Deep Patel

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Education

May 2021 − Present	**Ph.D**, *Indian Institute of Science (IISc)*, Bangalore, *CGPA: 8.5/10.* *Department of Electrical Engineering* <u>Advisor</u>: Prof. P.S. Sastry
Aug. 2018 − April 2021	**M.Tech (Research)**, *Indian Institute of Science (IISc)*, Bangalore, *CGPA: 7.7/10.* *Department of Electrical Engineering* <u>Thesis</u>: A Study of Robust Learning under Label Noise with Neural Networks [link] <u>Advisor</u>: Prof. P.S. Sastry
July 2012 −July 2016	**B.Tech**, *PDPU*, Gandhinagar, *CGPA: 8.29/10.* *Department of Electrical Engineering*

Work Experience

Sept. 2017 −July 2018	**Project Assistant**, *EE Department*, IISc, Bangalore. <u>*Advisor: Prof. Prasanta Kumar Ghosh*</u> <u>*Funding Agencies*</u>: *DST India & Pratiksha Trust*
Aug. 2016 −Sept. 2017	**Graduate Engineer Trainee**, *Reliance Industries Ltd. (RIL)*, Jamnagar, Gujarat. - Observation of electrical commissioning and maintenance activities at a Low Density Polyethylene Manufacturing (LDPE) Plant, RIL J3 Project

Teaching Experience

Sept. 2020 −Jan. 2021	**Teaching Assistant**, *EE Department*, IISc, Bangalore. *Course: Stochastic Models and Applications*
Jan. 2020 −June 2020	**Teaching Assistant**, *EE Department*, IISc, Bangalore. *Course: Pattern Recognition and Neural Networks (PRNN)*

Publications (Related to Thesis)

PAKDD 2021   **Patel, D.** et al., '*Memorization in Deep Neural Networks: Does the Loss Function Matter?*'

Preprint   **Patel, D.** et al., '*Adaptive Sample Selection for Robust Learning under Label Noise*'

Other Publications

Interspeech 2019   B. N., Suhas, **Patel, D**, et al., '*Comparison of Speech Tasks and Recording Devices for Voice Based Automatic Classification of Healthy Subjects and Patients with Amyotrophic Lateral Sclerosis*' [link]

ICASSP 2018   Illa, A., **Patel, D**, et al., '*Comparison of speech tasks for automatic classification of patients with amyotrophic lateral sclerosis and healthy subjects*' [link]

Research Experience

Aug. 2019 – April 2021   **Robust Supervised Learning under Label Noise**, *Masters Thesis*, IISc, Bangalore.
Advisor: Prof. P S Sastry

- Investigated the role of loss functions in reducing the degree of 'memorisation' in neural networks for better generalisation under label noise. [Chapter 4 – Thesis]
- Devised a novel sample reweighting scheme that relies on mini-batch statistics alone for robustness to label noise. These statistics capture the learning dynamics to control the degree of memorisation for better generalisation under label noise. [Chapter 3 – Thesis]
- This work has led to one publication – PAKDD 2021 and one arXiv preprint.
- Currently working towards a curriculum learning-based theory of the proposed adaptive sample selection scheme.

Sept. 2017 –July 2018   **Disease Onset & Severity Prediction for ALS**, *EE Department*, IISc, Bangalore.
Advisor: Prof. Prasanta Kumar Ghosh

- Design and creation of a dataset comprising of speech samples from patients with Amyotrophic Lateral Sclerosis (ALS)
- Investigated utility of a variety of speech tasks along with corresponding articulatory data for automated disease onset and severity prediction of ALS
- This work has led to two publications – ICASSP 2018 and Interspeech 2019

Recent Projects

March 2019 –April 2019   **Sparse Signal Estimation by Maximally Sparse Convex Optimization**.
Course: Compressive Sensing & Sparse Signal Processing .

- For the problem of denoising, an optimization problem that induces strong sparsity (than ℓ_1-norm) is studied.
- Parametric non-convex penalties are proposed to ensure stronger sparsity of solution and convexity of the optimization problem
- Performance comparison was done with these baselines: *Matching Pursuit*, *Basis Pursuit*, and *Hard Thresholding* methods. [code] [paper]

Extracurricular Activities

June 2020 –Present   **Team Member**, *EMPATHS*, IISc, Bangalore.
- Helping organize and moderate events related to mental health awareness and sensitization for the campus community

June 2019 –Present   **Team Member**, *NoteBook Drive (NBD)*, IISc, Bangalore.
- Helping organize annual events such as *Children's Day Celebration*, *Note Book Distribution*, and *Scholarship Distribution* which are carried out across 25 government schools in and around Bangalore ($\sim$ 4000 students).
- Helped organize a weekly programme, *Science Mentorship*, wherein government school kids get to study science and maths via interactive experiments and inculcate scientific temperament

April 2021 – July 2021   **Volunteer**, *GujaratCovidSupport.org*, Ahmedabad.
- Carried out verification for CoViD-19 related resources and maintaining a database for the same. (Worked with the team led by Kumar Manish)

Relevant Courses

- Stochastic Modelling & Applications
- Linear Algebra
- Detection & Estimation Theory
- Compressive Sensing & Sparse Signal Processing
- Linear & Non-Linear Optimization
- Online Prediction & Learning
- Analysis-I
- Topology
- Information Theory
- Convex Optimization
- Machine Learning
- Game Theory

Academic Achievements & Honours

2018 – 2020   Ministry of Human Resources Development (MHRD), Government of India, Scholarship Holder

2016   AIR 921 in Graduate Aptitude Test in Engineering (GATE)

2016   Silver Medal (University rank 2 out of 60 students) for academic performance in undergraduate program

Programming Skills

Languages   Python

Software & Tools   LaTeX, MATLAB, TensorFlow, PyTorch

Languages

- English
- Gujarati
- Hindi
- Kannada (Ongoing effort)

References

IISc, **Prof. P.S. Sastry**.
Bangalore   Department of Electrical Engineering
email: sastry@iisc.ac.in
website: http://www.ee.iisc.ac.in/faculty/sastry/index.php

IISc, **Prof. Prasanta Kumar Ghosh**.
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