**AMLT-2022 ITMO University**

**Exam questions**

1. Time series characteristics: seasonality, trend, noise, hetero/homoscedasticity. Time series analysis tasks. Metrics for assessing the forecast quality.
2. ARIMA models for time-series forecasting. Checking the stationarity. AIC criterion.
3. Autoencoders and latent space. Embeddings and representation learning. Denoising Autoencoder.
4. Basic concepts of Variational Autoencoders (VAE).
5. Generative Adversarial Networks (GANs). Generator and Discriminator. Training algorithm.
6. Interpretable machine learning: feature importance, permutation importance.
7. SHAP values for interpretable ML.
8. LIME method for estimating feature importance.
9. Reinforcement learning as Markov Decision Process.
10. Multi-armed bandits problem; exploitation-exploration trade-off; -greedy strategy.
11. Q-learning algorithm: Q-value function and Bellman equation.
12. Basic ADC scheme in Modern Cameras. Image Signal Processing (ISP) pipeline.
13. Basic stages of modern ISP: denoising, demosaicing, super-resolution, HDR processing.
14. Overview of the quality metrics for classic supervised and unsupervised learning models: classification, regression, clustering.
15. Quality metrics for text generation models. BLEU and ROUGE.
16. Full-reference IQA methods: PSNR, SSIM, deep-learning-based metrics (LPIPS, DISTS).
17. No-reference IQA methods: BRISQUE, NIQE and NSS model, NIMA.
18. Problems with classic RNNs. Attention mechanism on the example of machine translation.
19. Architecture of Transformers. Encoder, decoder, self-attention, positional encoding, multi-head attention.
20. Basics of GPT and BERT models. Vision Transformers.
21. General concepts of TinyML. Neural network compression and acceleration techniques.
22. Practical aspects of deploying ML and DL models on Mobile platforms. Software for Mobile AI.