Yeshwanth Kumar Adimoolam

Postgraduate Scholar

Personal Website:
LinkedIn:
Github:
Google Scholar:

yeshwant.sc18m031@pg.iist.ac.in
staryesh@gmail.com
(+91) 9171 991 992
(+91) 9188 26 1992

OBJECTIVE

As a persevering, consistent and inquisitive scholar of geoinformatics, I would like to contribute to finding novel solutions for problems in the intersection of deep learning, 3D computer vision, real world 3D data processing and understanding the built environment using skills acquired in the fields of remote sensing, LiDAR, machine learning, etc. I have a keen interest in working on challenging projects of a multidisciplinary nature that would continuously necessitate innovation and push me to broaden my knowledge and refine my skills.

TECHNICAL SKILLS

Languages : Python, R, Matlab, Javascript, C++, HTML, CSS

Software : CloudCompare, LAStools, FARO Scene, ESA SNAP, Open3D, ArcGIS, QGIS, ERDAS Imagine, ENVI

Database : PostgreSQL, PostGIS

Tools/Framework : Tensorflow(Python), Pytorch, Keras, CUDA, Folium, Point Cloud Library, PDAL, Leaflet, GDAL, etc.

Instruments/Techniques : Terrestrial Laser Scanning, LiDAR, Point Cloud Processing, DGPS Survey, GIS Network Analysis, Machine Learning, Neural Networks, FARO Focus S 350, Garmin GPS, Satellite Image classification, Digital Image Processing, etc.

EDUCATION

Indian Institute of Space Science and Technology, Thiruvananthapuram
Master of Technology (M. Tech), Geoinformatics
Expected June, 2020 **CGPA: 8.07/10.00**

Sri Venkateswaraa College of Technology, Chennai
Bachelor of Engineering (B. E.), Civil Engineering(CE)
May, 2017 **CGPA: 7.79/10.00**

D.A.V. Higher Secondary School, Gopalapuram, Chennai
Class XII (Higher Secondary Examination), Tamilnadu State Board
May 2013 **Aggregate 84.16%**

D.A.V. Boys Senior Secondary School, Gopalapuram, Chennai
Class X (Secondary Examination), CBSE
May 2011 **CGPA: 9.4/10**

PUBLICATIONS

1. CONFERENCE PROCEEDINGS

Yeshwanth Kumar, A., Noufia, M. A., Shahira, K. A., and Ramiya, A. M.: BUILDING INFORMATION MODELLING OF A MULTI STOREY BUILDING USING TERRESTRIAL LASER SCANNER AND VISUALISATION USING POTREE: AN OPEN SOURCE POINT CLOUD RENDERER, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XLII-2/W17, 421–426 https://doi.org/10.5194/isprs-archives-XLII-2-W17-421-2019, 2019.

ACHIEVEMENTS & CERTIFICATION

• **Qualified the national level Graduate Aptitude Test in Engineering (GATE) 2018 in Civil Engineering with a 90.56 percentile** by the National Coordination Board (NCB)-GATE, Department of Higher Education, Ministry of Human Resource Development (MHRD), Government of India.
This allowed me to avail the MHRD scholarship throughout the duration of my Master of Technology degree.
Scorecard earned on March 17, 2018 and valid up to March 16, 2021

• **Neural Networks and Deep Learning** by deeplearning.ai on *Coursera.*
Certificate earned at Sunday, March 3, 2019 4:13 PM GMT
Verify : *https://www.coursera.org/account/accomplishments/certificate/GYKQ2WMC8APK*

• **Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization** by deeplearning.ai on *Coursera*
Ongoing

• **Secured highest GPA in 5 out of 8 semesters** among my class during my Bachelor's degree.

MASTER'S THESIS

Estimation of Above Ground Biomass for Indian Mangrove Forests from Terrestrial LiDAR data and high resolution satellite imagery using deep learning techniques. (July 2020)

The primary objective of this study was to make accurate estimates of the biomass of mangrove forests in India. For this study, point cloud data acquired from a terrestrial laser scanner (TLS) was processed and analysed using machine learning techniques to estimate the volume of an individual tree along with its shape parameters (DBH, height, branching, etc). This study also involved using a breadth-first search segmentation approach to detect the number of pneumatophores in a forest plot. The outcomes of this study are:

i A machine learning pipeline to accurately estimate the above-ground biomass of an individual tree by generating a quantitative structure model from terrestrial laser point cloud data.

ii A pipeline to segment individual trees in a plot level TLS point cloud and estimate the above-ground biomass of forest plots as a sum of the AGB of individual trees and the AGB due to pneumatophores.

- **Technology/Tools:** ArcGIS, QGIS, LAStools, Cloudcompare, Python, ENVI, ERDAS Imagine 2018, etc.

BACHELOR'S THESIS

Experimental Investigations on Partial Replacement of Cement by Marble Powder in Hooked End Steel Fibre Reinforced Concrete cured using Magnetised Water (April 2017)

This project dealt with investigating the viability of using marble powder as a partial substitute for Ordinary Portland Cement (OPC) in concrete thereby reducing the demand and hence production of OPC. The manufacture of OPC is a process that has great environmental implications. This project aimed at finding alternate solutions to OPC which in turn would potentially reduce the environmental impact of the overall OPC manufacturing industry. At the end of the project, the following outcomes were realised:

i The partially replaced cement concrete was able to retain compressive strength of up to 40% of cement replacement.

ii At 10% replacement of cement with marble powder the compressive strength increased from 22 MPa to 40MPa.

- **Technology/Tools:** AutoCAD, Universal Testing Machine, Los Angeles Abrasion Testing Machine, etc..

PROJECTS

1. Course Project: Generation of High Resolution DEM from Cartosat-1 Stereo Pairs and Evaluation of its Quality by Comparison with Openly Available DEM data. (July 2019)

In this project, it was required to generate high resolution DEM data from Cartosat-1 (PAN-Aft) stereo pairs using the ERDAS Imagine Photogrammetry Toolbox. The generated DEM was evaluated by comparing it with conventional open source DEM data such as SRTM, ASTER DEM, etc. This was part of a credited mini project.

- **Technology/Tools:** ERDAS Imagine 2018, ArcGIS

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2. Outreach Project: Estimation of Cultivated/Cultivable Area from Sentinel-2 Imagery using the Multi Layer Perceptron Algorithm for the Kanjirappuzha Irrigation Project of Kerala (June 2019)

The objective of this project was to calculate the ayacut area (cultivated and cultivable plots) in the command region of the Kanjirappuzha Irrigation Project in order to devise a plan to irrigate these plots. This project was part of an Outreach Programme to reach out to government institutes and offices. This project was carried out in coordination with the Irrigation Design and Research Board of the Irrigation Department, Government of Kerala. The work was successfully completed to the requirement and submitted.

- **Technology/Tools:** Python 3, ERDAS Imagine 2018, ENVI 5.3, ESA SNAP Toolbox - Sen2Cor plugin, ArcGIS, GDAL, scikit-learn

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3. Course Project: Land Use / Land Cover Classification of a Multi-spectral Satellite Image (Sentinel 2) using the Multi Layer Perceptron Algorithm (May 2019)

The purpose of this project was to implement the multi layer perceptron algorithm to perform a simple pixel based land use/land cover classification of the Chennai city region using Sentinel 2 multispectral imagery. This was carried out in Python and using other software tools (open source and proprietary).

- **Technology/Tools:** Python 3, ERDAS Imagine 2018, ENVI 5.3, FLAASH, ArcGIS, GDAL, scikit-learn

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4. Course Project: Building Information Modelling and 3D Digital Documentation of the IIST Library using Terrestrial LiDAR Scans

(Apr 2019)

In this project, it was required to perform Building Information Modelling of the IIST Library and make a 3D digital document which could be published in the web and accessed by anyone. This was carried out using terrestrial LiDAR surveys and open source point cloud processing software. It required a total of 54 scan stations to fully encompass the library (interior and exterior) and the resultant point cloud had a total of 87,789,548 points.

- **Technology/Tools:** FARO Focus 350 Terrestrial Laser Scanner, FARO Scene (Registration Software), CloudCompare, LAStools, Potree

- **Demo:** `https://youtu.be/fBwMUnGnPR0`

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5. Course Project: Development of a Web Based Chronological Travel Itinerary Application of Mahatma MK Gandhi's Lifelong Travels using Folium and Leaflet (Apr 2019)

In this project, it was required to prepare a web based interactive application that displayed a map of

Mahatma Gandhi's lifelong travels across the world in a chronological sequence. This project was carried out in commemoration of the 150^{th} birth anniversary of Mahatma Gandhi. This was accomplished using open source web based map libraries such as folium and Leaflet.

- **Technology/Tools:** Folium, Leaflet, Python, Javascript, HTML, CSS, Geocoding

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6. Course Project: Land Use/ Land Cover Mapping of Chennai City using Open Source Machine Learning Algorithms such as SVM, MLP, Gaussian Naive Bayes and comparison of their performance. (Nov 2018)

A python based script which would perform pixel based classification of the Chennai city imagery obtained from the Sentinel-2 satellite using algorithms present in open source machine learning libraries and performance evaluation of each classifier.

- **Technology/Tools:** Python, scikit-learn, ArcGIS, ENVI

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7. Course Project: Generation of a Dense Point Cloud and 3D Model of the IIST Vyom Rocket Replica using the Structure from Motion Technique (SfM) (Nov 2018)

In this project, RGB images obtained from a simple smartphone camera were used to generate a dense point cloud of the IIST Vyom Rocket Replica. This was in turn used to generate a textured mesh and 3D model of the same object using open source point cloud processing and mesh generation tool-kits.

- **Technology/Tools:** VisualSFM, COLMAP, Meshlab

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8. Course Project: Assessment of Data Quality Components of Open Source GIS Repositories (Nov 2018)

The purpose of this academic project was to get acquainted with the various open source geospatial data portals and perform a qualitative assessment of the data products. The assessment criteria involved the following components: (i) Accuracy Components: Positional and Attribute Accuracy, (ii) Quality Components: Logical Consistency, Temporal Consistency, Semantic Consistency and Completeness. The primary idea of the project was to get familiarised with openly available data sources and get an idea regarding the quality and reliability of these data portals.

- **Technology/Tools:** DGPS Survey, ArcGIS, QGIS

COURSES ATTENDED

Pattern Recognition and Machine Learning, Introduction to Deep Learning and Neural Networks, Analysis and Modelling of Geospatial Data, Microwave Remote Sensing, Data Structures and Algorithms, Introduction to Database Management, Satellite based Positioning and LiDAR Remote Sensing, Remote Sensing and GIS for Environmental and Natural Resource Management, Geographic Information Systems, Scientific Computing for Geospatial Data Analysis, Photogrammetry, Remote Sensing and Image Analysis, Computer Aided Drafting and Modeling, Numerical Methods, Linear Algebra, Probability and Statistics

ADDITIONAL ACTIVITIES

• Conducted an Awareness Programme regarding space sciences, technologies and research to government school students of classes XI and XII with an intent of encouraging them to pursue space sciences and research as a viable career option. The programmes were carried out at the following schools:
1. Dr. Ambedkar Govt. Hr. Sec. School, Egmore, Chennai-600008
2. Presidency Girls Hr. Sec. School, Egmore, Chennai-600008

REFERENCES

1. **Professor Deepak Mishra** (one of my thesis supervisors), Indian Institute of Space Science and Technology, deepak.mishra@iist.ac.in, https://www.iist.ac.in/avionics/deepak.mishra

2. **Professor Gnanappazham L** (one of my thesis supervisors), Indian Institute of Space Science and Technology, gnanam@iist.ac.in, https://www.iist.ac.in/ess/gnanam

3. **Professor Ramiya A.M.** (my course tutor for LiDAR), Indian Institute of Space Science and Technology, ramiya@iist.ac.in, https://www.iist.ac.in/ess/ramiya