# Project plan

## Handwriting recognition system for symbols - Group 1

Esther Mang Zing s120173, Arturo Fabbro s203510, Xianhao Liu s202724

## Project goal

The aim of this project is to devise a system for the recognition of handwritten annotations that are marked on wooden boards by carpenters on the course of their work. This system would significantly ease the labour associated with carpenters’ woodwork, as it would translate their instruction for cutting wood into a machine-readable language, which could then be fed into a machinery for cutting wood, for example. The system is going to make use of a pre-existing pre-trained deep learning model.

Within the context of this project, we assume that carpenter’s annotations are made up of the following glyphs:

1. an horizontal arrow, pointing towards the cut line;
2. a vertical cut line;
3. an “X” symbol, identifying the cut piece that needs to be discarded;
4. an (approximate) measurement of the length of the piece that is to be kept.

Thus, by keeping into account the ten measurement digits (0-9), the system should be able to identify a total of thirteen glyphs.

## Time plan

The tasks are on time for the first week according to this time plan. The tasks for next week are crucial as we will test the algorithm. There could be some unexpected outcomes depending on the test sets. Depending on the outcome of the tests, it would need to adjust the time schedule for optimization and more tests.

## Project test and evaluation

The image preprocessing part has turned out satisfactory. The result for image preprocessing: four symbols on image can be detected without noise. Some symbols’ dimensions can be visualised and recognised. Identifying symbols and testing symbols are still ongoing. The features of symbols will be more analysed. Identification rules will be considered in a way that the dimension line, cut line and X symbol would be identified.

The preprocessed image of the digit was a bit difficult to read. It seems that the digit loses many pixels of information. We need to make it somehow so that it would be readable. In the digit recognition part, we have to identify the digit by cropping it separately from other symbols. In this way we can predict it by MNIST algorithm. We have done research on the MNIST algorithm. MNIST The accuracy based on the MNIST test set is pretty high (we expect it to be higher than 99%). Based on our own crafted photos, we got the confusion matrix then calculating the TFR and TNR. We expect the model with high TFR and low TNR.

The test data/image sets are ready in the first weekplan. When the testing algorithm implementation is finished, then we will test them. The good communication and collaboration pushed us forward to proceed on the project. For example, we give each other help or ideas when we are stuck. Doing more research on image analysis and computer vision will help a lot to the project.

## Risk analysis

Implementation is indeed a necessity to get done as soon as possible and on time. It may not work when the size of symbols are too large or too small. It may not work when the shape of symbols have some change. It may not work when the distances between symbols are too small. The pretrained model may have problems out of plan, and it would take a long time to fix them. The test for the whole system could be interesting as we haven’t run the whole system right now. Symbol recognition and digit recognition are tested separately. The accuracy will depend on how the pretrained model was used for the digit recognition. Optimizations and improvements will be done more depending on the test results. The Corona situation can also change things in this project period.