IAT 460: Generative AI and Computational Creativity

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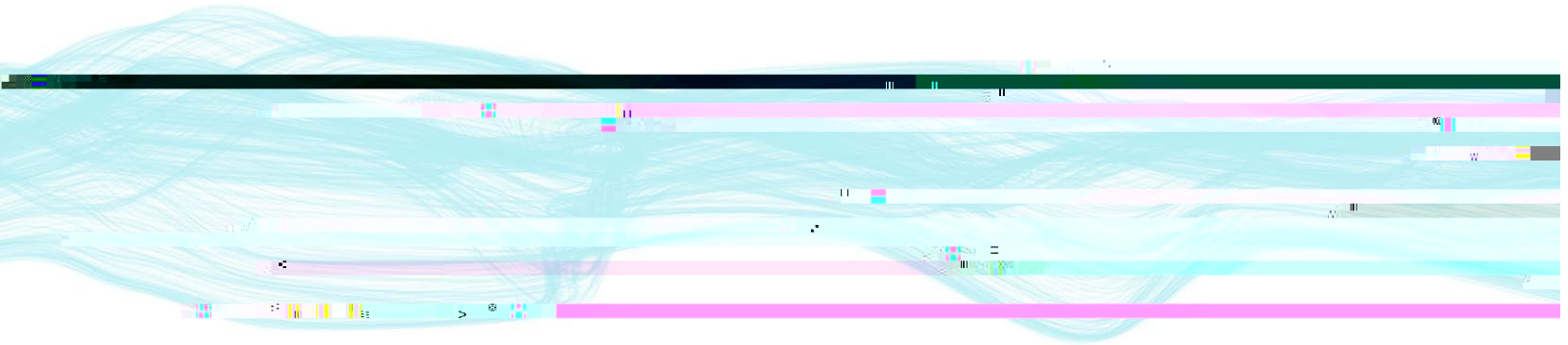
Introduction to AI/ML (SIAT course or equivalent).

- Generative AI
- Computational Creativity
- Generative Art,
- Generative Algorithms in Artificial Intelligence, Machine Learning, Artificial Life
- Computer-assisted Creativity

This course proposes an in-depth introduction and overview of the history and practice of generative AI in the arts and computational creativity with an emphasis on the formal paradigms and algorithms used for generation. The class presents the various approaches from AI, machine learning, and A-life that have been used for generative processes. The presentation is illustrated by numerous examples from past and current productions across creative practices such as visual art, new media, music, poetry, literature, performing arts, design, architecture, games, robot-art, bio-art and net-art. Students gets to practice these and develop new generative pieces through assignments and projects. Finally, the course addresses relevant philosophical, and societal debates associated with the automation of creative tasks.



This course proposes an in-depth introduction to AI algorithms used in generative art and computational creativity across creative disciplines.

At the end of the course the successful student will be able to:

1. Define, and explain generative art and computational creativity
2. Identify, describe, evaluate, critique, and contrast generative artworks and computationally creative systems
3. Describe, and apply the algorithms used for generative art and computational creativity in the creative domains covered in class
4. Design, implement, and test generative art systems.
5. Articulate and discuss the societal, ethical and philosophical issues surrounding computational creativity and generative art practices.

Notes:

- We are only using verbs from Bloom's Taxonomy of learning goals here and these span the six cognitive categories: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation.
- Learning Goals 3 is the main one given the vast number of generative algorithms covered (the description of these algorithms constitutes around 60% of the lecture time).

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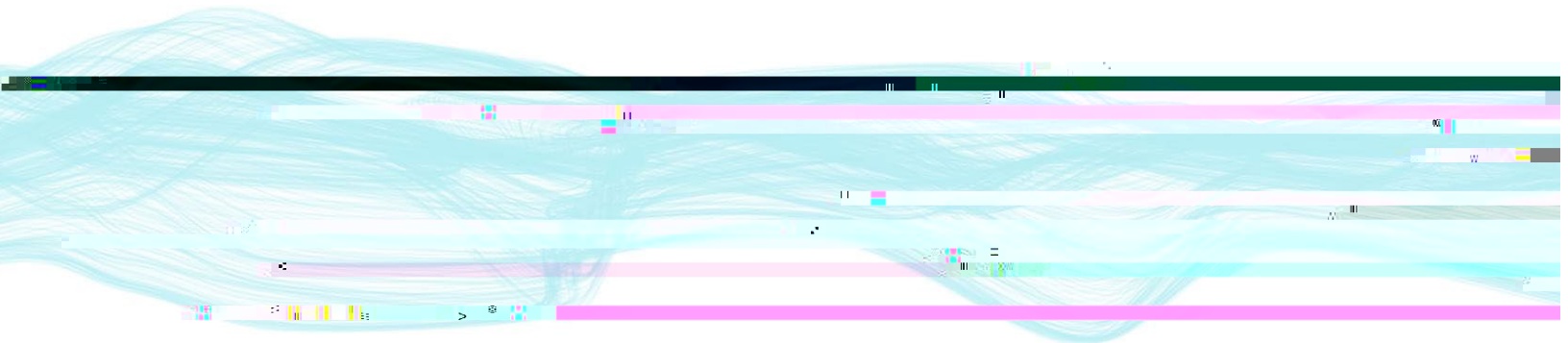
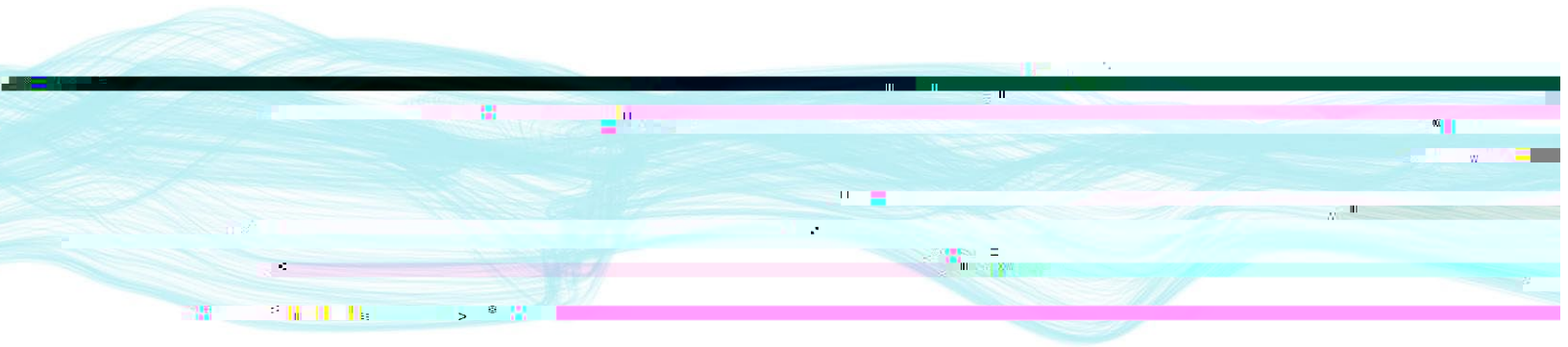
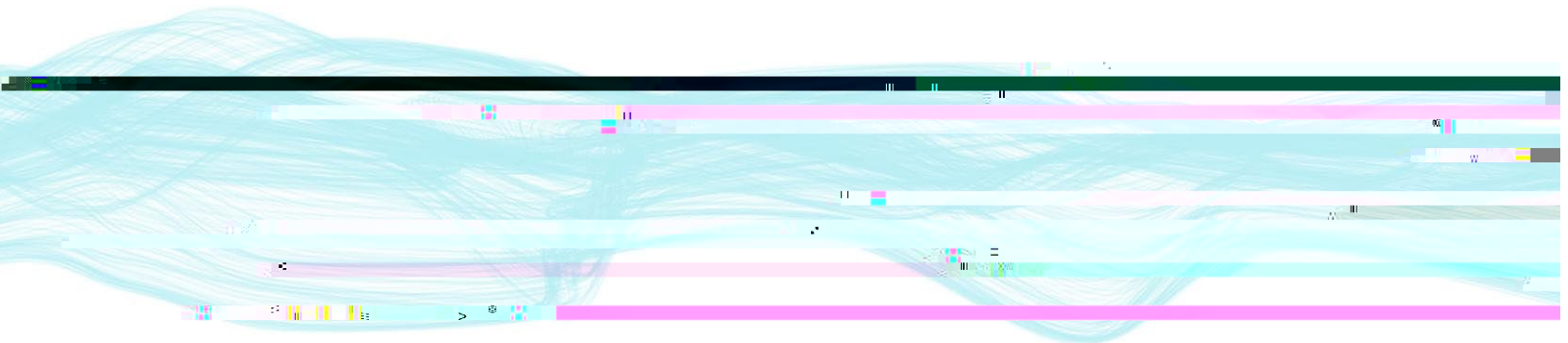


3. Designed, developed, and tested a new and original generative system in a domain of his/her/its choice, and using some of the algorithmic approaches covered in class



- Session 4: Agents and Multiagent systems: cognitive agents.
    - Introduction to artificial agents
    - Motivation for agentification of cybernetic systems
    - BDI, cognitive architectures
    - Agent communication,
    - Reinforcement Learning
    - Virtual agents: Examples from interative arts, VR, Net-art and games
    - Conversationel agents, chatbots, twitter bots
- Session 5: Agent and Multiagent systems: reactive agents
    - Reactive agents and subsumption architecture
    - Reactive agents and emergence
    - Swarm, boids, and particules,
    - Examples from visual art
    - Examples from robotic art
    - Guest lecture: MuseBots.
- Session 6: A-life: introduction to A-life and cellular automaton
    - Introduction to A-life
    - Cellular Automaton life
    - Applications of cellular automaton in art
    - Life and death in multi-agent ecosystems
    - Multi- life



        - Deep Learning
        - Visual Art examples
        - Music examples
- Session 10: Generation as Search
    - Enumeration and Search
    - MCTS
    - Video Games examples
    - Novelty Search
    - Examples from Visual Art
- Session 11: Computer-assisted Creativity, and Evaluation
    - Computer-assisted creativity
    - HCI for computational creativity
    - Typology of Evaluation methods
    - Examples from computational creativity
- Session 12: Wrap-up, Authorship and Societal Perspectives
    - The fear of automation
    - Technophilia and technophobia
    - Ecology and other concerns
    - Authorship and copyright.
    - Future of generative art and computational creativity
    - Conclusion

- Session 1: Research and characterize 2 Generative Art pieces (8%)
- Session 2: Colors arranged by chance (6%)
- Session 3: Markov Chain for melody generation (6%) and Quiz 1 (4%)
- Session 4: L-systems for visual (6%)
- Session 5: MuseBots (8%)
- Session 6: Quiz 2 (8%)
- Session 7: Cellular automaton (8%)
- Session 8: Interactive genetic algorithm (8%)
- Session 9: Quiz 3 (8%)
- Session 10: Multi-layer perceptron (8%)
- Session 11: Final Project - develop an original generative using one or several algorithms from the class (12%)
- Session 12: Quiz 4 (10%)

This is a project-based course. There will not be a final exam.