TDT4265 - 2021

Educational challenge: the devil is in the details

Video (w/ voice), 3-5 min: Concept, SotA Model or Example related to a CV topic

Count **18%** towards the final grade

Deadline: Monday **May 3rd**

Guidelines

- This is your **opportunity** to dig deep into a CV topic of **your choosing**, and then explain it to your fellow student in the form of a **video**.

- You will chose a **topic** and explain a concept, a state-of-the-art (SotA) model, a (numerical) example, or some combination of these. In the following slides you will see examples of topics that can be chosen.

- You can work in groups of up to **two participants**.

- The **video** should be **between 3 and 5 minutes** and include a **voice** that explains everything (it could be your PC talking). Preferably the video should be in .mp4 format. Use whatever tools you are comfortable with or learn something new. Talking through a presentation that is recorded could be a good approach.

- The coverage should be more **deep / detailed** than broad and you need to find the right balance within the constraints given (the devil is in the details, as well as new insight)

Guidelines (2)

- It’s perfectly ok to be **inspired** by relevant material that is “out there”. However, the video should be based on your **own work** (or be made into it) and to some degree contain new / original / creative material in order to receive a full score (i.e. just replacing the numbers in an already existing numerical example will definitely not give a full score). Providing a contribution related to a topic where not that many explanations already exist will count positive.

- **Important** to cover in terms of:

  - SotA **Models**: how things work and new things introduced relative to previous SotA.

  - (Numerical) **Examples**: Your example should be provided in the form:

    - **Given**: (i.e. state the information that is known)

    - **Find**: (i.e. state the information that needs to be found)

    - **Solution**: (i.e. provide a detailed description for going from “given” to “find”)

- In order to not make this list very long, please use the provided info as well as **common sense**, and you will be good (we know that this is a somewhat unusual task and are flexible in terms of what's accepted).

Topics

- You are **free to choose** whatever Topic, Concept, SotA Model or Example you want. If you are in doubt whether your contribution is what we are looking for and deserve up to 18% score, **ask**. Below you will find example of what we are looking for:

- **FCNNs**: Forward and backward pass, matrix notation, different activation and loss functions (relative simple task and need to be really good to get 18%)

- **Generalization**: 1) Data & Batch normalization + Parameter initialization or 2) Regularisation methods

- **CNNs**: Forward and Backward pass, different variants: 1) only a conv layer, 2) conv + pooling layer, 3) conv + pooling + FC layer, 4) use of the Convolution Matrix / Transposed Convolution Matrix.

- A State-of-the-Art **Model / Architecture** for Computer Vision, e.g. related to Image Classification / BaseModels (e.g. EfficientNet), Object Detection, Segmentation etc. (SSD and U-Net can not be chosen)

    - Look here for the latest and the greatest: PapersWithCode:CV

Topics (2)

- **Object Detection**: 1) Metrics for Bounding Box (BB) detection, 2) ROI Pool (all the way from BBs defined in image space, need to be good and comprehensive in order to deserve full score), 3) RPN (Region Proposal Network), 4) FPN (Feature Pyramid Networks)

- **Segmentation**: 1) Metrics (inc. panoptic segmentation), 2) Upsampling (inc. transposed convolutions (transposed convolution matrix) and skip connections, 3) ROI Align (vs. ROI Pool), 4) Mask head in Mask R-CNN

- etc. (you get the idea)

Assessment

- The level of **explanation and correctness.** The level of underlying **understanding** that the contribution displays.
- The level of **concreteness and detail** (depth of something instead of overview of everything)
- The level of **simplicity** (as simple as possible and as complex as needed)
- The level of **quality**.
- The level of **creativity and originality** (both are valued).
- The level of **complexness / difficulty** for the chosen topic.
- The level of **references** to previous works that have inspired you.
- The assessment will be based on the **overall evaluation** of your contribution, taking all the criteria mentioned above onto account.
- **Remember**: The target audience for this video should be yourself and your fellow students before you started working on this task.