

**TIES 4911 (2024): Guidelines for the Task 8****Your name:**

Study lecture materials...

**Task 8-1:** Study implementation examples CVAE (<https://www.tensorflow.org/tutorials/generative/cvae>). Choose another dataset (not fashion MNIST, but some other domain specific dataset) and make corresponding changes in the code to fit the dataset. Present generated images.

**Task 8-2:** Study implementation example of DCGAN (<https://www.tensorflow.org/tutorials/generative/dcgan>). Play with the code and convert Convolutional GAN into MLP (fully connected layers based) GAN. Please, do not search for separate existing implementation, but modify the initial DCGAN code. Run both codes and compare results of generated images. Choose another dataset (not fashion MNIST, but some other domain specific dataset)(could be the same dataset as in the Task 8-1) and make corresponding changes in the code to fit the dataset. Present generated images.

**Task 8-3:** Study implementation example of Stable Diffusion (High-performance image generation) ([https://www.tensorflow.org/tutorials/generative/generate\\_images\\_with\\_stable\\_diffusion](https://www.tensorflow.org/tutorials/generative/generate_images_with_stable_diffusion)). Play with your own prompts and present the results on the slides. Also, play with other image/audio/video generation services (use the links from the lecture materials with respect to the Generative AI services, or some other you find) and present your findings to others during the task delivery/presentation.

*Extra task for those who are aiming higher (optional):*

**Task 8-4 (extra):** Choose one of the following topics, study paper(s) and corresponding implementations (also use the relevant links mentioned on the lecture slides as well as any other materials you find on the web). Study initial research paper, corresponding implementation and highlight the important aspects of the idea and implementation (model architecture, dataset specifics, training process with loss function, etc.). Prepare own tutorial on the chosen topic and be ready to present it to other students. If it is feasible, try to use different dataset.

- Image-to-Image Translation with Conditional Adversarial Networks:
  - <https://arxiv.org/abs/1611.07004>
  - <https://www.tensorflow.org/tutorials/generative/pix2pix>
- Unpaired Image-to-Image Translation using Cycle-Consistent Adversarial Networks:
  - <https://arxiv.org/abs/1703.10593>
  - <https://www.tensorflow.org/tutorials/generative/cyclegan>
- A Style-Based Generator Architecture for Generative Adversarial Networks:
  - <https://arxiv.org/abs/1812.04948>
  - <https://www.youtube.com/watch?v=dCKbRCUyop8>
  - <https://drive.google.com/drive/folders/1LBWcmnUPoHDeaYIRiHokGyjiwIdyhAQb>

Basically, you may offer some other use case of Generative Model mentioned on the lecture materials or something else that was not mentioned but raised your attention/interest, where you may do the same steps (study initial research paper, possibly corresponding implementation, etc.). Please, communicate the custom topic to lecturer before you start work on it.

One more topic that can be taken for this task is prompt engineering techniques. It would be also great to show the examples of practical use/comparison of the techniques.

Or, you may chose the RAG (Retrieval-Augmented Generation) and study how it can be used as a knowledge source for LLM-based chatbot (pay attention to the Vector Database).

Files to include in the task results (archive file [ties4911-task08-\(your\\_name\).zip](#)):

- *Task8-instructions.doc (this file)*
- *PPT presentation with corresponding results of the solutions (datasets, codes, result images, etc.).*
- *source codes*
- *Tutorial for the Extra task (if applicable).*

Send the results as an archive to lecturer (oleksiy . khriyenko @ jyu . fi) before the deadline (end of 18.04.2024).

Results should be present during the Demo-8 Session. Be sure that you have all the necessary adapters to connect your computer in the classroom (if applicable).