# ATA MOHSENI

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## Research Experiences and Interests:

Computational efficient geometric sampling for large and dense multi feature 3D data.

Non-linear Dimensionality reduction.

Computational efficient application of spectral methods.

Application of permutation invariant geometric point based Neural Networks for 3D scene segmentation, 3D object detection, 3D change detection.

Application of unsupervised, semi supervised, supervised learning and adversarial methods.

Application of reinforcement learning.

## Education

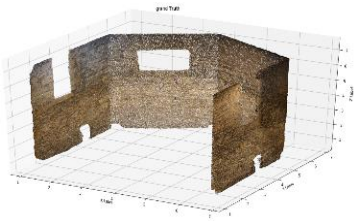
UCSD PhD, Structural Engineering specialization Computational Science and Mathematics (CSME)
**(GPA: 3.91)** *(09/17 – present)*
UCSD M.S. Structural Engineering (SE) **(GPA: 3.85)** *(09/16 – 06/18)*
UCSD B.S. Structural Engineering (SE) **Cum Laude (GPA: 3.75)** *(09/13 – 06/16)*

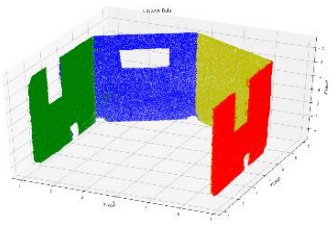
## Experience

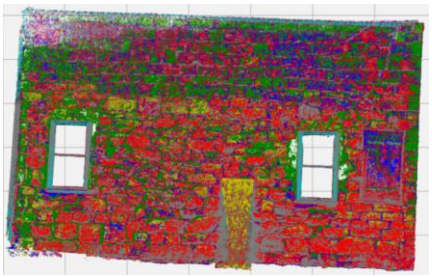
### Graduate Student Researcher UC San Diego: *(Fall 2017 –present)*

**https://chei.ucsd.edu/meet-team/**

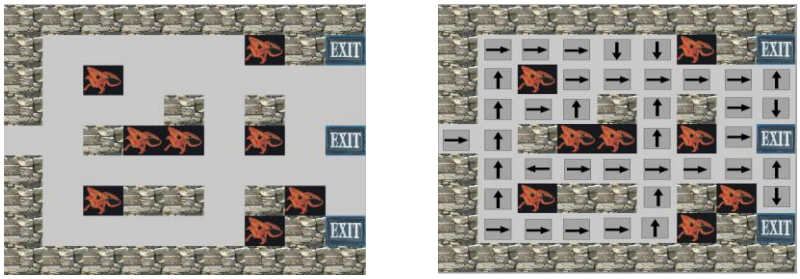
- Implemented and evaluated the self-tunning spectral clustering on large and noisy multi features point sets to perform the material segmentation and building component segmentation. (unsupervised learning)



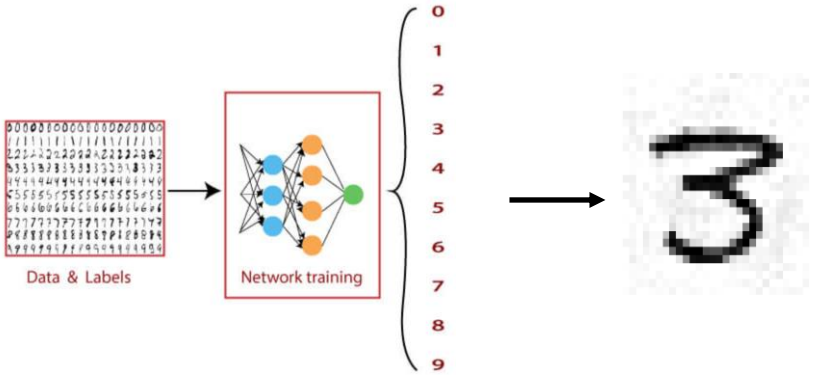




- Used policy and value iteration methods to find the Optimal Policy for an agent to solve a 9x9 maze (reinforcement learning)




- Generated adversarial examples using gradient ascent on loss function of trained Convolutional Neural Network on MNIST data. (adversarial)




$$\frac{\partial L}{\partial x} = \frac{\partial L}{\partial h^0} = \frac{\partial L}{\partial z^4}\frac{\partial z^4}{\partial h^3}\prod_{i=1}^{3}\frac{\partial h^i}{\partial h^{i-1}} = \frac{\partial L}{\partial z^4}\frac{\partial z^4}{\partial h^3}\prod_{i=1}^{3}\left(\frac{\partial h^i}{\partial z^i}\frac{\partial z^i}{\partial h^{i-1}}\right)$$

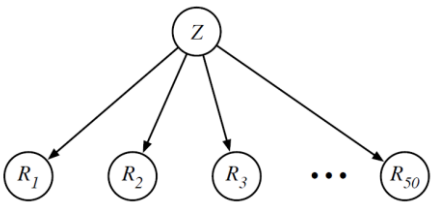
$$z^i = h^{i-1}W^i + b^i \quad \text{for} \quad i = 1,2,3,4$$

$$h^i = ReLU(z^i) \quad \text{for} \quad i = 1,2,3$$

$$p = \text{softmax}(z^4)$$

- Created a movie recommendation algorithm for unseen movies based on people's partial movie ratings using EM algorithm (semi supervised learning)

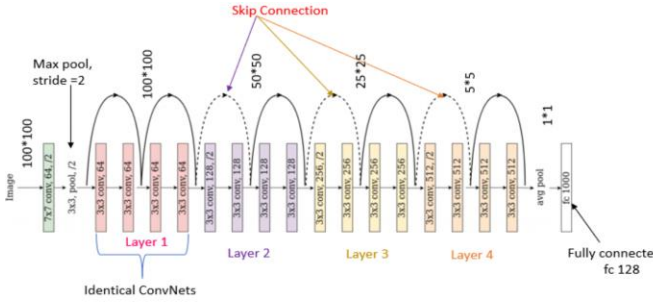
$Z \in \{1, 2, \ldots, k\}$ *K types of movie goer*




$R_i$-different movies

$$P\left(R_\ell = 1 \middle| \left\{R_j = r_j^{(t)}\right\}_{j\in\Omega_t}\right) = \sum_{i=1}^{k} P\left(Z = i \middle| \left\{R_j = r_j^{(t)}\right\}_{j\in\Omega_t}\right) P(R_\ell = 1 | Z = i) \quad \text{for } \ell \notin \Omega_t.$$

• Used Transfer Learning to classify diseases from Chest X-ray image data (supervised leaning)



ResNet-18 Architecture

| | |
|---|---|
| num_epochs | 3 |
| batch_size | 32 |
| learning_rate | 0.001 |
| seed | np.random.seed(1) |
| p_val | 0.1 |
| p_test | 0.2 |
| optimizer | Adam |
| criterion | BCEWithLogitsLoss() |
| network | resnet18 |
| initialization | Xavier |
| threshold | 0.18 |

**Graduate Research Assistant:** UC San Diego full-scale Earthquake Testing Center *(Summer 2017)*

- Developed a numerical non-linear finite element dynamic analysis model (used Tcl programming language interacted with open-source finite element software OpenSees) that accurately predicted dynamic earthquake response of a 2-story wood building.

  http://nheritallwood.mines.edu/education.html

## Related Skills

Python, TensorFlow, PyTorch, MATLAB, R, C, C++, Tcl, SQL, FEA, Microsoft Office, LaTeX

## Related Coursework

- Applied Statistics (MATH 282 A-B)
- Numerical Optimization (MATH 271A-B-C)
- Computer Vision (CSE 252A)
- Probabilistic Reasoning and Learning (CSE250 A)
- Learning Algorithms (CSE250 B)
- Neural Networks Pattern Recognition(CSE 253)
- Machine Learning for Geometric data(CSE 291)
- Large Scale Optimization (MATH 277A)
- Reliability & Risk Analysis (SE 224)
- Stochastic Process (MATH 285)

## Honors and Award

- First place in Tennessee Mathematical Association of Two-Year Colleges state-wide calculus contest. *(February 2011)*

  http://volunteerstatecommunitycollege.blogspot.com/2011/01/so-you-think-math-is-hard.html