Программа экзамена по машинному обучению

advanced_f20

Natural Language Processing

1. Embeddings
2. word2vec: linearity, skip-gram, negative sampling
3. Unsupervised translation approach
4. Ways to work with text data (RNN, CNN, classical approaches)
5. Attention, Self-attention approaches
6. Transformer structure
7. Machine translation metrics, quality functions
8. BERT structure, main ideas

Reinforcement Learning

9. RL problem statement. State, Action, Reward, Environment, Action
10. Cross entropy method
11. Value function, Q-function
12. Q-learning, approximate Q-learning. DQN, bells and whistles (Experience replay, Double DQN, autocorrelation problem)
13. Policy gradient and REINFORCE algorithm
    a. Baseline idea, A2C
14. Policy gradient applications in other domains (outside RL). How Self-Critical Sequence Training is performed? What is used as a baseline?

Computer Vision

15. KL divergence. Relations to cross entropy
16. Variational Autoencoders: structure, loss function, training process
17. Generative Adversarial Networks: structure, loss function, training process

Теоретический минимум

1. RL problem statement. State, Action, Reward, Environment, Action
2. KL-divergence
3. Log derivative trick
4. Value function, Q-function
5. Attention mechanism (motivation, main idea, additive, multiplicative & dot product attention scores)