About me:

My name is Ata. I am passionate about working with structured and unstructured data. I enjoy visualizing operations on data. I believe understanding and visualizing data and its behaviors at or between 1, 2 and 3 dimensions is good practice to generalize it to n-dimensional space. We can build an accurate and scalable decision-making pipeline based on your unique data.

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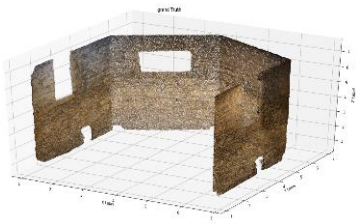
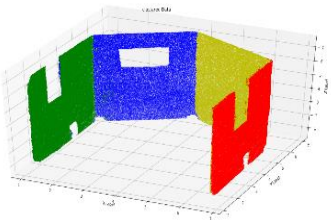
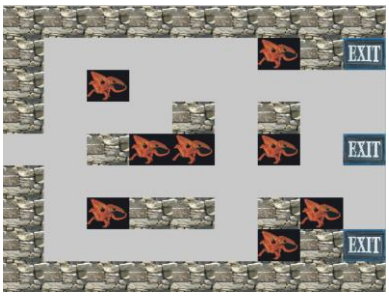
Sample Projects

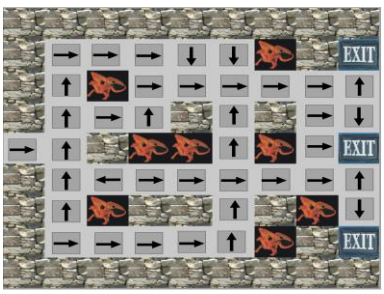
Implemented and evaluated the self-tuning spectral clustering on large and noisy multi features spatial point sets to perform the material segmentation and building component segmentation.



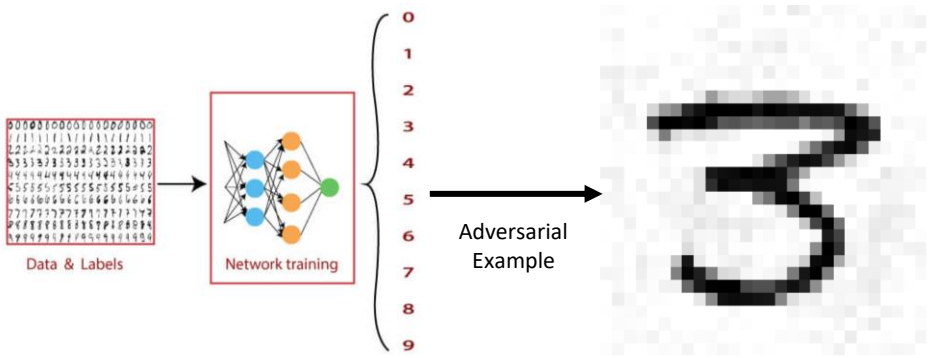


Used policy and value iteration methods to find the optimal policy for an agent to solve a maze.





Generated adversarial images for MNIST data set using gradient ascent on the loss function of trained neural network. Adversarial images can be used as extra training data sets.



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

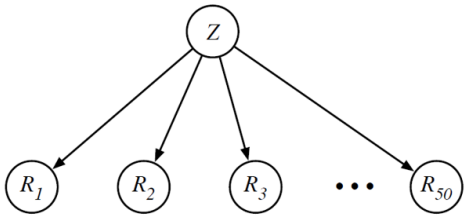
$$z^i = h^{i-1}W^i + b^i \quad \text{for} \quad i = 1,2,3,4$$

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

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

Developed a movie recommendation by using belief network and EM algorithm to uniquely recommend set of specific unseen movies for every user.

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

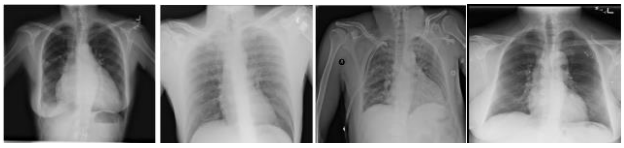


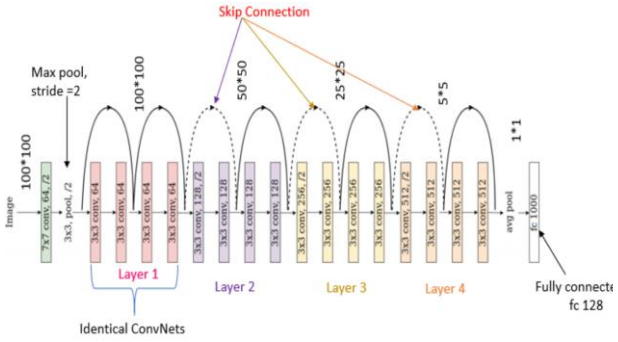
R_i -different movies

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

Ω_t : set of movies seen and rated by t^{th} person

Trained several convolutional neural network architectures including ResNet-18 and DenseNet-121 to classify one or more diseases from Chest X-ray image data.

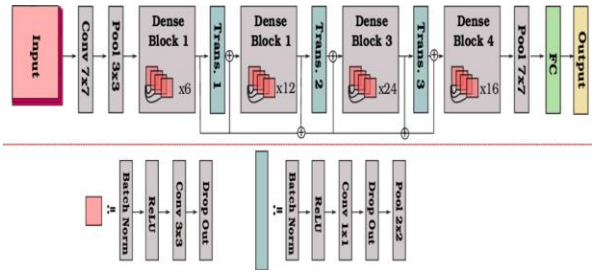




ResNet-18 Architecture

accuracy	precision	recall	bcr	Disease
0.586690	0.175493	0.808226	0.491859	Atelectasis
0.931173	0.177135	0.529536	0.353335	Cardiomegaly
0.617016	0.227688	0.913850	0.570769	Effusion
0.177890	0.174233	0.999144	0.586688	Infiltration
0.665725	0.096221	0.687061	0.391641	Mass
0.659779	0.086197	0.526455	0.306326	Nodule
0.988256	0.000000	0.000000	0.000000	Pneumonia
0.772360	0.133712	0.674847	0.404279	Pneumothorax
0.712898	0.096548	0.707637	0.402093	Consolidation
0.941430	0.139513	0.361650	0.250582	Edema
0.852881	0.072109	0.467991	0.270050	Emphysema
0.965562	0.065315	0.093851	0.079583	Fibrosis
0.881473	0.104091	0.352308	0.228199	Pleural_Thickening
0.998315	0.000000	0.000000	0.000000	Hernia

Transfer Learning Find Tuned Metrics using ResNet-18



DenseNet-121 Architecture

accuracy	precision	recall	bcr	Disease
0.666716	0.208527	0.792922	0.500725	Atelectasis
0.901739	0.145154	0.636929	0.391042	Cardiomegaly
0.726525	0.288684	0.882475	0.585579	Effusion
0.397651	0.214210	0.900616	0.557413	Infiltration
0.874535	0.231360	0.596045	0.413702	Mass
0.818146	0.166230	0.566964	0.366597	Nodule
0.978693	0.065728	0.057143	0.061435	Pneumonia
0.826371	0.186453	0.790188	0.488321	Pneumothorax
0.814231	0.130767	0.602113	0.366440	Consolidation
0.931421	0.156139	0.530120	0.343130	Edema
0.945493	0.242742	0.651515	0.447129	Emphysema
0.959120	0.124481	0.319149	0.221815	Fibrosis
0.903870	0.127551	0.359425	0.243488	Pleural_Thickening
0.997522	0.333333	0.063830	0.198582	Hernia

Transfer Learning Find Tuned Metrics using DenseNet-121