

# Yeshwanth Kumar Adimoolam

Research Associate / Doctoral Researcher

Website: <https://yeshwanth95.github.io>  
Github: <https://github.com/yeshwanth95>  
LinkedIn: [www.linkedin.com/in/ykadimoolam95](http://www.linkedin.com/in/ykadimoolam95)  
Google Scholar: Citations Profile

Nicosia, Cyprus  
staryesh@gmail.com

## SUMMARY

Presently pursuing doctoral research at the Department of Multimedia and Graphic Arts, Cyprus University of Technology, and also working as a Research Associate at the Visual Computing Group, CYENS Centre of Excellence. Machine learning and computer vision researcher with over 3 years of experience.

My work primarily focuses on developing deep neural network architectures for 3D urban scene understanding, which involves many challenging tasks such as 3D and 2D segmentation, object detection, 3D reconstruction, etc.

## EXPERIENCE

**Research Associate**, Visual Computing Group  
CYENS Centre of Excellence - Nicosia, Cyprus  
*January 2021 to present*

**Research Intern**, Immersive and Creative Technologies Lab  
Concordia University - Montreal, Canada  
*November 2023 to May 2024*

## SKILLS

**Languages:** Python, R, CUDA, Matlab, Javascript, C++, HTML, CSS  
**Frameworks:** Pytorch, Tensorflow, Keras, scikit-learn, Point Cloud Library, PDAL, GDAL  
**Database:** PostgreSQL, PostGIS  
**Software:** CloudCompare, Meshlab, LAsTools, ESA SNAP, Open3D, ArcGIS, QGIS  
**Other:** Folium, Leaflet, Terrestrial Laser Scanning, Differential GPS Surveys, etc.

## EDUCATION

**Cyprus University of Technology** - Limassol, Cyprus  
*Doctor of Philosophy (PhD)\*, Urban Semantic Understanding - January 2021 to present*

**Indian Institute of Space Science & Technology** - Trivandrum, India  
*Master of Technology (M. Tech), Geoinformatics - August 2020* **CGPA: 8.49/10.00**

**Anna University**, Chennai, India  
*Bachelor of Engineering (B. E.), Civil Engineering - May 2017* **CGPA: 7.79/10.00**

## PUBLICATIONS

Adimoolam, Y. K., Poullis, C., and Averkiou, M.: Pix2Poly: A Sequence Prediction Method for End-to-end Polygonal Building Footprint Extraction, In. Proc. IEEE/CVF Winter Conference on Applications of Computer Vision  
Accepted for publication

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.

## AWARDS

- Received the MITACS Globalink Research Award (2023)** for research in Canada. This award was granted in support of my proposal to conduct research on “Building Footprint Extraction from Remotely Sensed Data” at Concordia University in collaboration with Prof. Charalambos Poullis.
- 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 for the duration of my Master’s studies.

## Pix2Poly: A Sequence Prediction Method for End-to-end Polygonal Building Footprint Extraction from Remote Sensing Imagery

Pix2Poly is an attention-based *end-to-end trainable & differentiable* deep neural network capable of directly generating explicit high-quality building footprints in a ring graph format. Pix2Poly employs a generative encoder-decoder transformer to produce a sequence of graph vertex tokens whose connectivity information is learned by an optimal matching network. Compared to previous graph learning methods, this is a truly end-to-end trainable approach that extracts high-quality building footprints & road networks without requiring complicated, computationally intensive raster loss functions & intricate training pipelines. Upon evaluating Pix2Poly on several complex & challenging datasets, it was found that Pix2Poly outperforms state-of-the-art methods in several vector shape quality metrics while being an entirely explicit method. This work was supported by the MITACS Globalink Research Award for the year 2023. The outcomes of this work are presently under review for publication.

---

## Data Leakage Detection and De-duplication in Large Scale Image Datasets

The objective of this project was to develop an efficient and robust pipeline for quality assessment in large-scale image datasets commonly used in the intersection of remote sensing and deep learning literature. To this end, we propose a drop-in pipeline that employs perceptual hashing techniques for efficient de-duplication of the dataset and identification of instances of data leakage between training and testing splits. In particular, we focused our study on the AICrowd Mapping Challenge dataset, a popular dataset used in studies focusing on extracting building footprints from aerial images. In our experiments, we demonstrate that nearly 250k (~ 90%) images in the training split were identical. Moreover, our analysis of the validation split demonstrates that roughly 56k of the 60k images also appear in the training split, resulting in a data leakage of ~ 93%.

**Preprint:** <https://arxiv.org/abs/2304.02296>. The work is presently under review for publication.

**Code:** [github.com/yeshwanth95/CrowdAI\\_Hash\\_and\\_search](https://github.com/yeshwanth95/CrowdAI_Hash_and_search)

**Demo:** [datainspector.app](https://datainspector.app)

---

## Estimation of Cultivated/Cultivable Area from Sentinel-2 Imagery using the Multi-Layer Perceptron Algorithm for the Kanjirappuzha Irrigation Project of Kerala

The objective of this project was to calculate the ayacut area (cultivated and cultivable plots) in the command region of the Kanjirappuzha Irrigation Project to devise a plan to irrigate these plots. This project was part of an Outreach Programme to reach out and introduce modern machine learning techniques to governmental remote sensing departments. This project was carried out in coordination with the Irrigation Design and Research Board of the Irrigation Department, Government of Kerala. The work was completed to the requirement and submitted.

**Report:** <http://dx.doi.org/10.13140/RG.2.2.10734.64326>

---

## Building Information Modelling and 3D Digital Documentation of the IIST Library using Terrestrial LiDAR Scans

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

**Demo:** <https://youtu.be/fBwMUnGnPR0>.

## 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.**

The primary objective of this study was to make accurate estimates of the biomass of mangrove forests in India. For this study, an extensive terrestrial laser scanning survey was conducted in the mangroves of Thane, Maharashtra. The point cloud data acquired in this survey was processed and analyzed 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.

A preprint of this work can be found here: <https://www.preprints.org/manuscript/202210.0190/v1>

## BACHELOR'S THESIS

### **Experimental Investigations on Partial Replacement of Cement by Marble Powder in Hooked End Steel Fibre Reinforced Concrete cured using Magnetised Water.**

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 the 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 realized:

- i The partially replaced cement concrete was able to retain compressive strength at up to 40% of cement replacement.
- ii At 10% replacement of cement with marble powder the compressive strength increased from 22 MPa to 40MPa.

## REFERENCES

1. **Melinos Averkiou**  
MRG Leader, Visual Computing Group, CYENS CoE  
Contact: <https://melinos.github.io/>
2. **Charalambos Poullis**  
Associate Professor, Dept. of Computer Science and Software Engineering, Concordia University  
Contact: <https://poullis.org/>
3. **Andreas Lanitis**  
Professor, Dept. of Multimedia and Graphic Arts, Cyprus University of Technology  
Contact: <https://www.cut.ac.cy/faculties/aac/mga/staff/elected-staff/andreas.lanitis/?languageId=1>