Introduction to Course Project

ELG 5255 (Applied Machine Learning)

2025 Fall term

- **Project Overview:** The course project provides hands-on opportunities for you to apply machine learning (ML) concepts and algorithms you've learnt to a real-world engineering problem. **The project has two stages for reporting: 1)** A state-of-the-art review of applied ML algorithms in your selected topic and **2)** A code implementation of at least one applied machine learning algorithm in the selected topic.

- **Group Formulation:** Students can work in group sizes ranging from one to three students. Students are responsible for forming your own groups. Each group member will be evaluated separately based on their contribution to the course project and therefore, all deliverables **must clearly state the contribution of each group member** and all group members **must sign to agree**.

- **Tentative Timeline for the project** *(*changes are subject to course schedule and may be notified to students during the term)*

Tentative Deadline	Project Phase	Deliverables
October 7th	Phase 1: Project Proposal (8%)	A 5-min presentation of the state-of-the-art review of applied ML algorithm in your selected topic + Proposed ML application
December 2nd	Phase 2: Outcome presentation (10%)	A 10-min presentation of the code implementation workflow, outcomes, and final remarks
TBA before the end of October	Phase 3: Final project report (12%)	The final course project report should comply with the **IEEE conference format** (double-column), and it should be **at least 5 pages long**. The state-of-the-art review (from phase 1) should be included in the final report. The report should include abstract, introduction, literature review, an overview of the selected ML algorithm, implementation results, conclusion, and references.

- **Potential topics for selection**
    1. **Signal/Image processing:** audio signal enhancement, high-resolution image generation, image-to-image translation
    2. **Communication system:** Wireless channel prediction, cognitive radio for spectrum sensing, resource prediction or allocation in wireless networks
    3. **Smart grid:** load forecasting for data centers, renewable energy generation forecasting, load forecasting for residential areas, anomaly detection in smart grid
    4. **Robotics and embedded system:** real-time object recognition, energy-efficient edge computing for robotic tasks, predictive maintenance for robots
    5. **Health science and biomedical engineering:** electrocardiogram (ECG) data analysis, activity recognition with wearable sensor data

Note that the above are just some examples of the potential topics. You can also select a topic of your interests, as long as it falls within the definition of "Electrical and Computer Engineering". **For the code implementation**, if you are conducting a code implementation from a paper, the paper should be of high quality, and it should be ACM/IEEE indexed. For code implementation without references, the instructor and the TA will evaluate the technical contribution and feasibility and provide feedback to students.

- **Evaluation Criteria**

Your project will be evaluated based on the following criteria:

- **Clarity and Completeness:** Are your reports and presentations clear, well-structured, and easy to follow? Have you addressed all aspects of the project?
- **Technical Merit:** What is the technical depth of your chosen methodologies and implementations? Does your approach demonstrate a deep understanding of the selected topic?
- **Results and Analysis:** Are your results well-presented and thoroughly analyzed? Have you critically evaluated the performance of your models?
- **Project Report:** Are the project organized and well-written without typo? Does the project reflect what was presented in two presentations?