



# Artificial Neural Networks (ANNs) applicability for time-series processing

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## Week 1

**Lecture 1. Introduction to the course. Recurrent Neural Networks (RNN)**

14<sup>th</sup> June 2021, 10 am – 12 pm (UK time);

**Lecture 2. Convolution Neural Networks (CNN)**

15<sup>th</sup> June 2021, 10 am – 12 pm (UK time);

**Lecture 3. Attention mechanism, self-attention concept and Transformers**

16<sup>th</sup> June 2021, 10 am – 12 pm (UK time);

**Lecture 4. Combine it all together: CNN, RNN, Transformers**

17<sup>th</sup> June 2021, 10 am – 12 pm (UK time);

## Week 2

**Lecture 5. Generative models: Auto-encoders, Variational Auto-encoders (VAE), Generative adversarial networks (GAN)**

21<sup>st</sup> June 2021, 10 am – 12 pm (UK time);

**Lecture 6. Introduction to Meta-Learning and Domain adaptation**

22<sup>nd</sup> June 2021, 10 am – 12 pm (UK time);

**Lecture 7. Adversarial attacks**

23<sup>rd</sup> June 2021, 10 am – 12 pm (UK time);

**Lecture 8. ODE solving with ANNs**

24<sup>th</sup> June 2021, 10 am – 12 pm (UK time).

## Abstract:

The general focus of these lectures is to highlight the evolution of deep learning methods for time-series and dynamic systems analysis and processing. Lectures will start from an introduction to basic deep networks like CNN and RNN, followed by advanced techniques like attention mechanisms and transformers. At the end of the first week we will discuss how all these architectures can be combined and used for time-series processing. Further topics covered in the second week will be generative models, meta-learning, domain adaptation and adversarial attacks. The final theme will be numerical ODE solving using deep learning techniques.

## Short Bio:

Dr Vladyslav Kolbasin is a Senior Data Scientist at Toshiba R&D Centre Ukraine. He has a total 17 years of IT experience, 9 years as Data scientist. His research interests broadly involve Deep Learning, NLP and Computer Vision problems, also he is interested in researching dynamical systems and time-series identification. Vladyslav is a senior lecturer at CMAD department of NTU "KhPI". He also has 1 gold medal at the Kaggle text classification competition.