

CS-625

**Transfer learning and meta-learning**

Brbic Maria

Cursus	Sem.	Type
Computer and Communication Sciences		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Oral
Workload	60h
<b>Hours</b>	<b>28</b>
Lecture	28
<b>Number of positions</b>	<b>30</b>

**Frequency**

Every year

**Remark**

Spring 2024

**Summary**

This seminar course covers principles and recent advancements in machine learning methods that have the ability to solve multiple tasks and generalize to new domains in which training and test distributions are different.

**Content**

While machine learning methods excel on tasks with large labeled datasets that can support learning of highly parameterized deep learning models, to solve real-world problems we need machine learning methods that can generalize to unseen domains and tasks. The goal of this seminar course is to cover principles and recent advancements in machine learning methods that have the ability to solve multiple tasks and generalize to new domains in which training and test distributions are different.

This includes:

- few-shot learning where the goal is to generalize to a new domain given only a few labeled examples
- meta-learning methods that acquire prior knowledge over previous tasks so that new tasks can be efficiently solved
- domain adaptation and domain generalization where the problem is to generalize to a given target domain given existing training source domain(s) where target and source datasets are generated from different distributions
- zero-shot learning/open-world learning where the goal is to generalize to new unseen classes
- self-supervised pretraining for cross-domain transfer

Students will be expected to read, review, present, and discuss relevant research papers in this area. Every week, students will be responsible for reading one or more research papers that are relevant to the selected topic. One or more students will prepare a presentation highlighting the important points of the paper and leading a discussion around those points. All students will be responsible for reading the paper and contributing to the discussion of the paper's merits and weaknesses.

**Note**

By the end of the course the student must be able to: Understand fundamentals and state-of-the-art transfer learning and meta-learning methods, learn to critically read research papers in the field, and utilize the learned concepts in their own research.

**Keywords**

deep learning, transfer learning, meta-learning, few-shot learning, domain adaptation, domain generalization, self-supervised learning

**Learning Prerequisites**

**Required courses**

CS-433

**Assessment methods**

Oral