

Exposé

Survey on Continual Learning

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Idea

The idea of this thesis is to give a good overview of the machine learning (ML) field continual learning (CL) but through the lens of a statistician. This is to be achieved by gathering various papers on the topic and breaking down their statistical foundations. These should cover a broad spectrum of the possibilities in CL e.g. the different methodologies or criteria.

Since I enjoy coding and fiddling around with practical models more than their theory I could imagine training a linear continual learner with different regularization methods or something in the likes of for the last part of the thesis. But I am a little skeptical whether this is feasible or not. Over the last year I have also developed an interest in fraud analysis, but haven't had the time to really dive into this field. So I am thinking about taking this as an opportunity to educate myself and connect the two topics. Alternatively, Dr. Rodemann suggested to deeper analyze a single paper.

Progress of my Studies

Now about the current state of my studies. I started this degree in 2017 with a minor in Insurance and Risk Management. After the first year I changed my minor to computer science. I am still dealing with a couple of mental issues, hence the long duration, but I am determined to finish my degree.

This semester I intend to take my last two exams in GRM and I2ML. Both courses I have previously heard and solved most exercise sheets but never taken the final exam.

In my third semester I have taken the WP course "Stichprobentheorie" and in my eighth "Einführung in die Biometrie". I2ML is my last WP course that I have to pass.

The BA Seminar was together with Dr. André Klima and Dr. Georg Schollmeyer in 2020. Latter supervised my project, Visualisierung von Verteilungsunsicherheiten.

Familiarization

I have skimmed and summarized a multitude of papers. In order to keep a good overview of all my potential sources I created a mind map which connects every paper with its over arching topic. In total I would say my familiarization process is very advanced, near completion.

Submission

Preferred submission date: 01/17/2015

Potential Structure

1. Introduction
2. Framework for CL
3. Evaluation Metrics
4. General Approaches
 - 4.1 Replay
 - 4.2 Optimization
 - 4.3 Representation
 - 4.4 Architecture
 - 4.5 Regularization
5. Distribution Drift and Bayes
6. Regularization Approaches
 - 6.1 Parameter Space
 - 6.2 Function Space
7. Conclusion