



Figure 1: Me, starring as 'Martin the farmer' in our concept video.

Reflection — Designing Intelligence in Interaction

By Arthur Geel — Februari 3, 2019

Preface

The *Designing Intelligence in Interaction* course spoke to me as I saw it as an opportunity to further develop the hard skills in artificial intelligence I have acquired in the *Interactive Intelligent Products* course¹ as part of my Bachelor degree. I did have some experience in utilising a simple support vector machine for multi-class classification, though I am very eager to learn more about designing with sophisticated machine learning algorithms.

Reflection

In this project, we have designed the foundation of a goat identification system, and explored the implications it has on the future of livestock agriculture. My responsibilities within this project included *conceptual development*, *outgoing communication* (content and design of deliverables, presentations, making- and editing the concept video) and *pre-processing our dataset*. As such, my contributions to the 'practical and technical' areas such as feature extraction- and

neural network were not as significant on the individual level I had previously envisioned.

Nevertheless, I was able to gain substantial insights in designing a system based on a multi-layer perceptron neural network. Through the literature studies, open discussions with the professors guiding us in this project, and cooperative work with the other members of the team, I have acquired a more realistic vision on how employing neural networks (NNs) actually goes. At the start of the course, I imagined NNs to be a black-box system: normalized, visual data (images) goes in, some logic is constructed and a prediction comes out. However, I could not have been more wrong.

In our system, we extracted features from the photos before feeding them into the NN. Additionally, all data points were labelled (supervised learning). In extracting features from the images, we had to think of images in a different way. We had a number of approaches: looking at the image's data in terms of colour spaces (RGB, HSL & Black/White Intensity) and in terms of components (Sobel/Canny edge detection & foreground segmentation). At first I found it difficult to look at images in such an abstract way, however I now am able to think of novel ways to extract features from data.

I don't see myself as an all-out data- and/or computer scientist: I rather see myself as a design technologist. As a result, I don't consider it necessary to become an expert in understanding the theoretics behind neural networks.

1. In this course I designed a weight training glove that aided users in exercising. It was able to detect training movements, and provide qualitative feedback. For a more elaborate overview of this project, please visit my online portfolio — <https://arthurgeel.com/smartglove.html>

Instead, I find it more valuable to gain experience in working with technologies so that I am able to use them as a design material. In retrospect, this elective has allowed me to do so: I've explored multiple architectures of neural networks, and have become aware of strategies to extract valuable features from data. By using data visualisations — e.g. scatter plots and histograms — I now am able to predict which features would make suitable material for NNs, and save time in developing the technology.

Future Application

In this elective I have gained further experience in using machine intelligence to design intelligent products. By using the intuitions gained in this elective I am able to independently get a system based on NNs to work: acquiring high-quality data, pre-processing the data and extracting features and iteratively testing the NN to improve its reliability. I foresee the skills and knowledge acquired during this elective to be of great help when creating intelligent, data-driven design prototypes.