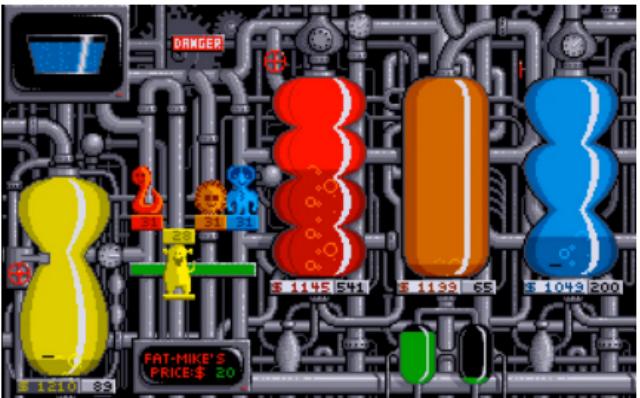
Datasets, Framework, and Method

02 Datasets

Ludens Image Dataset

- 3800 Images
- 35 Video Games
- Confoederatio Ludens
- Video Stills from Let's Play Streams

Ludens

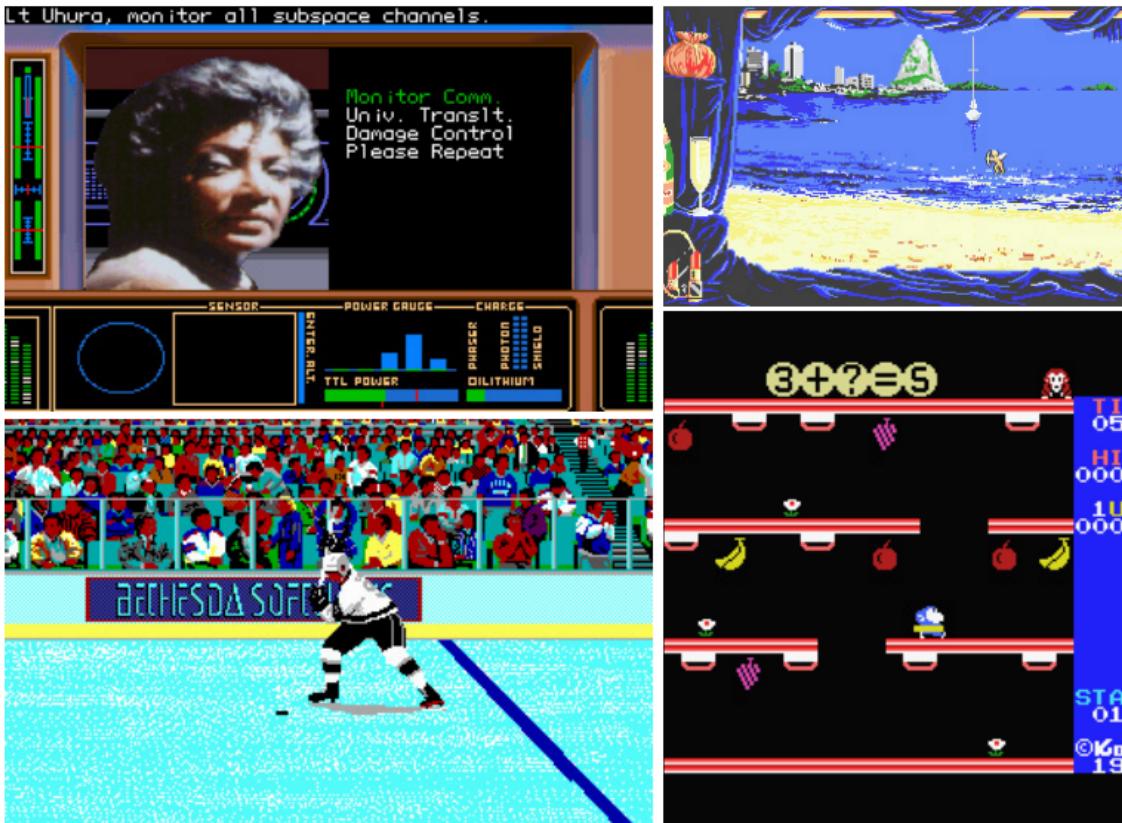


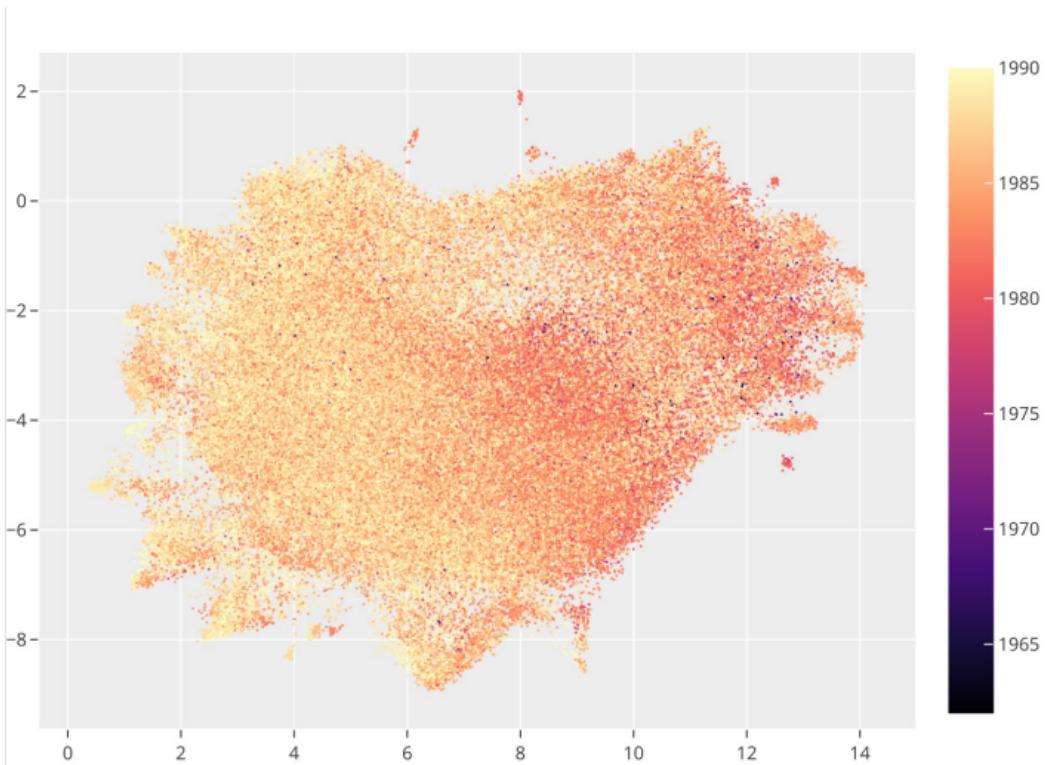
02 Datasets

VHS-D

Video Games History Screenshots Dataset

- 113'555 Images
- 4316 Video Games
- Pre-1990s
- MobyGames





02 Datasets

VHS-D

FAVR (faveur)

- *Framework for the Analysis of Visual Representation in Video Games*
- Critique of existing methods of image analysis
- Conceptual vocabulary to describe video game images

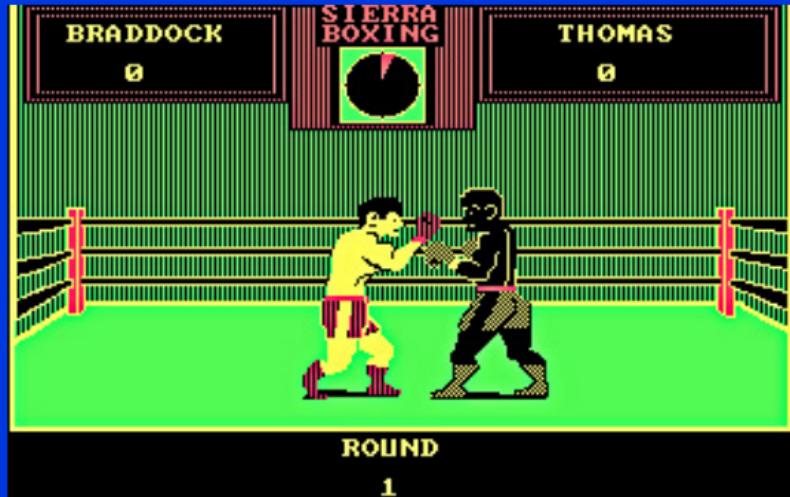
Modes
Composition
Construction
Spaces
Planes

02 Framework

FAVR



Title Screen



In-Game

02 FAVR

Modes



02 FAVR

Composition



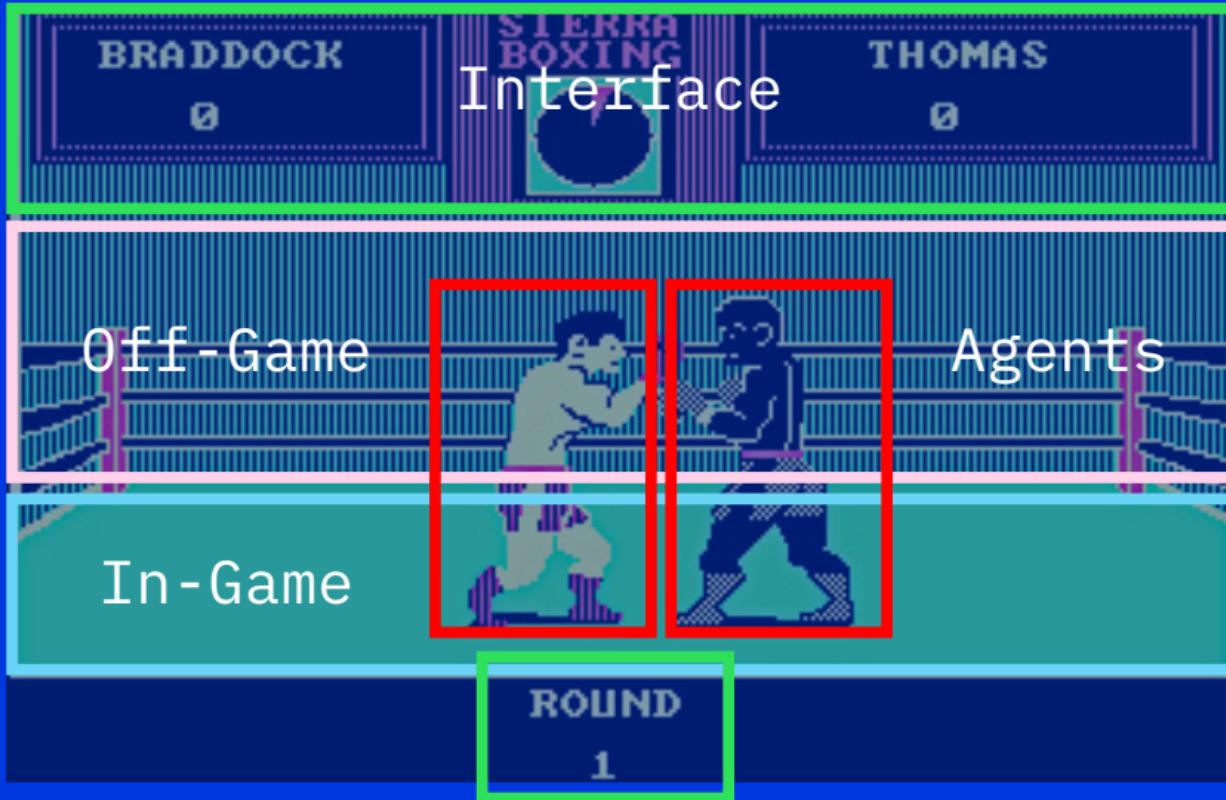
02 FAVR

Composition



02 FAVR

Construction

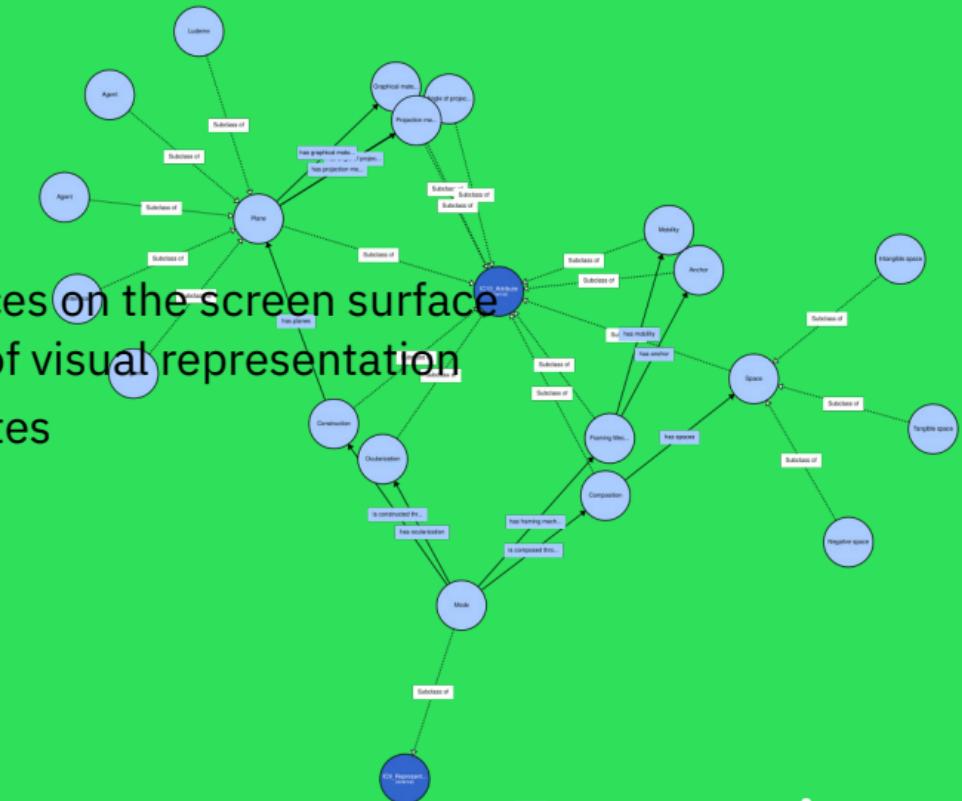


02 FAVR

Construction

Expanding FAVR

- *Composition*: organization of spaces on the screen surface
- *Construction*: conceptual planes of visual representation
- **FAVR Ontology** and **Tropy** templates



Expanding FAVR

- *Composition*: organization of spaces on the screen surface
- *Construction*: conceptual planes of visual representation
- **FAVR Ontology** and **Tropy** templates
- **Ludemes** as conceptual plane: Minimal unit of play



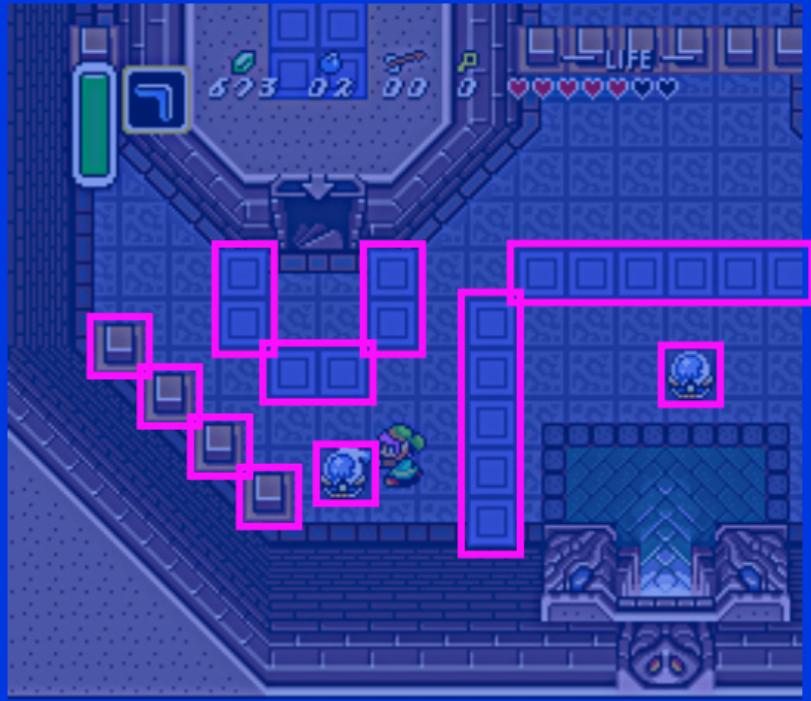
02 FAVR

Expansion



02 FAVR

Ludemes



02 FAVR

Ludemes

03 Findings

Findings and preliminary results



03 Findings

Image Dynamics



Static



Dynamic

03 Findings

Image Dynamics



03 Findings

Ludemes



03 Findings

Ludemes

Distant Viewing the VHS-Dataset

- **DINOv2** and **UMAP** for dimensionality reduction
- Multiple differently grained **K-means** clusterings
- Three types of clusterings
- *Formal* or *semantic* aspects, and *genres*

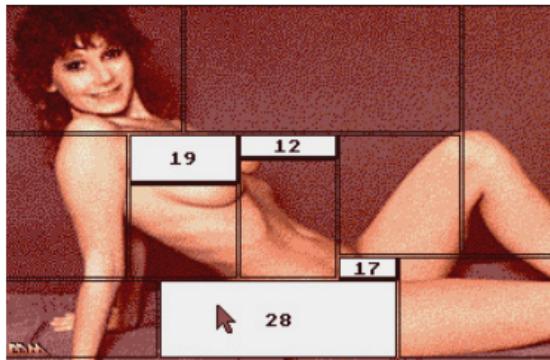
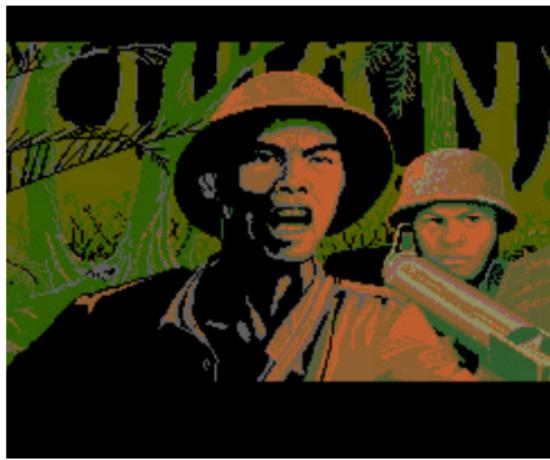
03 Findings

Formal



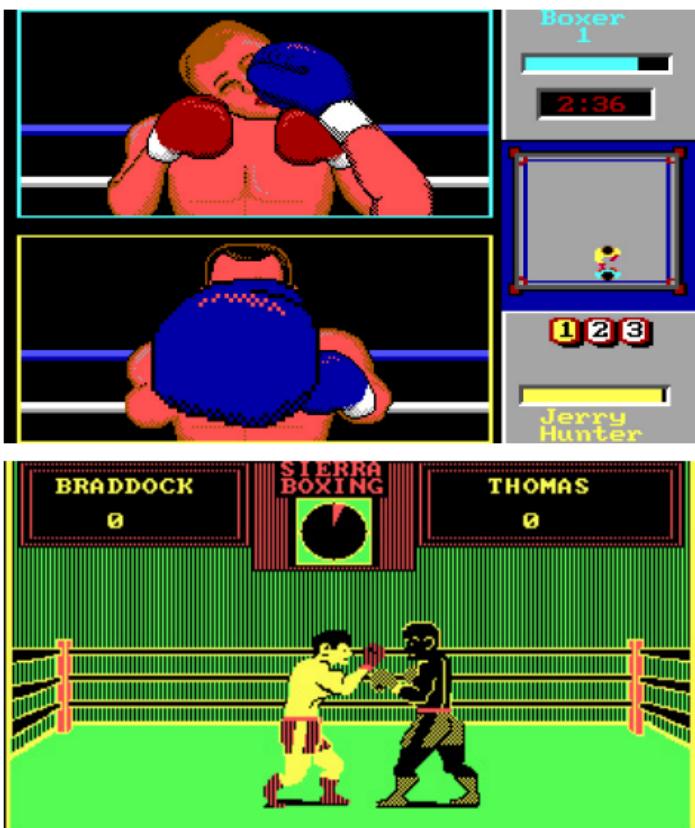
03 Findings

Semantic



03 Findings

Genre



Distant Viewing the VHS-Dataset



Clusters around Modes...

03 Findings

VHS-D

Distant Viewing the VHS-Dataset



Clusters around Modes...



...but not Ludemes

04 Implications

Digital Literacy and Video Game Images

**Source Code
Algorithms
Executable Software
On-Screen Images**

→ Digital Matter

04 Implications

**Historical Analysis
Technological Understanding
Visual Examination**

→ Multidisciplinary Approaches

04 Implications

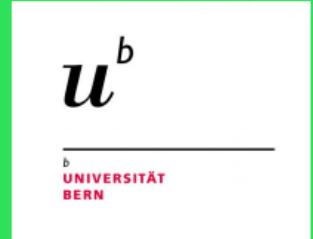
Challenges and limitations
Datasets/Ontology published
Finishing work on VHS-Dataset
Continue application of FAVR



04 Implications

Outro

Adrian Demleitner
adrian.demleitner@hkb.bfh.ch
orcid.org/0000-0001-9918-7300
@thgie@post.lurk.org



Digital History 2024, University of Basel, 12. September 2024



— Contact

Thank You

Ludography

- Airball (Microdeal/Microdeal, 1987, Atari ST)
- Antares: Der Griff Nach Den Sternen (Nightmare Productions/Bomico, 1991, Amiga)
- Barbarian: The Ultimate Warrior (Palace Software/Palace Software, 1987, Amiga)
- Centerfold Squares (Artworx/Artworx, 1988, Atari ST)
- Clown-o-Mania (Starbyte Software, 1989, Amiga)
- Crystal Castles (Atari/Atari, 1983, ZX Spectrum)
- Emmanuelle: A Game of Eroticism (Coktel Vision, Inférence/Tomahawk, 1989, Atari)
- Escape from Hell (Electronic Arts/Electronic Arts, 1990, DOS)
- Heavyweight Champ (Sega/Sega, 1987, Arcade)
- Lost Patrol (Astros Productions/Ocean Software, 1991, DOS)
- Marble Madness (Atari Games/Atari Games, 1984, NES)
- Monkey Academy (Konami/Konami, 1983, MSX)
- Patton Versus Rommel (Sculptured Software/Electronic Arts, 1987, DOS)
- Robox (Markt+Technik, 1986, Commodore 64)
- Sierra Championship Boxing (Everyware/Sierra On-Line, 1983, PC Booter)
- Star Trek V: The Final Frontier (Level Systems/Mindscape, 1989, DOS)
- The Immortal (Sandcastle/Electronic Arts, 1990, Apple IIGS)
- The Legend of Zelda: A Link to the Past (Nintendo/Nintendo, 1991, SNES)
- The Neverending Story II (Linel/Linel, 1990, Amiga)
- The Secret of Monkey Island (Lucasfilm Games/Lucasfilm Games, 1990, Amiga)
- TKO (Accolade/Accolade, 1989, DOS)
- Traders (Linel/Linel, 1991, Amiga)
- Wayne Gretzky Hockey (Bethesda Softworks/Bethesda Softworks, 1988, DOS)

Bibliography

- Alberts, Gerard, and Ruth Oldenziel, eds. 2014. *Hacking Europe: From Computer Cultures to Demoscenes*. History of Computing. London: Springer. <https://doi.org/10.1007/978-1-4471-5493-8>.
- Arnold, Taylor, and Lauren Tilton. 2023. *Distant Viewing: Computational Exploration of Digital Images*. Cambridge, Massachusetts: The MIT Press.
- Arsenault, Dominic, Pierre-Marc Côté, and Audrey Larochelle. 2015. "The Game FAVR: A Framework for the Analysis of Visual Representation in Video Games."
- Ayccock, John. 2023. *AMNESIA REMEMBERED: Reverse Engineering a Digital Artifact*. 1st ed. Berghahn Books. <https://doi.org/10.3167/9781800738676>.
- Berry, David M. 2015. *The Philosophy of Software: Code and Mediation in the Digital Age*. Basingstoke: Palgrave Macmillan.
- Birken, Jacob. 2023. "Illusion als Versprechen - Die unerwartete Überzeugungskraft des frühen 3D-Spiels."
- Căşvean, Tulia-Maria. 2015. "An Introduction to Videogame Genre Theory. Understanding Videogame Genre Framework." *Athens Journal of Mass Media and Communications* 2 (1): 57–68. <https://doi.org/10.30958/ajmmc.2.1.5>.
- Demleitner, Adrian. 2024a. "Thgie/Favr-Ontology: FAVR+." Zenodo. <https://doi.org/10.5281/zenodo.13735972>.
- —. 2024b. "Thgie/Ludens-Image-Corpus: Initial Release." Zenodo. <https://doi.org/10.5281/zenodo.12745042>.
- —. 2024c. "Thgie/Vhs-Dataset: Cluster Labels and Descriptions." Zenodo. <https://doi.org/10.5281/zenodo.13349250>.
- Fizek, Sonia. 2022. "Through the Ludic Glass: Making Sense of Video Games as Algorithmic Spectacles." *Game Studies* 22 (2). http://gamedstudies.org/2202/articles/gap_fizek.
- Gaboury, Jacob. 2021. *Image Objects: An Archaeology of Computer Graphics*. Cambridge [Massachusetts]: The MIT Press.
- Gerling, Winfried, Sebastian Möring, and Marco Mutiis. 2023. *Screen Images. In-Game Photography, Screenshot, Screencast*. <https://doi.org/10.55309/c3ie61k5>.
- Haddon, Leslie. 1988. "The Home Computer: The Making of a Consumer Electronic." *Science as Culture* 1 (2): 7–51. <https://doi.org/10.1080/09505438809526198>.
- Hansen, Damien. 2023. *Parler le jeu vidéo : Le ludème comme unité minimale d'une grammaire vidéoludique? Parler le jeu vidéo : Le ludème comme unité minimale d'une grammaire vidéoludique?* Culture contemporaine. Liège: Presses universitaires de Liège. <https://books.openedition.org/pulg/18941>.
- He, Kaiming, Xiangyu Zhang, Shaoqing Ren, and Jian Sun. 2015. "Deep Residual Learning for Image Recognition." arXiv. <https://doi.org/10.48550/arXiv.1512.03385>.
- Hurel, Pierre-Yves. 2020. "L'expérience de création de jeux vidéo en amateur - Travailler son goût pour l'incertitude," May. <https://orbi.uliege.be/handle/2268/247377>.
- Kurfess, Franz J. 2003. "Artificial Intelligence." In *Encyclopedia of Physical Science and Technology* (Third Edition), edited by Robert A. Meyers, 609–29. New York: Academic Press. <https://doi.org/10.1016/B0-12-227410-5/00027-2>.
- Marino, Mark C. 2020. *Critical Code Studies. Software Studies*. Cambridge, Massachusetts: The MIT Press.

Bibliography

- Martino, Simone De, Marianna Nicolosi-Asmundo, Stefano Angelo Rizzo, and Daniele Francesco Santamaria. 2023. "Modeling the Video Game Environment: The VideOWL Ontology."
- McInnes, Leland, John Healy, and James Melville. 2020. "UMAP: Uniform Manifold Approximation and Projection for Dimension Reduction." arXiv. <https://doi.org/10.48550/arXiv.1802.03426>.
- Montfort, Nick, and Ian Bogost. 2009. *Racing the Beam: The Atari Video Computer System*. Platform Studies. Cambridge, Mass: MIT Press.
- Oquab, Maxime, Timothée Darcret, Théo Moutakanni, Huy Vo, Marc Szafraniec, Vasil Khalidov, Pierre Fernandez, et al. 2024. "DINOv2: Learning Robust Visual Features without Supervision." arXiv. <https://doi.org/10.48550/arXiv.2304.07193>.
- Pfister, Eugen. 2023. "How to analyse a Video game from a historical, source-critical perspective: The HGP-Method." Billet. Horror - Game - Politics (blog). February 1, 2023. <https://doi.org/10.58079/piqb>.
- Pfister, Eugen, Aurelia Brandenburg, Adrian Demleitner, and Lukas Daniel Klausner. 2023. "Warum wir es für eine gute Idee gehalten haben, eine DACH-Spieledatenbank aufzubauen." In *Game-Journalismus: Grundlagen – Themen – Spannungsfelder*. Ein Handbuch, edited by Benjamin Bigl and Sebastian Stoppe, 307-16. Wiesbaden: Springer Fachmedien. https://doi.org/10.1007/978-3-658-42616-3_22.
- Ruggill, Judd, and Ken McAllister. 2015. *Tempest: Geometries of Play*. Ann Arbor, MI: University of Michigan Press. <https://doi.org/10.3998/lvg.13030180.0001.001>.
- Swalwell, Melanie. 2021. *Homebrew Gaming and the Beginnings of Vernacular Digitality*. Cambridge: MIT. <https://mitpress.mit.edu/9780262044776/homebrew-gaming-and-the-beginnings-of-vernacular-digitality/>.
- Williams, Richard. 1976. "Early Computers in Europe." In Proceedings of the June 7-10, 1976, National Computer Conference and Exposition, 21-29. AFIPS '76. New York, NY, USA: Association for Computing Machinery. <https://doi.org/10.1145/1499799.1499804>.
- Xu, Yuhang. 2024. "Application of Image Segmentation Algorithms in Computer Vision." *Frontiers in Computing and Intelligent Systems* 7 (April):17-20. <https://doi.org/10.54097/gq1s6737>.