

# DAT301m Open-Ended Project

## Overview

One of the main goals of DAT301m is to apply state-of-the-art Deep Learning and Artificial Intelligence to an application.

In this open-ended project, you will explore an AI or DL topic of your choice and develop a practical solution or research prototype using TensorFlow. You are encouraged to choose an area that **you are particularly interested in** — whether it's a scientific domain, art, health, finance, gaming, natural language, or beyond.

**The goals of this project is to:**

- Encourage independent exploration and creativity.
- Give you the opportunity to apply TensorFlow to real-world problems or research questions.
- Practice building, evaluating, and communicating a complete DL solution.

**Requirements:**

- You must use **TensorFlow**.
- You may use other libraries (Scikit-learn, Huggingface, Keras, OpenCV...) alongside TensorFlow if needed.
- You should train at least one custom model, don't just use an out-of-the-box pre-trained inference pipeline.

**The project will be graded based on:** The technical quality, the significance of the topic choice, the novelty of the work and the clarity of the write-up. Your grades will be the same for all members of your team.

The project can be done in teams **up to 3 people** and will account for 30% of your final grade. Please sign-up for your team [here](#). The deadline for signing up is **June 17th, 2025 at 23:59**.

**Note:** Only 1 member of your team (Team Leader) need to fill in the sign-up form and submit the Deliverables.

## Project Topic

Your first task is to pick a project topic. The main kinds of topic can be:

- Experimental evaluation of algorithms and models on an interesting dataset, ideally to derive new insights from the dataset.
- A theoretical project that considers a model or an algorithm and derives a rigorous result about it.
- A scalable implementation of an algorithm for processing massive amounts of data.

Ideally, projects will be a mix of the three types of projects outlined above. Your project should be exploring something deeper than what is required in your labs already.

We encourage you to come up with your own project ideas, but if you have no idea where to start, here are some suggestions:

- 2D Navigation using SLAM algorithms for Robotics
- Fake News Detection on Social Media
- Multiclass Classification of Fetal Health using Cardiotocogram Data
- Champion Recommender System for League of Legends
- Personalized Anime Recommender with Deep Learning
- NBA Player Performance Prediction using XGBoost and Synergies
- Anomaly Detection and Disease Prediction with LSTM Autoencoders
- Generative Models and Transformer-Based approaches on many various topics: Music Separation, Video Matting, Protein Structure Generation, Multimodal Few Shot Classification,...

## Deliverables

There are 3 deliverables for the project:

1. Project Proposal (10% of the project grade): Due **June 20th at 23:55**.
2. Project Milestone (20% of the project grade): Due **July 7th at 23:55**.
3. Final Project Report (70% of the project grade): Due **July 23rd at 23:55**.

## Part 1: Project Proposal

(Due: June 20th, 2025 at 23:55)

The **project proposal** should be a first draft of your introduction section of your final paper.

The project proposal should be about **2 pages long**, and is accounted for **10% of your project grade**. It should try to answer the following questions:

- What is the problem you are solving?
- What data will you use? How do you plan to get it? **Provide a link to your dataset if possible.**
- What are some related work of the problem?
- What work do you plan to do the project?
- Which algorithms/techniques/models you plan to use/develop? Be as specific as you can.
- How will you evaluate your method? (What's the loss function, how to measure the accuracy, especially if you plan to use Generative Models)
- What are your expected outcomes?

You are advised to use **LaTeX and Overleaf** for your Project Proposal and Project Report.

Please use the **NeurIPS 2024 template**. The template can be found [here](#).

**What to Submit:** A PDF of your Project Proposal (One per team, submitted by Team Leader).

## Part 2: Project Milestone

(Due: July 7th, 2025 at 23:55)

The **Project Milestone** can be considered as a draft of your final report but without your major results. It is recommended that the Project Milestone is around 3-5 pages long (excluding references), and it is accounted for **20% of your project grade**.

It is expected that you have completed about 50% of the project. For most projects, this would include implementing and evaluating at least a baseline method/model.

In the project milestone, you should provide a clear picture of what your project is about, even if you still have not finished or implemented several key parts.

The Project Milestone should have the following:

- A thorough introduction of your problem
- Review of the relevant prior work
- Description of the data collection process
- Description of any initial findings/results
- Formal description of any important algorithms used
- An outline of the parts which have not yet been completed, any difficulties you are facing, and what you plan to have in the final report.

**What to Submit:** A PDF of your Project Milestone (One per team, submitted by Team Leader).

## Part 3: Final Project Report

(Due: July 23rd, 2025 at 23:55)

The final project report should be about 5-10 pages long (excluding references), describing the introduction, related work, approach, results and conclusion of your work. It should contain at least some amount of mathematical analysis, and some experimentation on real or synthetic data. It is accounted for the remaining **70% of your project grade**.

The final project report template should follow this structure:

- **Introduction:** What is it that you are trying to solve or achieve and why does it matter.
- **Related Works:** How does your project relate to previous work. Give a short summary on each paper you cite and how it is relevant.
- **Data Collection:** Summary of your datasets and any data preprocessing you have done.
- **Method:** A detailed description of your primary contribution (What model you used, what mathematical logics and formulas are applied, what evaluation metrics are necessary...).
- **Results and Findings:** A clear and conclusive set of experiments which successfully evaluate the problem you set out to solve.
- **Discussion:** Interpret the results and talk about what can we conclude and learn from your evaluations. If there are any errors and limitations, what you can do in the future to improve/address the limitations of the current model results.
- **Conclusion:** A summary of your work, include the link to your code and any open question for future works.

An example report can be found [here](#).

### What to Submit:

- A PDF of your Final Report.
- All your code, notebooks (as a .zip or .rar file), or links to your repositories (Preferred - can be included in the report PDF).

(One per team, submitted by Team Leader)