

# Abhishek V. Potnis

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## CONTACT INFORMATION

GeoComputational Systems and IoT Group, Email: abhishekvpotnis@gmail.com  
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Mumbai 400076, India

## RESEARCH INTERESTS

Knowledge Representation and Reasoning, Geospatial Semantics,  
Deep Learning for Computer Vision, Satellite Image Processing,  
Geographic Information Systems, Natural Language Processing, Internet Of Things

My doctoral research lies in the areas of Deep Learning and Geospatial Semantics,  
towards leveraging Knowledge Graphs for enhanced Scene Understanding of Remote  
Sensing Scenes

## EDUCATION

**Indian Institute of Technology Bombay**  
M.Tech. - PhD. Dual Degree July 2014 - April 2021(Expected)  
Specialization: Geoinformatics  
CPI: 9.28

**University of Mumbai**  
Bachelors of Engineering (B.E) July 2009 - July 2013  
Specialization: Computer Engineering  
Percentage: 74.26

## PEER REVIEWED PUBLICATIONS

- ❑ **Semantics-Driven Remote Sensing Scene Understanding Framework for Grounded Spatio-Contextual Scene Descriptions**  
Abhishek Potnis, Surya Durbha, Rajat Shinde  
*ISPRS International Journal of Geo-Information*, 2021
- ❑ **Towards Visual Exploration of Semantically Enriched Remote Sensing Scene Knowledge Graphs(RSS-KGs)**  
Abhishek Potnis, Rajat Shinde, Surya Durbha  
*IEEE International Geoscience and Remote Sensing Symposium 2021 (IGARSS 2021)* [Accepted]
- ❑ **Towards Enabling Deep Learning based Question Answering for 3D LiDAR Point Clouds**  
Rajat Shinde, Surya Durbha, Abhishek Potnis, Pratyush Talreja, Gaganpreet Singh  
*IEEE International Geoscience and Remote Sensing Symposium 2021 (IGARSS 2021)* [Accepted]
- ❑ **Real-time Embedded HPC based Earthquake Damage Mapping using 3D LiDAR Point Clouds**  
Pratyush Talreja, Surya Durbha, Rajat Shinde, Abhishek Potnis  
*IEEE International Geoscience and Remote Sensing Symposium 2021 (IGARSS 2021)* [Accepted]
- ❑ **Towards Natural Language Question Answering Over Earth Observation Linked Data Using Attention-Based Neural Machine Translation**  
Abhishek Potnis, Rajat Shinde, Surya Durbha  
*IEEE International Geoscience and Remote Sensing Symposium 2020 (IGARSS 2020), United States of America*
- ❑ **Online Point Cloud Super Resolution Using Dictionary Learning For 3D Urban Perception**  
Rajat Shinde, Abhishek Potnis, Surya Durbha

*IEEE International Geoscience and Remote Sensing Symposium 2020 (IGARSS 2020), United States of America*

- ❑ **Multi-Class Segmentation of Urban Floods from Multispectral Imagery using Deep Learning.**

Abhishek Potnis, Rajat Shinde, Surya Durbha, Kuldeep Kurte

*IEEE International Geoscience and Remote Sensing Symposium 2019 (IGARSS 2019), Japan*

- ❑ **Semantics enabled Spatio-Temporal Modeling of Earth Observation Data: An application to Flood Monitoring.**

Kuldeep Kurte, Abhishek Potnis, Surya Durbha

*ACM SIGSPATIAL 2019 International Workshop on Advances in Resilient and Intelligent Cities 2019 (ARIC 2019), United States of America*

- ❑ **A Semantic Framework for Spatial Query Reformulation for Disaster Monitoring Applications.**

Kuldeep Kurte, Abhishek Potnis, Rajat Shinde, Surya Durbha

*IEEE International Geoscience and Remote Sensing Symposium 2019 (IGARSS 2019), Japan*

- ❑ **Compressive Sensing based Reconstruction and Classification of VHR Disaster Satellite Imagery Using Deep Learning.**

Rajat Shinde, Abhishek Potnis, Surya Durbha, Prakash Andugula

*IEEE International Geoscience and Remote Sensing Symposium 2019 (IGARSS 2019), Japan*

- ❑ **Rapid Earthquake Damage Detection using Deep Learning from VHR Remote Sensing Images.**

Ujwala Bhangale, Surya Durbha, Abhishek Potnis, Rajat Shinde

*IEEE International Geoscience and Remote Sensing Symposium 2019 (IGARSS 2019), Japan*

- ❑ **A Geospatial Ontological Model for Remote Sensing Scene Semantic Knowledge Mining for the Flood Disaster.**

Abhishek Potnis, Surya Durbha

*IEEE International Geoscience and Remote Sensing Symposium 2018 (IGARSS 2018), Spain*

- ❑ **On-Board Biophysical Parameters Estimation using High Performance Computing.**

Pratyush Talreja, Surya Durbha, Abhishek Potnis

*IEEE International Geoscience and Remote Sensing Symposium 2018 (IGARSS 2018), Spain*

- ❑ **A Spatio-Temporal Ontological Model for Flood Disaster Monitoring.**

Kuldeep Kurte, Surya Durbha, Roger King, Nicolas Younan, Abhishek Potnis

*IEEE International Geoscience and Remote Sensing Symposium 2017 (IGARSS 2017), United States of America*

- ❑ **Exploring Visualization of Geospatial Ontologies Using Cesium**

Abhishek Potnis, Surya Durbha

*International Workshop on Visualization and Interaction for Ontologies and Linked Data (VOILA 2016), International Semantic Web Conference 2016 (ISWC 2016), Japan*

## **Doctoral Thesis: Semantics-driven Scene Understanding and Multi-modal Rendering from Remote Sensing Scenes**

*Supervisor: Prof. Surya Durbha*

- ❑ Leveraging **Deep Learning** based **Semantic Segmentation** in tandem with a Knowledge based approach for Formalization, Extraction and Mining of Contextual Spatial Semantics
- ❑ Modelling Remote Sensing Scenes in the form of **Knowledge Graphs** through the

PROFESSIONAL  
EXPERIENCE

**development of Ontologies**

- ❑ Multi-modal rendering of Remote Sensing Scene Knowledge Graphs(RSS-KGs) in the form of **Grounded Contextual Natural Language Scene Descriptions** and **Visualizations** to enhance the interpretability and understanding of Remote Sensing Scenes, focusing on disaster scenarios

**Bachelor's Thesis: An Open Web App for Editing and Storing Rich Text Documents** Jun. 2012 - Jun. 2013

*Mozilla Student Project*

*Supervisors: Dr. David Rajchenbach-Teller, Mozilla and Prof. Sangita Chaudhari*

- ❑ Worked in a group of 3 to develop a ubiquitous web application to edit rich text documents
- ❑ The web app made use of IndexedDB API of HTML5 to store and retrieve user documents
- ❑ The web app supported adding pictures from gallery and also printing of documents

**Google Summer of Earth Engine 2019 - Research Programme**  
**Identifying Cropping Patterns using Machine Learning for Tracing Wildlife Conflict in India** Jun. 2019 - Aug. 2019

*Organization: Centre for Wildlife Studies / Mentor: Anubhav Vanamamalai*

- ❑ Implemented Supervised Satellite Image Classification for identifying different crop types using Google Earth Engine for understanding wildlife conflict
- ❑ Experimented with different classification approaches such as Random Forest, SVM and ANN, to maximize model performance

**Google Summer of Code 2016** May 2016 - Aug. 2016  
**Enabling Cesium for Liquid Galaxy**, *Organization: Liquid Galaxy*

*Mentor: Andrew Leahy, Western Sydney University*

- ❑ Developed a web application, enabling Cesium - a WebGL based virtual globe to run across the multiple displays, providing an immersible experience to the users
- ❑ Focused on endowing Cesium with features such as Camera Synchronization, Content Synchronization across the displays and Space Navigation Camera Control.

**Google Summer of Code 2015** May 2015 - Aug. 2015  
**NASA's Data Curtains from Space**, *Organization: Cesium Community*

*Mentors: Ryan Boller, Mike McGann, NASA*

- ❑ Developed a web application to process and visualize LiDAR Profiles captured by the CALIPSO Satellite with the orbital tracks of the satellite and Aqua-MODIS-Reflectance as the base layer, using CesiumJS

**Cybertech Systems and Software Ltd.** Dec. 2014

*Role: Winter Intern - GIS Web Developer*

- ❑ Developed Keyhole Markup Language(KML) File Reader Widget for ESRI's Web App Builder using ESRI's ArcGIS JS API
- ❑ Developed a proof of concept prototype location based web application with offline usability for Hydrant Maintenance Personnel to record maintenance related events

**Mozilla Firefox** 2012 - 2016

*Code and Documentation Contributions*

- ❑ Fixed front-end and performance related bugs by authoring code patches in JavaScript and C++ for Mozilla Firefox
- ❑ Edited and improved technical articles on Mozilla Developer Network
- ❑ Recognized as a core contributor in the "about:credits" section of Mozilla Firefox

OPEN SOURCE  
CONTRIBUTIONS

### Identifying Solar Farms in India using Machine Learning with Google Earth Engine Mar. 2019

*Google Earth Engine India Advanced Summit Buildathon 2019*

- ❑ Worked in a team to employ the Random Forest Classifier with R,G,B, NIR and VV Polarization as features to obtain an Accuracy of 81.07%
- ❑ Added Wavelet Kernel-based Convolution as an additional feature to detect solar panels' texture thus improving the Accuracy to 83.65%

### SenseQube - An Internet of Things(IoT) based platform for Smart Agriculture 2017 - 2020

*Research Project funded by the Ministry of Electronics and Information Technology, Government of India*

- ❑ Worked in a team, to develop an IoT based end-to-end platform consisting of an integrated weather station to advice farmers in implementing precision agriculture practices
- ❑ Worked with sensors and embedded systems for data dissemination along with server side scripting, databases and machine learning models to generate actionable insights such as crop water requirement and disease susceptibility for farmers to improve crop yield
- ❑ Presented at the DST-JST Indo-Japan Project Meeting under the Strategic International Collaborative Research Program (SICORP) at IIT Hyderabad

### Pratham - IIT Bombay Student Satellite Oct. 2014 - Sep. 2016

*IIT Bombay's largest student technical initiative in collaboration with ISRO*

*Role: Electrical Sub-System Team Member and Web Manager*

- ❑ Implemented the AX.25 protocol in embedded C for communication between the Ground-Station and the Satellite
- ❑ Developed the Satellite Telemetry Monitoring application in Matlab, for accessing the performance of the Thermo-Vacuum test in real-time

### An Integrated Client-Server based Interoperable Geographic Information System for Forest Fire Monitoring Aug. 2015 - Oct. 2015

*Geospatial Data Interoperability and Standards Course Project*

- ❑ Worked in a team to develop an AJAX driven interactive web client aimed at integrating and querying geospatial data conforming to Open Geospatial Consortium(OGC) specifications
- ❑ Integrated services such as Web Feature Service(WFS), Web Map Service(WMS), Web Coverage Service(WCS) and Sensor Observation Service(SOS) to form a web mash-up

### Satellite Image Classifier using Parallelepiped Classification

*Satellite Image Processing Course Project* Aug. 2014 - Oct. 2014

- ❑ Studied and implemented the pixel based Parallelepiped Classifier for classifying satellite imagery into land use land cover classes
- ❑ Developed an interactive web application for training the classifier to generate a model and perform satellite image classification

### Emergency Response Route Navigation and Simulation of Bus Service in IIT Bombay Campus Aug. 2014 - Oct. 2014

*Geographic Information Systems Course Project*

- ❑ Implemented a web app for route navigation, to identify the nearest bus from an emergency location and guide it using the shortest possible route computed using Dijkstra's algorithm

## TEACHING EXPERIENCE

Teaching Assistant, GNR 629: Advances in Geospatial Standards, Interoperability and Knowledge Discovery  
Teaching Assistant, GNR 605: Principles of Geographic Information Systems  
Teaching Assistant, GNR 636: Remote Sensing of Vegetation  
Teaching Assistant, GNR 615: Geographic Information Systems Lab  
Teaching Assistant, GNR 402: Introduction to Geographic Information Systems

## RELEVANT SKILLS

**Languages, Frameworks , Databases, Tools and Version Control Systems**  
*Java, C++, Python, HTML5, CSS3, JavaScript, PHP, JSP, AJAX, XML;*  
*Keras, TensorFlow, PyTorch;*  
*Android SDK, NodeJS, jQuery, Twitter Bootstrap, ArcGIS JS API;*  
*Oracle, MySQL, PostGreSQL, PostGIS, SPARQL, GeoSPARQL;*  
*ArcGIS, QGIS, Erdas Imagine;*  
*Git, Mercurial*

## CERTIFICATIONS

**Deep Learning Specialization** Apr. 2019  
*Instructor: Dr. Andrew Ng, Coursera*  
**Oracle Certified Professional Java Programmer SE - 6** Jul. 2012  
*Secured 96% in the OCJP SE-6 Certification Examination*

## COMMUNITY MEMBERSHIPS

- ☐ IEEE Student Member
- ☐ IEEE Geoscience and Remote Sensing Society (GRSS) Student Member
- ☐ Student Member of Resources Engineers Association (REA), CSRE, IIT Bombay

## SYNERGISTIC ACTIVITIES

- Manuscript Reviewer**
- ☐ IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (IEEE JSTARS)
  - ☐ Earth Science Informatics, Springer
  - ☐ Journal of the Indian Society of Remote Sensing, Springer

### Session Manager

- ☐ IEEE International India Geoscience and Remote Sensing Symposium 2020
- ☐ IEEE International Geoscience and Remote Sensing Symposium 2020

## AWARDS AND ACHIEVEMENTS

- ☐ Recipient of the Google Cloud Platform Academic Research Credits Grant
- ☐ Successfully completed the Google Summer of Earth Engine project "Machine Learning based Mapping of Croplands with Google Earth Engine for Identifying Human-Wildlife Conflict Locations" with Centre for Wildlife Studies
- ☐ Winner of Google Earth Engine India Advanced Summit Buildathon 2019 for the project - "Identifying Solar Farms in India using Machine Learning with Google Earth Engine"
- ☐ Successfully completed an 8-week Entrepreneurship Bootcamp (July-September 2019) organized by TiE Delhi-NCR for ITRA, Digital India Corporation, New Delhi
- ☐ Quarter-Finalist for the India Innovation Challenge 2017 hosted by IIM Bangalore and conducted by Government of India and Texas Instruments
- ☐ Recipient of the IEEE Geoscience and Remote Sensing Society Travel Grant to present at IEEE Geoscience and Remote Sensing Symposium (IGARSS) 2018, Spain
- ☐ Recipient of the International Semantic Web Conference 2016 Student Travel Grant funded by Semantic Web Science Association (SWSA) and the US National Science Foundation (NSF) to present at ISWC 2016 in Kobe, Japan
- ☐ Recipient of the Ministry of Human Resources Development(MHRD), Govt. of India Fellowship

