# 02466 Project work in Artificial Intelligence and Data LOGBOOK

Magnus Fredslund, [s183905@student.dtu.dk](mailto:s183905@student.dtu.dk)

Jakob B. Andersen, [s183909@student.dtu.dk](mailto:s183909@student.dtu.dk)

Hanlu He, [s183914@student.dtu.dk](mailto:s183914@student.dtu.dk)

The main purpose of the logbook is that it serves as a tool for you to keep track of the project and document project meetings.

**Project Meetings**

**Week 01: 05.02.20-11.02.20**

*Questions:*

*Which project is the best?*

*Advantages and disadvantages of each?*

*Reading, who and what*

*Getting overview of methods and state of art for the different projects. - All*

*Implementation, who and what*

*Implementation of base UI to easier visualize the game - MF*

*Results, who and what*

*Choosing the “Myretuen” - project*

*Decisions, who and what, what do you do alone, what do you do together*

*Magnus implement UI and game logic so we have the environment ready before creating the AI*

**Supervisor Meetings**

**Week 02: 12.02.20-18.02.20**

*First meeting:*

*Discussing basic ideas for implementation*

*Discussing ideas for AI*

*Showing the UI and discussing our choices of limitations and which game rules we did not include in first version*

*Action points for next week*

*Continuing with the game implementation - Magnus*

*Consider his ideas next meeting same time next week*

**Project Meetings**

**Week 02: 12.02.20-18.02.20**

*Questions:*

*What is the best ways to start our project - All*

*What is our timeline - All*

*How should we structure our time - All*

*Reading, who and what*

*Saw online lectures from David Silver - Deepmind - Hanlu*

*Read code - Jakob*

*Implementation, who and what*

*Implementation of game locic and finishing UI - Magnus*

**Supervisor Meetings**

**Week 03: 19.02.20-25.02.20**

*Presentation of results since last meeting*

*Showed our random agents playing and discussed the implementation of the first simple Linear Model*

*Plans for this week is to implement our first simple linear model.*

**Project Meetings**

**Week 03: 19.02.20-25.02.20**

*Questions*

*Saw online lectures from David Silver - Deepmind - Magnus*

*Started reading Impala paper - Hanlu*

*Started on online reinforcement course - Hanlu*

*Implementation, who and what*

*Finished implementation of game - Magnus, Jakob*

*Implemented first linear model (LM) - Magnus*

*Results, who and what*

*After 525 rounds of play against a random agent - Magnus*

*Score LM 327 vs random 182 (16 ties) - (No self-play,… No search… The training was included in these games)*

*Decisions, who and what, what do you do alone, what do you do together*

*We saw first prove that a agent could play this game, by beating the random agent 2:1*

*Discussed improvement of AI for later implementation*

*Saved state in git under branch ‘version-0.1’*

*Finished Project Plan - All*

**Supervisor Meetings**

**Week 04: 26.02.20-03.03.20**

Suggested implementation of TD lambda

Suggested self-play

**Project Meetings**

**Week 04: 26.02.20-03.03.20**

*Questions*

*Reading, who and what*

*Implementation, who and what*

*Results, who and what*

*Decisions, who and what, what do you do alone, what do you do together*

*Refactoring code for speed improvements and easier to create new agents – Magnus*

*Created a Player Agent controlled using the UI - Magnus*

*Implemented simple Linear Model – Magnus and Jakob*

*Implemented explore mode – Magnus*

*Implemented self-play – Magnus*

*Implemented Neural Network AI – Jakob*

*Feature engineering for better features (the state vector) – Magnus & Jakob*

*Score NN win rate score of +90%-97% against random Agent*

*Much faster learning due to TD lambda*

*Saved state in git under branch ‘version-0.2’*

**Supervisor Meetings**

**Week 05: 04.03.20-10.03.20**

*Presentation of results since last meeting*

*Action points for next week*

Showed code as well as talked about our current progress

Talked about the implementation of IMPALA

Discussed a possible ELO system

Discussed the report

**Project Meetings**

**Week 05: 04.03.20-10.03.20**

*Questions*

*Reading, who and what*

*Implementation, who and what*

*Results, who and what*

*Decisions, who and what, what do you do alone, what do you do together*

*Implemented TD lambda – Jakob*

*Configured High performance computing for easy training of multiple agents – Magnus*

*Saved state in git under branch ‘version-0.3’*

*Implemented Impala v1– Magnus*

*Implemented Elo v1 – Magnus*

*Created probability game specific feature - Jakob*

*Feature engineering – Magnus and Jakob*

*Fixed reward system – Jakob*

*Wrote first version of method for report – Magnus*

*Tested Elo with NNAgent and Random – Elo Random ≈ 1100 vs Elo NNAgent ≈ 1500*

*Saved state in git under branch ‘version-0.4’*

**Supervisor Meetings**

**Week 06: 11.03.20-17.03.20**

*Presentation of results since last meeting*

*Action points for next week*

*Talked about improvements to the Elo system*

Talked about improvements to the impala system

Talked about the report

**Project Meetings**

**Week 06: 11.03.20-17.03.20**

*Questions*

*Reading, who and what*

*Implementation, who and what*

*Results, who and what*

*Decisions, who and what, what do you do alone, what do you do together*

*Speed improvements – Magnus*

*Simplified process of testing for more organized testing – Magnus*

*Fixed Elo system for absolute scoring – Magnus*

*Minimax search – Jakob*

*Minimax added hyperparameters – Jakob*

*Minimax made it work with the softmax function – Jakob*

*New optimizing function - Jakob*

*Changed Impala system to a batch training process – Magnus*

*Implemented new way of controlling the exploration by Boltzmann Approach – Magnus*

*Read TD-Gammon – Jakob*

*Read enough of IMPALA to conclude it could not be used – Magnus and Jakob*

*Rapport introduction and references – Hanlu*

*Rapport method and Environment – Magnus and Jakob*

*Saved state for Midtvejsaflevering under branch ‘version-0.5’*

**Supervisor Meetings**

**Week 07: 18.03.20-24.03.20**

*Presentation of results since last meeting*

*Action points for next week*

We discussed the fact that the impala system could not be used due to our limitations of not having a policy network, which is not easily implementable due to the complexities of the action space.

Talked about doing more tests

**Project Meetings**

**Week 07: 18.03.20-24.03.20**

*Questions*

*Reading, who and what*

*Implementation, who and what*

*Results, who and what*

*Decisions, who and what, what do you do alone, what do you do together*

Given feedback to other group

Made improvements in the testing system, more parameters can now be tested - Magnus

Refactored code – Magnus

Implemented dropout for the linear models - Magnus

**Supervisor Meetings**

**Week 08: 25.03.20-31.03.20**

*Presentation of results since last meeting*

*Action points for next week*

*Discussed report with general positive feedback but some improvements to notation and so on, which Tue would add as comments in the report because he didn’t have write access before.*

*Showed some of the testing we had done and discussed further testing strategies*

*More testing as well as code improvement is the plan for this week*

**Feedback Meetings**

**Week 08: 25.03.20-31.03.20**

*We gave the prepare feedback to the other group and they gave us feedback*

*They had some structural improvements of the report to make it easier for the reader*

*They gave concreate improvements to some of the sections in the method which they found the hardest to read.*

*They said we should add a better description of the implementation for better reproducibility.*

*They generally liked the report and their feedback was appreciated*

**Project Meetings**

**Week 08: 25.03.20-31.03.20**

*Questions*

*Reading, who and what*

*Implementation, who and what*

*Results, who and what*

*Decisions, who and what, what do you do alone, what do you do together*

*Created mean variance plot for easier and better comparison between the models – Magnus*

**Supervisor Meetings**

**Week 09: 01.04.20-07.04.20**

*Presentation of results since last meeting*

*Action points for next week*

**Project Meetings**

**Week 09: 01.04.20-07.04.20**

*Questions*

*Reading, who and what*

*Implementation, who and what*

*Results, who and what*

*Decisions, who and what, what do you do alone, what do you do together*

**Supervisor Meetings**

**Week 10: dd.04.20-dd.04.20**

*Presentation of results since last meeting*

*Action points for next week*

**Project Meetings**

**Week 10: dd.04.20-dd.04.20**

*Questions*

*Reading, who and what*

*Implementation, who and what*

*Results, who and what*

*Decisions, who and what, what do you do alone, what do you do together*

**Supervisor Meetings**

**Week 11: dd.04.20-dd.04.20**

*Presentation of results since last meeting*

*Action points for next week*

**Project Meetings**

**Week 11: dd.04.20-dd.04.20**

*Questions*

*Reading, who and what*

*Implementation, who and what*

*Results, who and what*

*Decisions, who and what, what do you do alone, what do you do together*

**Supervisor Meetings**

**Week 12: dd.04.20-dd.04.20**

*Presentation of results since last meeting*

*Action points for next week*

**Project Meetings**

**Week 12: dd.04.20-dd.04.20**

*Questions*

*Reading, who and what*

*Implementation, who and what*

*Results, who and what*

*Decisions, who and what, what do you do alone, what do you do together*