# MATH 7207 – Algorithms for Optimization
# Mini-project Proposal Form

## *Your name:Haoen Huang*

## *Project description.*

Implement one of the projected gradient descent algos for non-negative matrix factorization discussed in the paper https://www.csie.ntu.edu.tw/~cjlin/papers/pgradnmf.pdf.

## *Inputs and outputs*

Input: a matrix(size m * n) image data from :Patrik O. Hoyer. Non-negative matrix factorization with sparseness constraints. Journal of Machine Learning Research, 5:1457–1469, 2004.

Output: two matrices (size m * r and r * n), also reform the original matrix.

## *Solution algorithm.*

First, initialize two matrix W, H with each element > 0.

Then optimize it until it converge to the original matrix.

Decide on the converge criteria.

## *Corner cases*

Some of the input data may have elements that is equal to 0. This needs special treatment to make it positive.

## *Testing*

Compare the reform picture or the reform matrix to the original matrix.