University of Cyprus
Department of Computer Science

You are cordially invited to the PhD Defense on:

Conditional Generative Denoising Autoencoder

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Friday, October 25, 2019
10:00-11:00 EET

Room 148, Building 12
Faculty of Pure and Applied Sciences, New Campus

Abstract

Machine Learning's unsupervised learning paradigm is primarily concerned with the development of generative models that learn the data distribution of real-world problems. In this context we present a conditional generative model, the Conditional Generative Denoising Autoencoder that relies its mathematical foundation on the theoretical framework of the conventional Denoising Autoencoder. The model generates images according to the user's preferences that define both the desired and the undesired image characteristics that are evident in the training dataset. For example, training on a dataset containing human faces that may or may not process some specific characteristics like eyes and hair color, face shape, gender, presence of a beard, wearing a hat or glasses, being old or young etc., the model is able to generate images of faces either possessing or not possessing such characteristics. Selected characteristics may constitute a broader categorical meaning in which case the model generates images corresponding to one or more specific problem categories. Besides the structures trained with unsupervised learning, the model also contains a classifier structure trained with supervised learning. The proposed model's functionality relies on the concatenation of the features produced by the classifier and the features calculated by the model's structures trained with unsupervised learning. Unifying the two learning regimes (supervised and unsupervised learning) in order to enhance unsupervised learning has not generally been explored by the research community. On the contrary, the use of unsupervised learning for improving supervised learning is widely known as semi-supervised training and is being researched to a greater extend. The value of the proposed model rises from its ability to generate good quality images according to predefined conditions (labels), while the available Machine Learning models performing the specific task are very few in number, generally perform moderately and have important disadvantages. Generative models are very important in the Machine Learning field and the Artificial Intelligence field in general, mainly because of the belief that unsupervised learning and its variants occupy a large portion of human brain functionality. The proposed methodology besides constituting a novel generative model, also establishes the argument that supervised learning may assist unsupervised learning through an interaction of the two learning paradigms.

Short Bio:

Savvas Karatsiolis is a PhD candidate at the Department of Computer Science under the supervision of Professor Schizas N. Christos. His research interests lie in the area of deep learning and especially unsupervised learning, self-supervised learning and recurrent neural networks. He holds a HND in Electrical Engineering from Higher Technical Institute, a BSc in Computer Engineering from Intercollege Nicosia and a MSc in Information and Communication Systems from Open University Cyprus.

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