UPLINX Seminar
Applied Deep Learning in the Automotive Industry and Industry 4.0

Seminar – WS 18/19

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Today

➢ What this Seminar is About
➢ Organizational Stuff
➢ Seminar Topics
➢ Practical Assignments & Datasets
➢ Tips regarding Talks
UPLINX AND ML
What is this all about?

- What is UPLINX?
- Why Deep Learning (DL)?

https://towardsdatascience.com/why-deep-learning-is-needed-over-traditional-machine-learning-1b6a99177063
What is this all about?

- What is UPLINX?
- Why Deep Learning (DL)?
ORGANIZATION
Fast Facts

- **Time:** Thursdays, 12:00-14:00 pm (c.t.)
- **Location:** Building E1 3, Room 016 (seminar room)
- **Credit Points:** 7 (Seminar)
- **Language:** English

https://tractat.dfki.de/teaching/2018WT-DL-Seminar/
Prerequisites

- Good English skills (literature will be English)
- Good programming skills (the practical part will involve programming)
- Basic ML knowledge (to understand the papers and common concepts)
- NO DL knowledge is required (although it could come in handy). You’ll learn the practical aspects of DL on the fly

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Procedure

- You’ll make teams of 2-3 people
- Each team will be assigned a topic, a paper and a dataset
- With your team you will:
  - Present the paper (45 min + 15 min discussion)
  - Implement and train a model on the dataset
  - Present your work to the rest of the class (20 min +10 min)
  - Write a final report on what you did

- Attendance to all talks is mandatory. Your contributions to the discussion will form part of your grade
Grading Criteria

- 25% - Presentation of the assigned scientific paper
- 15% - Active participation in the discussion of presented topics
- 20% - Final presentation
- 40% - Final report
Registration

- Write an email to michael.feld@dfki.de with the subject: “[UPLINX] Seminar Registration WS18/19”

- Include the following information
  - Full Name
  - Matriculation Number
  - Email
  - Team Members (if you already have them)
  - Topics of Interest (in order of interest)

- This registration is not final (teams will be announced next week)
- You’ll have to register to HISPOS separately
Talks

- Topic presentation based on a scientific paper
- Don’t just give a summary of the paper, present the **subject**
- **45** minutes - Please stay close to this threshold
- Approx. 15 minutes for questions / discussion afterwards
- Try to split the time evenly among the team members
- Send a draft version of your talk to your supervisor two weeks in advance (be prepared to meet with your supervisor to discuss)
- Do set up / test your laptop in time before the talk!
- Send us the final version in PDF format right after your talk
Practical Assignments

- Train a DNN on an assigned dataset
- Task is related to your paper
- You can implement the DNN from the paper or use something else
- You’ll also experiment with the hyper-parameters, architecture, noise, etc.
- The final accuracy of your model is not important, but how much work you put in and how much you learned (evaluated from the report and presentation)
- Bi-weekly reports
- You will get access to computing resources
Questions?
TOPIC SELECTION
Image Classification

*Image Classification* is the computer vision task of matching a label to an input image from a set of possible labels.
Semantic Segmentation

Semantic Segmentation classifies every object in the image pixel-wise by producing a mask of the same size as the original image, where each pixel represents the class of the object that contains it.
Object Detection

In addition to assigning a label to objects in an image, Object Detection deals with the localization of these objects within the image by "drawing" a bounding box around them.
Gesture Recognition

*Gesture Recognition* is the task of detecting when a gesture is performed and classifying what kind of gesture it is. While Image Classification deals with static images, Gesture Recognition takes a sequence of frames of arbitrary length as input.
### Image Classification


### Object Detection


### Semantic Segmentation


### Gesture Recognition

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PRACTICAL ASSIGNMENTS & DATASETS
Berkley Deep Drive

- Over 1,100 hours of driving videos
- 100,000 images for object detection
- 10,000 images for image segmentation
- And more…
CityScapes

- 30 classes in 8 groups
- 5,000 annotated images with fine annotations
- 20,000 annotated images with coarse annotations
Kaggle State Farm Distracted Driver Detection

- 10 different classes
- Over 2000 training images per class
- Different lighting conditions and ethnicities
LISA Traffic Signs

- 7855 annotations on 6610 images
- 47 classes
- Different vehicles and cameras
LISA Hand Gestures

- 19 gesture types
- 885 samples for train/test of dynamic hand gestures
- 8 subjects in driver and passenger seat
- Depth Information
BMW-DFKI PerGE

- 6 (basic) gestures types
- 89 subjects
- 10 samples per subject per class
- 11 subjects with 40 samples per class
- Depth information
Other Datasets

Don’t like them?
Suggest another one!
Existing Models

Models exist for some of these datasets. We won’t prevent you from using them, but you have to let us know. More experimentation will be expected from you.
Frameworks

Keras

TensorFlow

Python
Other Helpful Material

GIVING A TALK – SOME TIPS AND GUIDELINES
Important Points

- Form / presentation matters!
- Practice your talk.
  The best talks are (almost) always well-practiced talks.
- Know your slides
Structure

- Think about the overall structure before creating slide contents
  - Should be a logical order – don’t jump back&forth between topics
- Make sure listeners understand your structure
  - Outline slide or section separators are helpful
  - For very short talks, a classical outline can be omitted
  - Headings can also be used to convey structure
- Almost every talk should have an Introduction/Motivation section and a Conclusion/Summary section
- Test whether someone else would get the key points of your objective through your motivation slides
- Title page with talk title, speaker name, and where it is presented
- Avoid switching into PowerPoint after you have reached the end of your slides
Text / Contents

- Add content that
  - supports the understanding of your topic
  - contributes to the discussion
- Completeness is not the primary goal
- Examples can be extremely helpful for understanding!
  - Include examples on your actual slides
- Cut down the text on your slides to the essential parts
  - Much different from written style!
  - Avoid long / full sentences
- Be prepared to explain everything on your slide
- If you present something complex (e.g. formula), make sure you explain it in reasonable manner – otherwise you have to omit complexity from the presentation.
Presenting Other Sources

- **Abstraction** is an important contribution
  - Simply summarizing other sources saves people time, but does not really add value yet
  - Instead of only presenting work A, B, C..., focus on similarities and differences
  - If you present multiple related references, consider having a slide comparing them side-by-side, e.g. in tabular manner

- Maintain the **perspective** of a third party when presenting other’s work
Layout (1)

- Try to use an intuitive layout for each slide that fits the content
  - E.g. for a comparison, you could use two columns
- Your natural enemy: Bulleted lists
  - Generally fine, but easily over-used or malformed
  - However far better than raw text paragraphs!
- **Vary the layout** intentionally → keeps the audience awake
- But don’t confuse: Certain style elements should be consistent (e.g. titles, colors, fonts)
  - PPT e.g. offers presentation color / font / effect schemes
- In other words, slides should look dynamic but not chaotic
- **Do not sacrifice readability for design**
Layout (2)

- Avoid slides with a single top-level bullet point → simply remove the “point”
- Apply formatting to highlight things (e.g. bold, color, font size…)
- Make use of multiple indentation levels in lists
- Use consistent capitalization and line endings
- Don’t use text that is too small
  - Multiple short slides often work better than fewer full ones
Images

- **Combination of text and image** is a key element!
- Number of images depends e.g. on the subject, type of talk and audience
- Most people use too few images
  - Rule of thumb: 1 per slide
- Use helpful images if available, or symbolic otherwise
  - Just not too many prominent but meaningless images...
- Drawing custom figures from basic shapes (boxes & arrows) is worth the effort
- **Add text to images** that are not self-explanatory
- Motivation is usually a good place to have images (photos)
Animation

- Can generally be used for most types of talk (but don’t have to)
- For scientific talks, limit yourself to **subtle effects** (e.g. fade, wipe)
- Keep in mind that animations increase the talk time
- Special case: Animations that illustrate a process
- Simple form of animation: **Incremental slides**
  - Can be very helpful, especially for complex graphics
  - Can be used to make it easier to follow your logic
  - But can also limit readability for “fast” listeners when overused
    - Combine items to appear in blocks when too many
  - Can slow down the talk
    - You have to know your slides very well
    - More difficult to speed up / skip points
Other Media

- It can be very helpful to incorporate other media (e.g. videos or audio files)
- You can also switch to other applications for a demo or to the blackboard for explanations
- Use a laser pointer when you refer to parts of your slide
  - Alternatively you can integrate “pointers” into the slides
Timing

- Being too slow is just as bad as being too quick
  - Stay in a +/- 3 minutes time window for a 30 min. seminar talk
  - For other talks, timing rules may be stricter
- Design your slides for a normal speaking pace
- Practice your timing at least once
- As a rough rule of thumb while drafting slides, most people use 1 slide ~ 1 minute
- Keep an eye on the time while giving the presentation
- If you are seriously behind, it is sometimes better to skip slides
  - Don’t make that the default case though
  - Obviously, don’t skip important matter
Talking

- Speak **freely** – don’t convey the impression of reading
- Speak **clearly** (loud, not too fast)
- Don’t speak with your back to the audience
That’s it for today!

- Final teams / task assignments will be published on the webpage next week (including supervisors)
- These slides will be uploaded
- Papers will be linked / uploaded

See you next time! 😊