# Wrik Bhadra

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## Research Interests

Computer Vision, Machine Learning, Medical Image Analysis

## Work Experience

**Rakuten India**, Bangalore

- *Software Engineer II - Machine Learning* Jan 2022 – present
- *Software Engineer I - Machine Learning* Aug 2021 – Dec 2021
- *Software Engineer I* Aug 2020 – Jul 2021

**Internships**

- *Software Engineering intern*, Rakuten India Jun 2020 – Jul 2020
  Worked on full-stack development (Go backend, Vue.js frontend) of an Application Performance Monitoring system.
- *Research intern*, Rakuten Ready Jan 2020 – May 2020
  Worked on identifying location types by learning location embeddings with triplet-loss networks as a case of multi-label classification problem.

## Education

**IIIT Delhi, India**
M.Tech. in Computer Science and Engineering 2018 – 2020

**Techno India University, West Bengal**
B.Tech. in Computer Science and Engineering 2014 – 2018

## Publications

**Method, Apparatus, and Computer Readable Medium** (Patent)
US Patent and Trademark Office (app. number: 17/645,726) [filed Dec 2021]

**Generalized Prediction of Hemodynamic Shock in Intensive Care Units**
AAAS Science Translational Medicine [resubmitted June 2022 - pending review]
medRxiv 2021.01.07.21249121 link

**Transcriptional Advantage Influence Odorant Receptor gene choice**
The FEBS journal [submitted July 2022 - pending review]
(work done as part of an MTech project)

## Selected Projects

**5G Cellular Antenna Damage Detection**

{*object detection, large-scale training, transfer learning*} Team size: 5

A computer vision-based fully automated system for detecting physical damage to 5G cellular antenna towers for Rakuten Japan.

- Part of a two-member sub-team responsible for developing the core AI solution.
- Devised a method for semi-automated curation of a labelled dataset from video footages. This technique has been submitted as a utility patent at USPTO in Dec 2021.
- Developed system for fine-tuning Faster R-CNN ResNet-50 FPN on the curated labelled dataset of about 100k images of cellular antenna towers.
- The model achieved 95% validation accuracy within a 3° tolerance.
- Additionally, implemented solutions for crack detection, fire detection and intruder detection in the vicinity of towers.

**Adversarially Robust Classifier**

{*adversarial robustness, fgsm, pgd*} Team size: 1

Exploring adversarial attack methods such as FGSM (Fast Gradient Sign Method) and PGD (Projected Gradient Descent) attacks to image classifiers alongwith robust prevention.

- Project report / GitHub repo

**Distracted Driver Detection**

{*visual recognition, feature engineering, classifier ensembles*} Team size: 3

Given dashboard images, our system classifies the driver on the basis of 10 predefined actions (texting, speaking on the phone, reaching backwards etc.)

- Project poster / GitHub repo / Kaggle link

**Forecasting & Anomaly Detection**

{*time-series analysis, data pipeline, apache kafka*} Team size: 2

Forecasting & Anomaly Detection in application log streams as part of Rakuten SixthSense.

- Created baselines with ARIMA for usage forecasting and implemented Isolation Forest algorithm for detecting anomalies in both univariate and multivariate time-series data.
- Developed data pipelines using Apache Kafka and Python to process application logs.

## Skills

**Machine Learning** PyTorch, TensorFlow, scikit-learn
**Programming languages** Python, MATLAB, Java
**Application development** Flask, MongoDB, SQL, Docker, Kafka
**Tools** Bash, LaTeX, Git, Jupyter Notebook/Lab

## Honors, Awards & Recognition

**Rakuten India annual awards** Dec 2021

*Part of the winning team under the Rakuten Eureka (Innovation) category.*

**Rakathon - Rakuten India's annual hackathon** Apr 2021

*Selected in the top 110 teams out of 7500+ submissions under the AI - Healthcare category.*