



xCoAx 2021 9th Conference on
Computation, Communication, Aesthetics & X

2021.xCoAx.org

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Mežs / Forest

Keywords: Forest, AI, Machine Learning, Trees, Biodiversity, Speculative Art, Global Climate Change

The techno-ecologies concept which implies the integrated view on the interconnection of technology and ecology in providing the needed resources in the present world; my work is intended as a comment on the effects of the Anthropocene on the environment. *Mežs* looks at critical environmental challenges and how we can speculate on how nature might look in the future. Speculating on the future of forests; it proposes new computer-generated species of trees and traces their habitats by composing the soundscapes that surround them. The research will explore the use of artificial intelligence and machine learning algorithms in generative art. The project investigates how these algorithms can generate audiovisual and textual material that can form the basis of the artwork itself.

The outcome consists of a series of three artworks: an interactive online archive of trees and their soundscapes, a time-based work envisioning the world with the new tree species introduced, and an interactive book – an archive of the previously generated materials.

Description

Mežš is an artistic research that explores the use of artificial intelligence (AI) and machine learning (ML) algorithms in generative art. Media artist and theorist, Philip Galanter describes generative art as:

Art that refers to any art practice where the artist uses a system, such as a set of natural language rules, a computer program, a machine, or other procedural invention, which is set into motion with some degree of autonomy contributing to or resulting in a completed work of art. (Galanter, 2003)

My artwork, namely, investigates how by creating a custom training dataset, a ML system can generate audiovisual and textual material that can form the basis of the artwork itself. *Mežš* is a speculative look into the future of forests; it proposes new species of trees that are computer-generated, and also traces their habitats by composing the soundscapes that surround them. This new species of trees could cover the earth in the future to maintain natural balance. The new trees are the result of evolution of existing ones and mutations between them. They have qualities from multiple trees from different environments that allow them to be more resilient to future environments, and in some cases, even migrate away from the environment if the conditions for their survival become too harsh. The artwork consists of a series of three artworks: the first work is an interactive online archive of trees and their soundscapes, the second is a time-based work showing how the world would look like with these new tree species, and the third one, is an interactive book archiving all the previously generated materials.

Mežš looks at artists that create their works with the help of AI concentrating on artworks that deal with artificial ecology, speculative futures, and critical design, such as *Artificial Remnants* by Sofia Crespo, *Cusp* by Jake Elwes, *Myriad* by Anna Ridler, and *Asunder* by Tega Brain, Julian Oliver, and Bengt Sjöln. For the research I am looking at the fields of generative art and techno-ecologies.

Sofia Crespo's work *Artificial Remnants* is part of an ongoing exploration of artificial life using deep learning to generate insects as well as their names and anatomical descriptions. My interest in this work focuses on the approach the artist has towards presenting her work online, and the methodology behind it. Jake Elwes' work *Cusp* is trained on a photographic dataset, the machine proceeds to learn the embedded qualities of different marsh birds, and in the process reveals forms that fluctuate between species. I am especially intrigued by the way the artist presents time-based fragments of the work in its natural

habitat, through the use of panels and projection, Anna Ridler's project *Myriad* is an installation of thousands of hand-labeled photographs of tulips that are ML generated. My work was especially inspired by Ridler's approach of presenting a big dataset in a way where you can look at all of it, or a smaller part by interacting directly with it. *Work Asunder* by Tega Brain, Julian Oliver, and Bengt Sjöln responds to a growing interest in the application of AI to critical environmental challenges by situating this approach as a literal proposition, combining state of the art climate and environmental simulation technology. The artwork concept has inspired me to think about environmental challenges that nature needs to go through to provide for us and how we can speculate on how nature might look in the future.

Another concept which provides the theoretical context for my work is the term Techno-Ecologies, which refers to an idea which connects to the critical discourse about the Anthropocene era:

everyday life is intimately interwoven with complex technological ecologies. I believe that we can no longer consider technology as the alienating "other". The idea that we "inhabit" technological ecologies, emphasises our connectedness to our environment and our dependence on available resources. The field of Techno-Ecologies builds upon the urgent call by philosopher Felix Guattari for an integrated perspective on the dramatic techno-scientific transformations the Earth is undergoing. (Smite, R., Kluitenberg, E., & Smits, R., 2012)

My first step into generating the imagery of the work was to put together a custom dataset of trees using a custom Python script that searches for tree images on the Internet. My script looks for images that are square and minimum 1024x1024 pixels in size. Next step was to select images where the tree is centred. The search started with a specific species of trees that grow in my home country Latvia followed by trees from my current location in Washington state and continue into more harsh environments like the tundra, deserts, the rainforest, and even underwater environments, ending with rear tree species. The script collected 4000 images that I manually filtered and selected the ones that fit my criteria. I ended up with 1000 images and 39 species of trees. Using the NVIDIA StyleGans2 ML algorithm It generated 120,000 new trees. The new trees were separated into 39 groups using the unsupervised KMeans clustering algorithm that groups similar data points together. Each new group of trees then went through the KMeans process again to separate similar images in the same group of images. I manually selected images of trees with the most interesting color palette, shape, and background, ending up with 1848 images of new trees.

Furthermore, I created computer-generated soundscapes to accompany the images of the trees. Using the tree species, the environments where they grow, and various forest types as keywords I wrote another custom Python script using the Freesounds API. All the collected sounds were edited to have the same length, and then were used to train a WaveGan ML algorithm. After eliminating files that contained silence, my new dataset contained 5825 sound files. These were used to generate short samples of soundscapes for each new tree species. With this process, I generated 125000 new soundscape samples. After removing the ones that consisted of white noise and once that were clipping, I manually assigned a soundscape by listening to it and imagining how a tree would move and interact with its environment.

To use AI not as a solutionist strategy for climate change, but to comment on the effects of the Anthropocene on the environment, to speculate about the potential of future imaginations by the collaboration of human and non-human agents; to investigate the poetics of using AI both visually, and also sonically, by creating an immersive experience. To explore the format of the interactive publication as a way of archiving and disseminating this research into AI, art and ecology.

Mežš means a Forest in Latvian. The website *mezs.ai* is an interactive digital archive consisting of 39 new tree species and soundscapes.

Fig. 1. Screenshot from the web page after entering it accompanied by all soundscapes.



Fig. 2. Screenshot of a selected tree for a closer look accompanied with its species soundscape.



Available at: <http://mezs.ai>

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