Software architecture:

Database:

- **moon-problems.db**

Jupyter notebook pre-processing scripts:

- **pre-process_database.ipynb**: This notebook extracts the problems from the database and transforms them into the 12 submatrices of size 13x13 that are the individual inputs to the neural network (as described in the Presentation). Then the dataset is separated into 70% train and 30% test sets that are representative of the general set. These train/test sets are saved as “problems_train.npy”, “problems_test.npy”. “grades_train.npy”, “grades_test.npy”. Then, some data exploration is done and plotted.
- **get_hold_difficulty.ipynb**: This notebook classifies the holds as easy (0.33), medium (0.66) and hard (1). It saves the difficulties as csv file called “hold_difficulty.csv”
- **draw_problem.py:** This is a helper script that draws the problem submatrices or the full problems starting from the holds in text format (ie [A5, F13, H8, etc]). It opens the “hold_difficulty.csv” to know what values to use at the center of the submatrices.

Machine learning Jupyter notebooks and Python scripts:

- **Machine_learning_custom_convolution.ipynb:** Runs machine learning and evaluates the accuracy of the model. Preliminary machine learning runs were done to determine the adequate number of epochs etc. Only best result is shown here. The notebook also saves the testing data as individual numpy arrays that can be sent to the server and classified in real time. Lastly, the notebook saves the ML model in a way that it can be loaded to use when grading problems in real time.
- **streaming_new_problems.py**: Streams test problems, saved as test_problem_n.npy, where n runs over the test problems, and grades them in real time by sending back an updated copy called test_problem_n_graded.npy that contains the grade. The code also returns a score that tells you how well the grading performed.

Jupyter notebook webscraping -- Proof of principle:

- **WebScrape_Moonboard.ipynb**: Shows a basic sequence of steps to browse through Problems Created by Active Users on the Moonboard website. This basic workflow, if implemented, could download new problems added every day to a MySQL database.