

## Ashish Gupta

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## EXPERIENCE

### Junior ML Engineer at Omdena

Oct 2019–Present

A team of 40 people from 23 countries are working on social good to find the solution of forest fire using AI. And we will spend the **8 weeks(2 months)** from now working on the challenge.

### Research Intern under Arun k. Pujari Vice Chancellor, Central University of Ajmer, Rajasthan

Jan 2019–Sept 2019

- I worked on 3D reconstruction problem using deep learning.
- Different works are Visual Hulls(3D reconstruction algorithms), 3D representations like voxels, octrees, Object Pose estimation(6 DOF), Semantic Segmentation.
- Constructed the pipeline of complex networks that includes the combination of different CNN's, Visual Hull construction algorithms. Different Networks are tested and modified.
- Trained the CNN's model in a GPU with environment.
- Used Py-Torch framework for implementing the model. Other libraries were numpy, matplotlib, PIL, OpenCV, Matlab.
- Different pooling sizes are tested as  $7 \times 7$ ,  $3 \times 3$ ,  $1 \times 1$  with skip connections and batch normalisation to different units. Finally a basic understanding is drawn to put the different techniques like batch norm, skips to the CNN units.
- Pinhole camera model is used. The 3D object is reconstructed in unit-length cube.

### Intern Orbnet Softech Solution Pvt. Ltd

May 2017–March 2018

I worked on developing Student Online Test System with Marks Evaluation Using Fuzzy Logic(Online Portal) with JSP, MySQL, HTML, CSS and develop various small Desktop Applications in Java.

## EDUCATION

## Courses

- Deep Learning Specialization
- Intro to Deep Learning, Pytorch Udacity
- Machine Learning Coursera by Andrew Nag
- Fuzzy Logic, Nptel(Prof. Debasis Samanta)
- Linear Algebra(18.06) by Gilbert Strang MIT OCW
- ScienceOf Uncertainty, edx
- NLP Analyzing Text with the Natural Language Toolkit by Steven Bird, Ewan Klein, and Edward Loper
- Java SE, Java EE

## Achievements

- Convener at Computer Society of India, BIT Since 2017(3rd Sem), MESRA Campus.
- Winner at SUR SANGAM at Vibrations, Cultural Fest BIT Mesra.
- Operations Coordinator at Quizophilic India.
- Winner at Singing Competition at Surbhi Music Sanstha.

2016–Saint George Academy, Jaipur –12th RBSE Board

2020–Pursuing BE( 7th Sem) in Computer Science Engineering from Birla Institute Of Technology, Mesra, Ranchi

## PROJECTS

### 1. Extracting Silhouette By Semantic Segmentation

March 2019-April 2019

- I extract silhouette from the images using deep Residual network(encoder-decoder).
- Various architectures are tested like FCN-VGG,FCN-AlexNet,etc.
- The output voxel probability is binarise with 0.4 threshold.
- Mean IOU on Synthetic Data(ShapNet) is **0.897** and on Pascal Voc 2012 is **0.731**.
- Pytorch is used with Pillow. Dataset used was PascalVoc 2012.
- Various data Augmentation techniques are used with mask images have to be prepared manually for silhouette.
- The learning rate is set to 1e-4 with around 7000 images with batch size of 16. Google Colab GPU is used for training.
- Adam Optimizer with Cross Entropy loss is used. Different Learning rate schedule like cosineAnnealing(used),step,etc are tested.

### 2. Single View 3D Object Reconstruction Using Deep ResNets.

Jan 2019-present

- Using deep Residual Nets(CNN) and Shape Net(Synthetic Images) dataset, I construct a network which takes a single input image and gives output as the corresponding 3D object of the object present in the image.
- Encoder-Decoder deep Resnet architecture is used as a model.
- Mean IOU are as follows-
  1. airplane : 0.053
  2. chair: 0.071
  3. Car:0.127
  4. couch:0.235
- I have taken 4 different objects i.e.couch, chair, car, airplane with 100 classes each.
- Its observed that the model performed better when the object have more solid shape like in couch.
- The 3D objects/models are handled with Binvov lib and voxels are used as representation.
- All the implementation is done in Pytorch Framework,Pillow and GPU used is Google colab. Batch size is 24 and learning rate is 1e-4 with xavier initialisation and binary cross entropy loss is used.
- ShapeNet Dataset is used.Data Augmentation with different learning rates are tested and used(1e-4,-5,etc).
- The problem of Saddle point is observed.

### 3. Botanical Flowers Identifier with Web Search Facility

October2018

- Sponsorship coordinator at Cavorts.

## Skills and Handles

### Deep Learning and ML

Pytorch,Tensorflow,keras  
Sklearn,numpy,pandas and  
openCV,matplotlib,NLTK

### Web and Desktop Development

Java SE and Java EE

### Database

Mysql,Oracle

### Cloud

Google Colab

### Programming Languages

Python,Java ,C,C++

### Operating Systems

Linux,Microsoft Windows

### GitHub

<https://github.com/ashishgupta2598>

### Medium Blogs

[https://medium.com/@ashishgupta\\_65016](https://medium.com/@ashishgupta_65016)

### LinkedIn ID

<https://www.linkedin.com/in/ashish-gupta-36934874/>

- Various architectures with transfer learning and from scratch are tested like VGG's, Inception, resnets.
- Web Browser, Google Search API is used. Training is done in Google Colab GPU. Pytorch with pillow and OpenCV are used.
- Validation accuracy was improved from 71.45% to 89.77%.
- Data Augmentation techniques like flipping, center-crop etc used.
- Begin the project with 5 flower classes (accuracy-89.77 at resnet50) then 10 classes and finally reached 102 classes (accuracy-around 71%)

#### **4. Object Pose(6 DOF) Estimation Using Deep ResNet.**

**Feb 2019**

- Using ShapeNet and Pascal Voc dataset we estimate rotation and translation (camera extrinsic parameters).
- Mean Rotation Error comes out to be **10.76 degrees**.
- Preparation of dataset is crucial part as data in Pascal Voc comes in different format. Different implementation is tested and finally ShapeNet dataset is used for training the CNN model.
- Using CNN as pose regressor and the project is implemented in pytorch. I used L1 loss and Adam optimizer with a learning rate of  $1e-4$  and decreased to  $1e-6$  after 20 iterations.
- Tested on both L1 and L2 loss and its observed that L1 loss produces better results.
- Construction of Visual Hull from 6 Dof and mask images requires different testing on problems like scaling, consideration of different parts.

#### **5. Sentiment analysis using RNN(GRU's) (NLP)**

- Here in this, I used the Recurrent Neural Network with 3 recurrent units. Different layers of LSTM, GRU are tested.
- Finally used GRU's and used a data-set consisting of 50000 reviews of movies from IMDB.
- All the implementations are done in Tensorflow with Keras.
- accuracy training: 0.8765      validation accuracy: 0.8752
- The model is trained under GPU.

#### **6. Rule based NIM Game JAVA**

**August 2017**

- It's a GUI Java-based game which uses various Heuristic(Rules) for designing the brain of the game.
- GUI is designed in Swings Java and Action Listener is used. The game can be played both multiplayer and single.

The set of rules are designed on two bases:

- i. Winning Condition-The winning goes in the hand of the computer player, ie. now whatever move human will take, there is no chance of winning the human player.
- ii. Not in winning condition-The computer player is not in the winning condition, so it will try to take all those moves to let the computer player be in winning strategy.

## **7.Chabot using RNN with attention mechanism**

**Nov 2018- Dec2018**

- Filtering of the dataset is the crucial Part of this project.As the data in the reddit is tree form.
- Single Month Dataset(July) is used and interpreted using SQLite python.
- Some Rules(logic) are used for filtering of the dataset.5 Gb of the dataset is reduced to 250 MB of Questions and answers.
- I used Neural Machine Translation Concept. Next, it also contains support for attention mechanisms.
- Its find that Bidirectional RNN performed better than simple architecture.
- Here attention mechanism help to go upto 80+ tokens.

## **8.Text Summarizer Using NLTK and RNN's**

**Sept2018-Jan 2019**

- Data cleaning "ain't": "am not" which can create problems are handled. And regex is used for advance filtereation.
- Sequence to Sequence basic encoder-decoder strategy follows.
- Attention mechanism follows for long term memory.
- All the implementations are performed in Tensorflow with use of NLTK and Regex.
- Different methodology is tried. The simplest one is data cleaning is done using NLTK and then frequency count is calculated.Based on it a basic summary is given.
- Adam optimizer is used with learning rate of 0.008.

## **9. Online Test System with Marks Evaluation Using Fuzzy Logic(Online Portal)**

**December 2017-Feb 2018**

- Here in this, an online portal is created using Java Server Pages (JSP) with HTML and CSS. Database-MySQL
- **Features:**
  - ✓ Login/ accounts for students and Faculty.
  - ✓ Faculty can conduct various examinations (MCQ's) for particular batches.
  - ✓ Students marks are evaluated and updated in the Data Base.
  - ✓ At the end of the semester, student marks are evaluated using Fuzzy Logic and mark sheet is generated.

