arch529

research portfolio

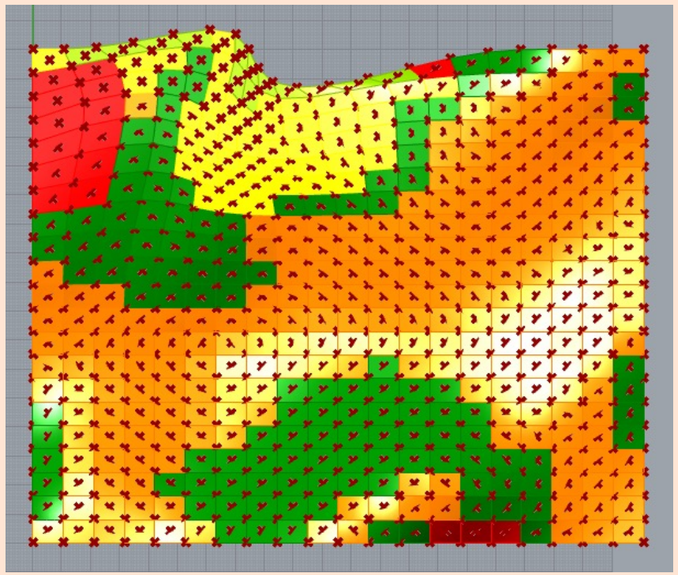
preston pape

SciKit Learn Framework

SciKit Learn was used as a starting point to learn concepts of machine learning. This simple few lines of code is all that was required to read a dataset (iris.csv) and to create a machine learning model to predict data input.

529-ML-research > ML-testing.py > ...

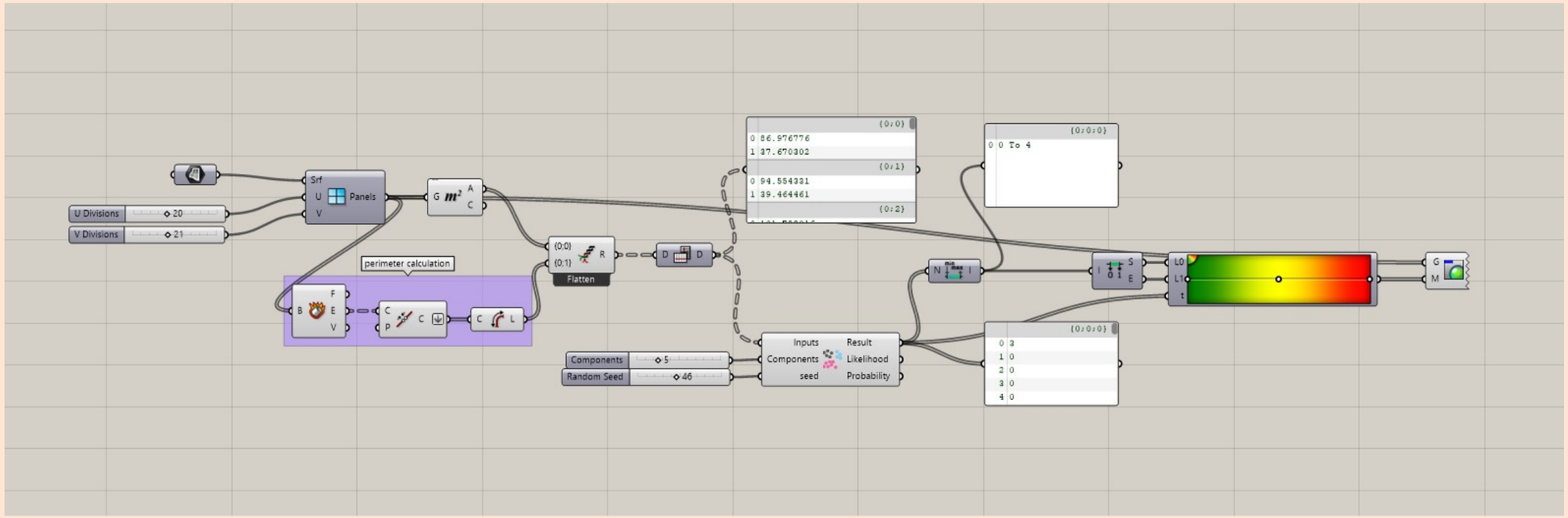
```python
from sklearn.model_selection import train_test_split
import numpy as np
from sklearn import datasets
import matplotlib.pyplot as plt

iris = datasets.load_iris()
# split it in features and labels
X = iris.data
y = iris.target

print(X.shape)
print(y.shape)

# hours of study vs good/bad grades
# 10 different students
# train with 8 students
# predict with the remaining 2
# level of accuracy

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2)
```



gaussian mix solver

Gaussian mix solver is a Lunchbox component used here to categorize graphically by color, panels of similar area and perimeter values to each other. This is useful during even standard parametric modeling in Grasshopper to locate and visualize designs on the fly.

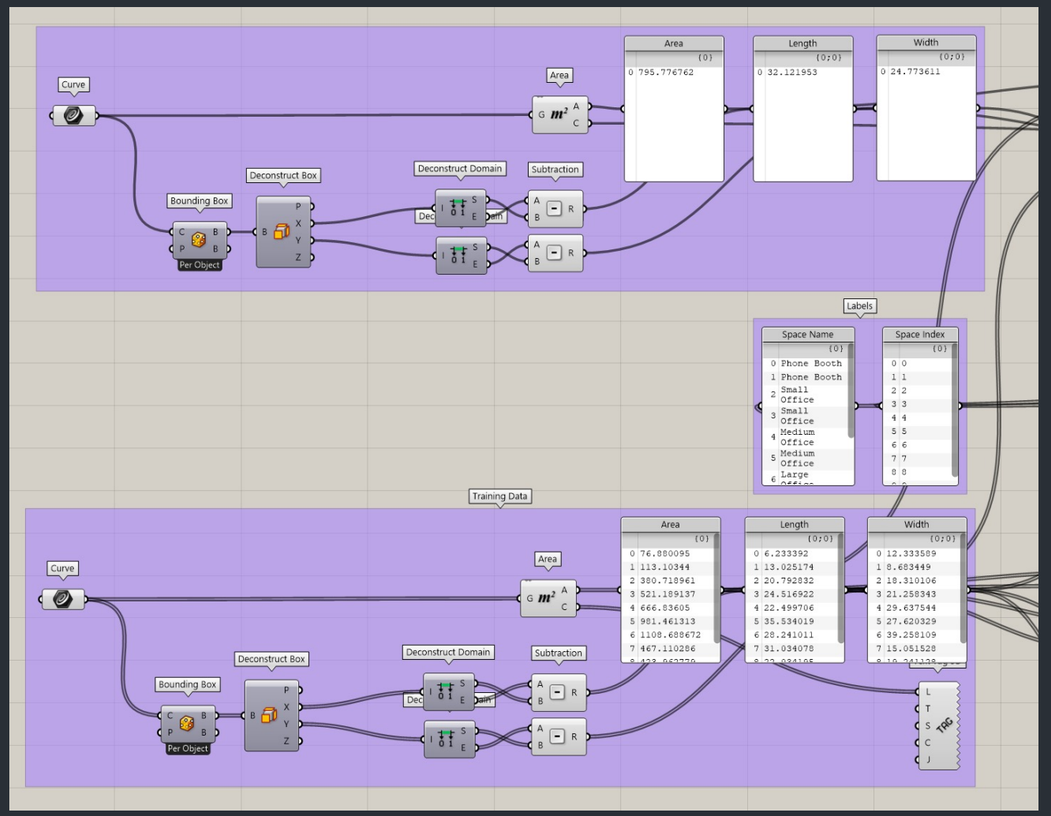
Further, this could be utilized to interpret site features or climate data.



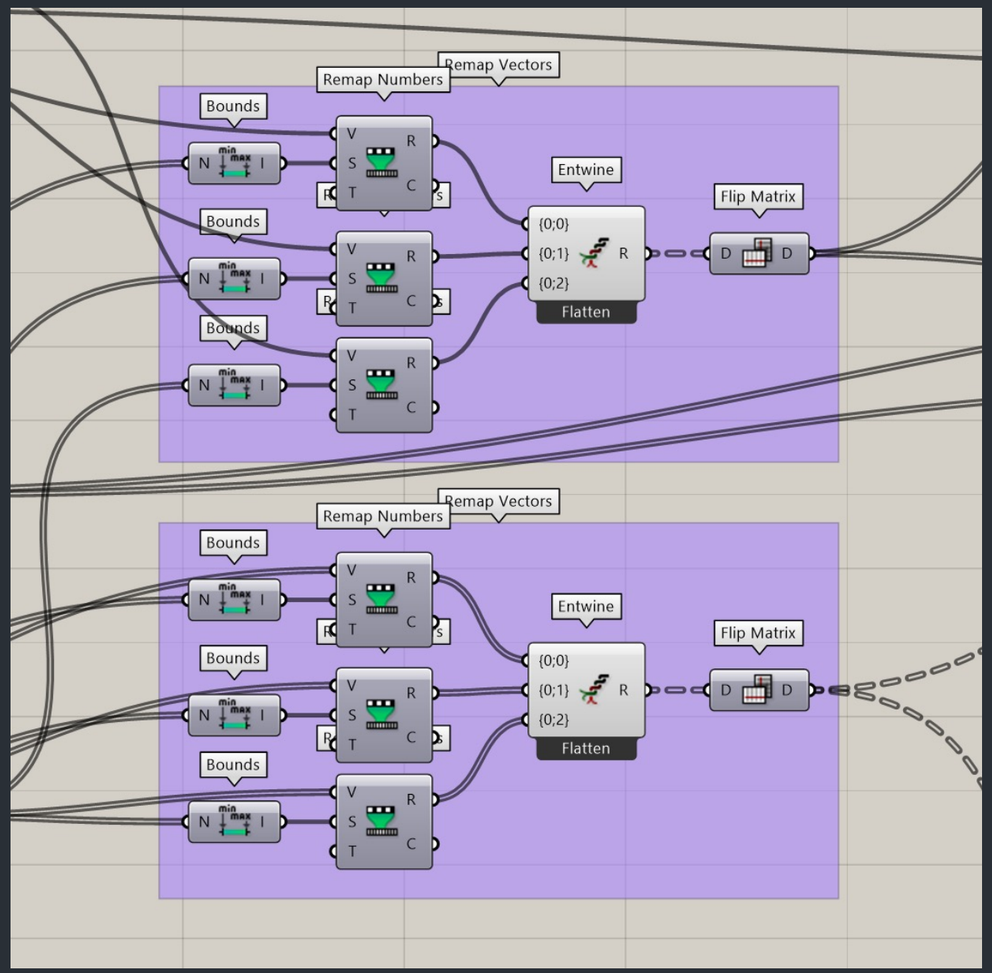
neural network

Neural networks operate largely by mimicking brain function and the organizing patterns of neurons. Here, a neural network was trained using a relatively small set of data: 2 examples each of varying labeled room dimensions and areas.

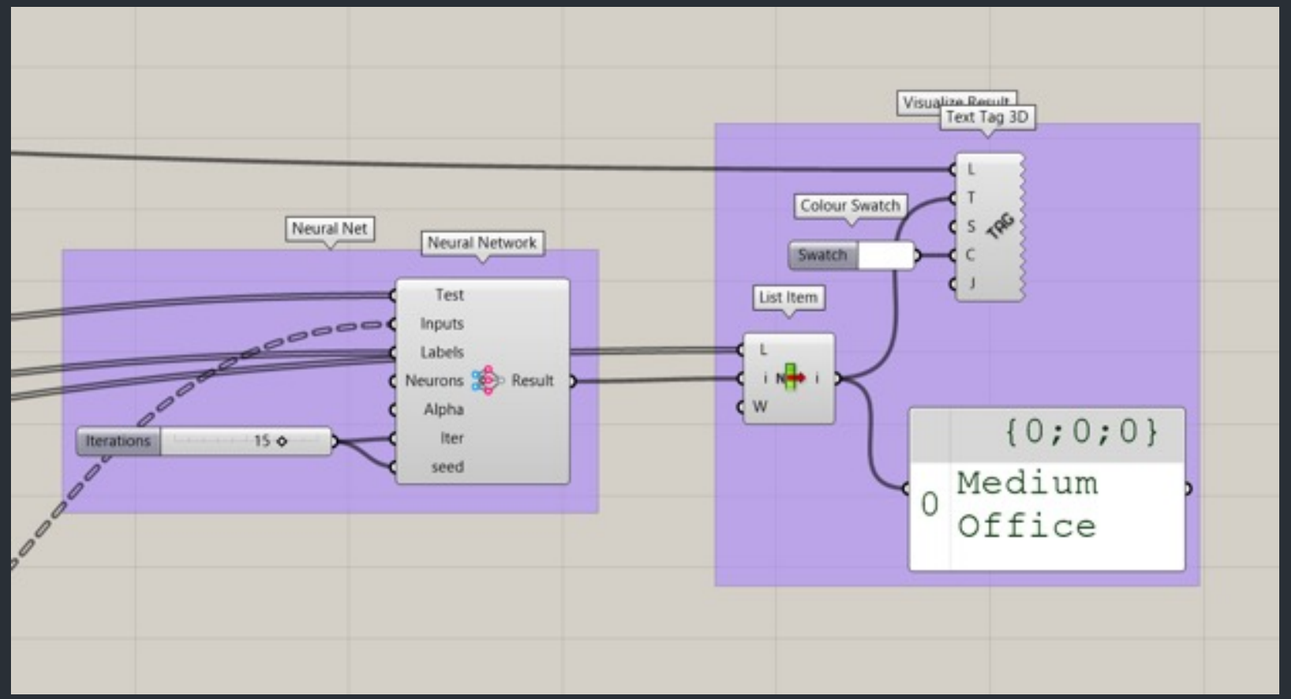
The network is able to take the red input room geometry and return a label for it based on its nearest fit to the training set.



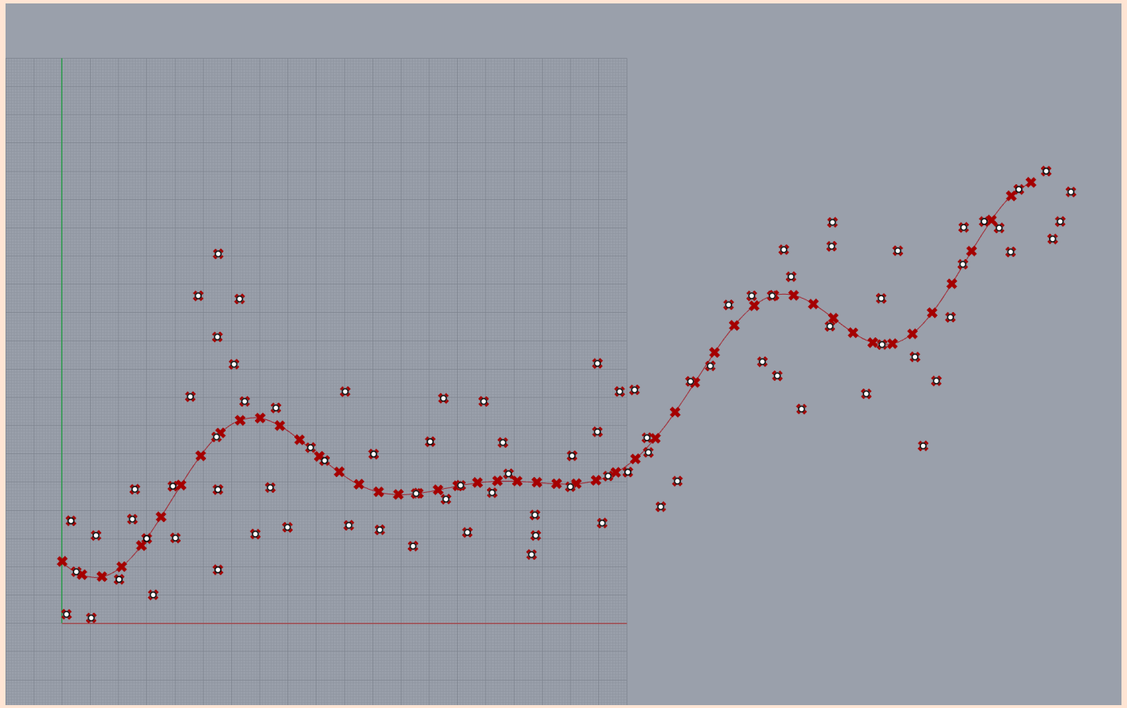
neural network, continued.



These two images show the “flattening” function to the left and output data to the right. Flattening refers to modifying the domain and range of training data to lie between 0 and 1, to more easily compare data between input and output.



non-linear regression



Finds function of best fit line through selected data,
 whether this is points, surfaces, etc
(can be any Grasshopper geometry)

The use case for this machine learning function in architectural design is hard to see but could possibly be useful for certain analytics-based tasks.