Multimedia Art: The Synthesis of Machine-generated Poetry and Virtual Landscapes

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Abstract

Artificial Intelligence, VR and AR are transforming multimedia art, offering the opportunity for novel creative human-machine collaborations. In this work we demonstrate the synthesis of a character-level long short-term memory network for generating poetry and L.e.O. (Luci e Ombre), a virtual landscape composed of dynamic architectural elements and surfaces, providing an immersive digital art experience.

Generating poems with LSTMs

Recurrent neural networks encompass high-dimensional hidden states and are able to iterate over sequences of arbitrary size, process and memorize information. [1] RNN variants are commonly deployed in the field of natural language generation. [2] Thus, we trained a character-level long short-term memory network (LSTM) on a dataset of 1.3M characters of classical and contemporary poems, where the network receives an input at each timestep, updates its hidden state and predicts one character at a time. The model architecture comprises an LSTM layer with 128 hidden units, followed by a Dropout layer (0.2) as a regularization technique [3], a dense layer and a softmax activation function. Hundreds of poems were generated and evaluated. The selected poem for this work shows errors in morphology and syntax, but seems largely coherent from a semantic perspective, where expressions like *soul of the storm* can be interpreted as creative and novel metaphors. The linguistic style matches approximately the requirements and aesthetics of poetry, however, there is a striking word-level repetitiveness (Table 1).

on a charred spinning wheel, the world was cold the soul of the storm, the shadow s soul where the strong she still, the stars that beautiful and strain, and the strange and the storm of the stars, and the stars of the storms of the stars, i say i shall be the made the stars of the storm, the stars when the wind of the stream of the shadow, the thing of the said the world was a sea, and the shadow of the sky

Table 1. The selected LSTM-generated poem.

3D-modeling: The virtual landscape

L.e.O is an alternate reality composed of real light and shadows, where 9 distinct silhouettes were extracted from the original structure. The selected objects were then deconstructed, analyzed and reassembled in a different manner. Subsequently, the pieces were scaled up and down depending on their role in the virtual environment. The digital island was developed in Rhinoceros 3D and then imported into Unity for adding a range of different textures to the environment (Fig. 1). [5] As a final step, we blended the human-read audio recording of the poem into the video sequence, which lets the observer explore a surreal virtual environment, while hearing the AI-generated poem in the background.

Fig. 1. The digital 3D-island L.e.O.

Conclusion

Creative design projects can be enhanced by Artificial Intelligence in various ways, such as leveraging deep learning models for image, video and text generation. Thus, it can be used for content creation as well as for assisting humans in the creative process. Our work demonstrates how two creative streams can be merged: (1) a 3D model of a virtual landscape, created through modular and patchwork assembly, and (2) a poem generated by a character-level LSTM trained on a dataset of 1.3M characters of poems. Future work can include models such as Generative Adversarial Networks for generating novel virtual landscapes.

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Biographies

Suzana Ilić is a PhD student (Linguistics and Media Program) at the University of Innsbruck/Austria. Her research interests include sentiment analysis and text-based affective computing, as well as generative models for creative language output. She is currently working on conversational systems (NLU) in Tokyo, Japan.

Milano born architect and artist Martina Moro started her studies in Architecture at the University of Innsbruck/Austria. She is currently working on art projects in the fields of design, computer technology and architecture and contributed to numerous exhibitions in Austria and Italy, such as the Venice Architecture Biennale 2018.