Résumé

Omkar Muglikar

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Education:

Qualification	Board/University	Year	Percentage (%)	Class/Division
MS (Computer Science)	Arizona State University	2021	CGPA 3.78/4.00	Distinction
BE (Computer Engineering)	Savitribai Phule Pune University	2019	CGPA 8.42/10	Distinction
HSC (Grade XII)	Maharashtra State Board	2015	88.0	Distinction
SSC (Grade X)	Maharashtra State Board	2013	95.2	Distinction

Course Work: Perception in Robotics, Advances in Robot learning, Data intensive systems for machine learning, Statistical Machine learning, Data mining and warehousing, artificial intelligence and robotics, data analytics, embedded systems and internet of things, operations research, computer graphics, etc.

Project (Capstone): 'Answering Open Ended Questions Based On Image Using Deep Learning Approach'
Team Size: 4
Aim: To analyze baseline model (CNN+LSTM) for visual question answering task and try to improve on the same

- Modelled Convolutional neural networks for image feature extraction and Long Short-term memory (LSTM) networks for extracting features from question. Analysed a part of VQA dataset to train the neural networks and compared performances with different CNN models.
- Performed Exploratory data analysis on the VQA dataset followed by extracting relevant data
- Executed the models on 60,000 training and 9783 testing samples to observe that Inception Resnet + LSTM gave highest top 5 accuracy of 77.02%

Tools and Technologies Used: Python, Keras, numpy**,** spacy

Course Projects (Master's):

1. Learning Reactive Policies for Collision Avoidance and Agent Detection in Multi-Agent Systems (January 2020 – May 2020)
Team Size: 3
Aim: To learn policies for multi-agent defend and attack game simultaneously

- Designed a simple 2D attack and defense game consisting of two teams – protectors (2 agents) and seekers (2 agents). Protectors defend a given landmark and seekers try to reach it without colliding with protectors
- Modified observation space of each agent by making its perception limited to a vision radius around the agent
- Designed opposing rewards for both teams keeping in mind limited vision. i.e. it gets reward only if it sees the other agents
- Used MADDPG (Multi-Agent Deep Deterministic Policy Gradient) Reinforcement Learning algorithm to train both the set of teams
- Trained the system on 3 different environments for 50,000 episodes to see some emergent behaviours from the agents as they learn to reach their respective objectives.

Tools and Technologies Used: Python, OpenAI gym, TensorFlow, numpy

2. Study of Memory Allocation in Deep Learning Systems (January 2020 – May 2020)
Team Size: 3
Aim: To study the importance of memory allocation in TensorFlow for different workloads

- Monitored system-wide function overheads with help of perf tools in Linux environment.
- Focused the study on memory related functions causing significant overheads and recorded the behavior for different phases in training the deep learning workload
- Ran 4 types of workloads (Custom CNN, VGG19, Resnet and BERT) on CPU and GPU systems to record various memory operations throughout the system
- Identified operations with significant overheads and concluded that memory allocation causes around 10-15% overhead in deep learning systems and can be further optimised for better performance

Tools and Technologies Used: Python, Perf Tools, Tensorflow

3. Music Genre Classification (August 2019 – December 2019)
Team Size: 5
Aim: To classify music based on genre and do a comparative analysis of various models

- GTZAN dataset was used.
- Features like mel-frequency spectrogram from audio signals were extracted
- Implemented various classifiers like CNN, SVM, CNN+RNN including the latest **bottom up broadcast neural network (BBNN)** using Keras.
- Trained the BBNN for 100 epochs and tuned the hyperparameters to achieve maximum accuracy of 91%

Tools and Technologies Used: Python, Keras, Jupyter Notebook, Librosa

4. Meal detection using the Continuous Glucose Monitoring Data (August – December 2019)
Team Size: 4
Aim: To detect if the person has taken a meal (yes/no)

- Extracted features from the CGM series data of 5 patients and applied PCA to get 5 components.

- Applied **ensemble learning** with hard voting to get an accuracy of 78% on validation data.

Tools and Technologies Used: Python, NumPy, pandas, matplotlib

Course Projects (Bachelor's):

5. Android Application for Calling Ambulance in Emergency

Team Size: 4

Aim: To build an android application for calling an ambulance in an emergency

- Android studio used for developing the app
- APIs like Google maps API, Google directions API, Google Places API were used
- Firebase was used as a real-time database

Tools and Technologies Used: Java, Google APIs, Android Studio

6. Red/Green Circle Detection for Vehicle Automation

Team Size: 4

Aim: To detect red/green circles for automating vehicles (motor for demonstration purposes) to follow traffic signals.

- Circles were detected using the Hough circle transform algorithm
- Hardware used was bolt IOT chip which consisted of WIFI module and some GPIO pins
- The image processing was done using Python (OpenCV library)
- Communication was accomplished with Python (urllib library).

Tools and Technologies Used: Python, OpenCV, BOLT IOT device, Pycharm IDE

7. Online Pizza Ordering System

Team Size: 4

Aim: To develop a website for online pizza ordering system

- HTML and CSS were used for designing the web page.
- Javascript was used for client side validation.
- JSP was used for the server side programming.

Tools and Technologies Used: HTML 5, CSS, JavaScript, JSP, Google maps

8. Classifying Breast Cancer as Benign or Malignant

Team Size: 4

Aim: To classify breast cancer as benign or malignant

- Data pre-processing was done
- Three different classification algorithms were used for classification namely support vector machines, decision tree, and K-nearest neighbors
- Cross-validation was used while training the classifier for enhancing the performance

Tools and Technologies Used: Python, sklearn, pandas, jupyter notebook

Seminar: Object Detection Using Deep Learning

- It explored existing methods of deep learning for detecting objects.
- The input was taken from real-time camera from webcam of the laptop. Methods like YOLO (You only look once) and SSD (single shot multi-box detector) were studied thoroughly.

Internships:

1. At: Centre for Development of Advanced Computing (CDAC)

Duration: June to November 2018 (Six Months)

- Designed and developed User Interface using HTML, CSS, JavaScript
- Understood requirement, technicalities and design of the software.
- Embedded interactive graph design in UI and integrated it with server using PHP and Python
- Created and managed database tables using MySQL

2. At: Vasundhara Geo Technologies Pvt. Ltd.

Duration: June to September 2018 (Four Months)

- Developed code in Python for detecting a change in specific area in the satellite image.
- Extracted coordinates from geo-referenced satellite images in Python.
- Collaborated with fellow interns to understand the workflow and requirements of project and develop code accordingly.

Computer Skills:

Linux, Windows

Software Skills: Jupyter notebook, Pycharm IDE, Eclipse IDE

Languages: C/C++, Java, Python

Databases: MySQL, MongoDB, Firebase

Hardware Skills: Raspberry Pi, Bolt IOT chip.

Awards and Achievements:

- Stood 2nd in my school in the state board examination (10th grade)
- Stood among the top 1% in state board examination (12th grade)
- Qualified for the INSPIRE scholarship (by Govt of India for the top 1% in entire board) in the 12th grade
- JEE mains (Joint Entrance examination - All India level entrance examination for admission to engineering program) percentile score was 97.43.

PORTRAIT

Name: Omkar Muglikar

Date of Birth: 27/11/1997

Languages: English, Hindi, Marathi