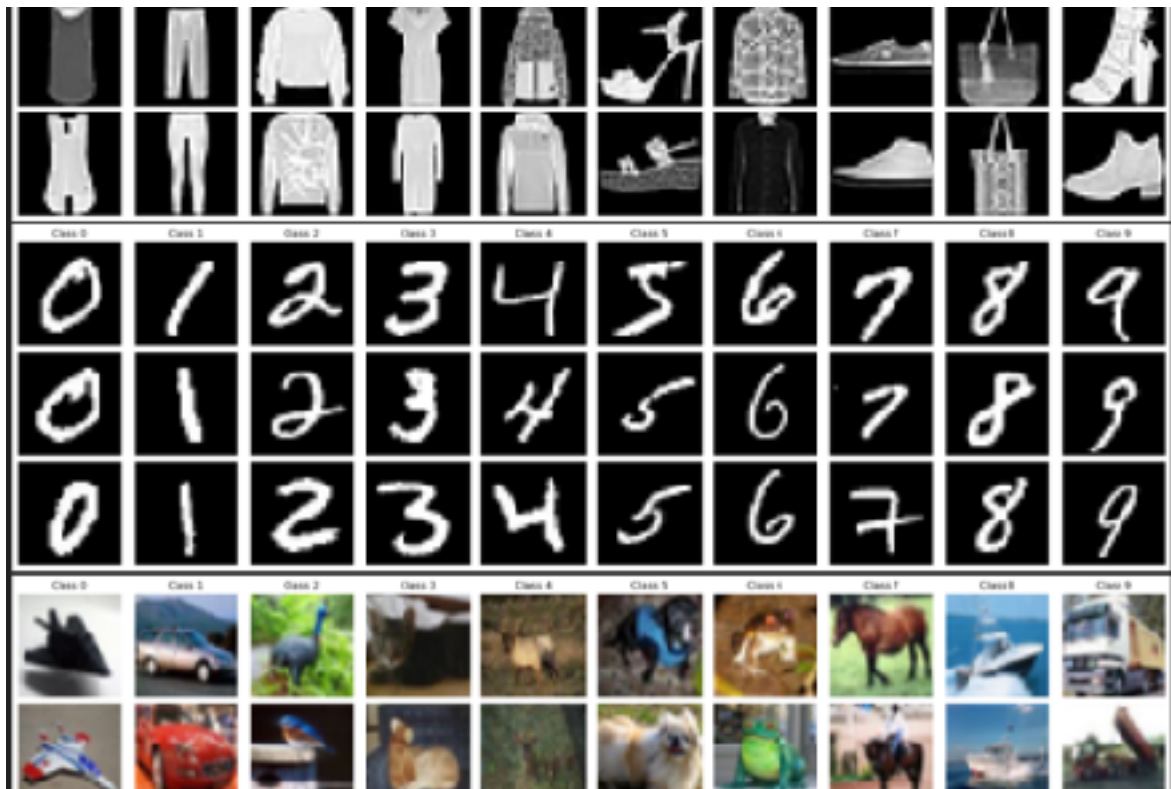


Thesis Report

Generative Data Augmentation using Multi-Agent Diverse Generative Adversarial Networks



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WS24/25 - SS25

Supervision by

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How to read the document:

The report is merely summarizing the most important achievements, given the current phase. Each report has its dedicated page and is lead by an image of the project plan. The red dot in the project plan shows the current point in time.

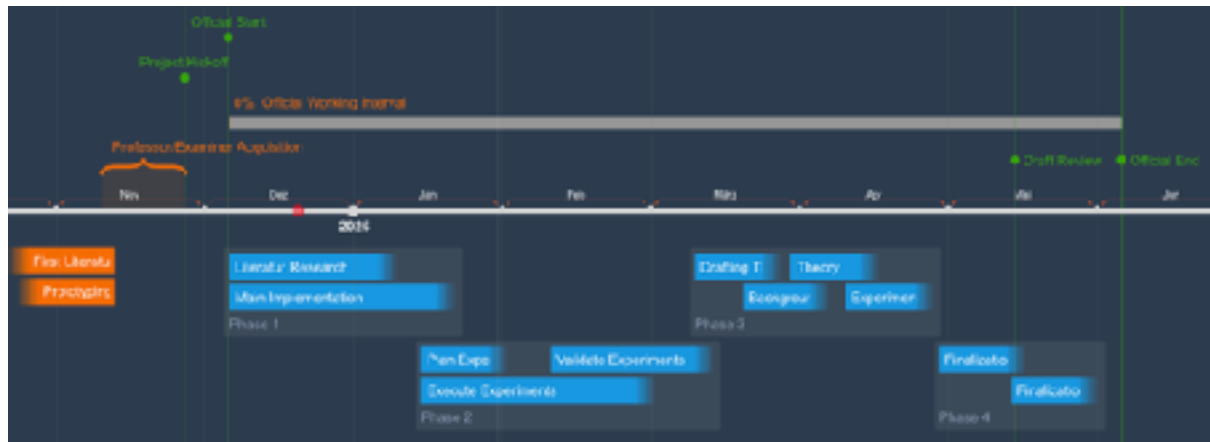
The project plan itself is separated into four phases.

1. Main implementation & Literature Research
2. Experimenting
3. Drafting & Writing
4. Finalization

A reports heading will be suffixed by its current phase. Overlapping phases will be listed and explained, if mandatory.

Markers:

- | | |
|---------------------|-----------------------------------------------------------------------------------------------------------------------|
| + (Positive) | A point that went well worked generally or can continue as planned. |
| - (Negative) | A point that does not hold true to its set timing, is not working as planned or must be left out of the initial plan. |
| # (Neutral) | Things to note. Adding further information to points above or adding general information that is noteworthy. |



Report 2024.12.20 - Phase 1 - Implementation

+ **Implementation is going very well**

The prototype has been expanded to a production like setup to support experiments in the future. Test-wise, experiments are already running to ensure full functionality with end-to-end testing.

repository: https://github.com/N10100010/mad_gan_thesis

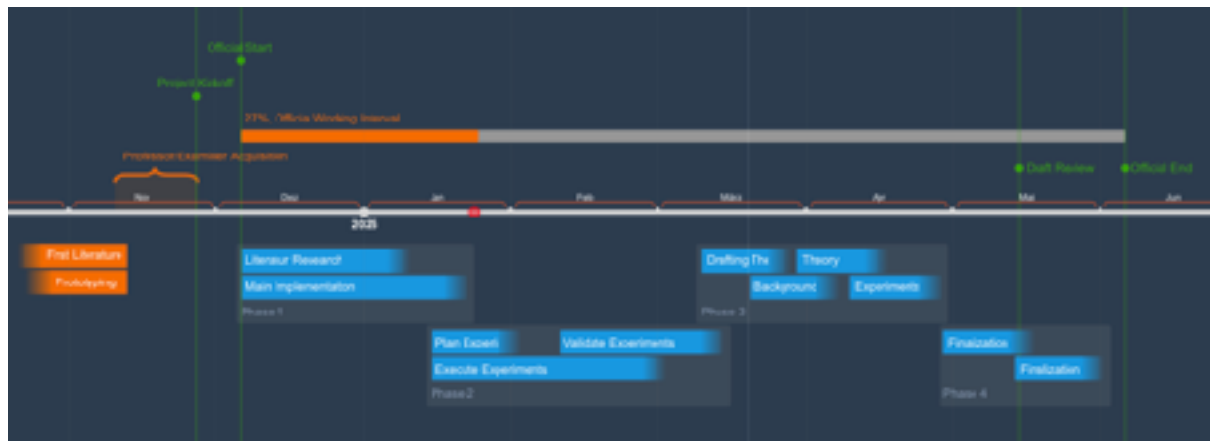
+ **Set up working environment on the HdM Servers of the IAAI**

- The setup was not straight forward and cost nearly 2 days to reliably spin-up a working conda environment.

- **Implementation of conditionality constraint worked**

Changing the objective functions altered the main research question, thus the adjustment will be omitted going forward.

Main literature research is scheduled for beginning of January



Report 2025.01.15 - Phase 1/2 - Implementation & Experimentation

+ **Implementation is 85% finished**

+ MAD GAN for the main datasets (mnist, moist-fashion and cifar10) is finished.

+ Vanilla GAN for main datasets (mnist, moist-fashion and cifar10) is finished.

+ Image generation for both, Vanilla- and MAD GANs created.

+ **Multiple papers have been set for research and references**

- More papers needed for final amount of papers for references.

- **Strong flow break**

- A strong flow with a week of fever held me off of my thesis for 2 weeks.

+ **Experiments/Models for mnist, fashion-mnist, cifar10 ran with differing number of generators**

- Difficulty creating coherent images with MAD GAN architecture for cifar10. The images look generally “good” (colours and general relation between colours), but are hard to be assigned to a class.

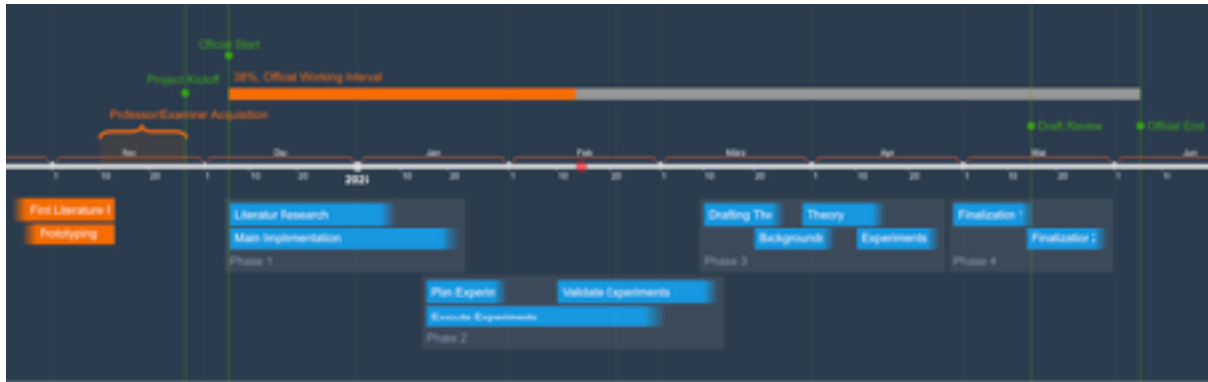
Open implementation tasks:

Classifiers for the three datasets.

Experiment settings, to test different setups like:

- Number of classes
- Number of images per class

MAD GAN architecture with less images in a given class to test the ability to withstand the mode-collapse problem



Report 2025.02.14 - Phase 2 - Implementation & Experimentation

+ **Implementation is 90% finished**

- + MAD GAN for the main datasets (mnist, moist-fashion and cifar10) is finished.
- + Vanilla GAN for main datasets (mnist, moist-fashion and cifar10) is finished.
- + Image generation for both, Vanilla- and MAD GANs created.

+ **Experiments are going well for the most part**

- + Data generation is finished MAD GAN
 - + mnist, fashion-mnist
 - + cifar10: MAD GAN model have been generated
- Vanilla GAN models struggle to not collapse
 - The models for mnist and cifar10 struggle to not collapse into:
 - $n\text{-modes} < n\text{-classes}$
 - (+) For fashion-mnist however, the vanilla model does not collapse

