Rajaswa R. **Patil**

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Education

Birla Institute of Technology and Science, Pilani (Goa Campus)   *Goa, India*

B.E. (HONS.) IN ELECTRICAL & ELECTRONICS ENGINEERING   *Aug 2017 - Jun 2021*

- **Cumulative GPA:** 8.26/10.00
- **Bachelor's Thesis :** Computational Modelling for Coherence in Spoken Discourse
- **Academic Projects:** [1] Psycholinguistic models of Spoken Word Processing; [2] Data-driven models of Indian Maritime Trade
- **Study in Advanced Topics:** [1] Computational Neuroscience; [2] Meta Learning

Experience

TCS Research   *Remote, India*

PRE-DOCTORAL RESEARCH FELLOW   *Jul. 2021 - Jun. 2023*

- Working on the broad research topic: "Program Synthesis from Natural Language"
- **Co-advised By: Dr. Gautam Shroff and Dr. Lovekesh Vig**

Cognizer Inc.   *Bengaluru, India*

DATA SCIENCE INTERN (REMOTE)   *Apr. 2021 - Jun. 2021*

- Developed a REST API for an automatic question-answer generation pipeline for parsed natural language text documents
- Worked on question generation with text-to-text transformer models, grammar correction APIs, and text simplification models
- **Employer: Cognizer.ai**

Language Cycles Group, Max Planck Institute for Human Cognitive & Brain Sciences   *Leipzig, Germany*

RESEARCH INTERN (REMOTE)   *Apr. 2021 - Jun. 2021*

- Worked on chunking a natural speech corpus with combinatory categorial grammar (CCG) and dependency grammar
- Performed chunking with human-like incremental language processing with left-branching CCG parsing
- Assisted with aligning Hindi speech audios to their transcriptions, to be used for psycholinguistic experiments
- **Supervised By: Dr. Lars Meyer (Language Cycles Group, MPI HCBS)**

MIDAS Lab (IIIT Delhi)   *Delhi, India*

RESEARCH ASSISTANT   *Dec. 2019 - Jun. 2021*

- Worked on modelling information structure & coherence in spontaneous spoken discourses
- Mentored undergrads on projects related to modelling various aspects of ESL speakers' speech, like fluency, discourse content & coherence
- Contributed towards building a speech scoring system for ESL speakers (under a collaboration with Second Language Testing, Inc.)
- **Supervised By: Prof. Rajiv Ratn Shah (Dept. of CSE & HCD, IIIT Delhi)**

Cognitive Neuroscience Lab (BITS Goa)   *Goa, India*

RESEARCH ASSISTANT   *Aug. 2019 - May. 2021*

- Lead projects on Syntactic processing for Indic languages, Mental Lexicon Development and EEG-based brain imagery
- Designed and implemented an experiment for EEG data collection (6 subjects with 200 trials each) to inspect the role of low-level visual representations (BA-18 & BA-19) in spoken word processing. Used Sequential and Generative Deep Learning models with the collected data
- Worked on modelling causal reasoning in natural language texts with multi-head self-attention based deep neural-network models
- **Supervised By: Prof. Veeky Baths (Dept. of Biological Sciences, BITS Pilani Goa Campus)**

NCETIS, Indian Institute of Technology Bombay   *Mumbai, India*

SUMMER INTERN   *May. 2019 - Jul. 2019*

- Implemented various models for aspect-based sentiment analysis in open-domain texts
- Built a pipeline for data-domain independent opinion-mining in natural language texts
- Built various text-based utilities for entity resolution, topic extraction, theme extraction and lexicon-based sentiment polarity extraction
- **Supervised By: Prof. Ganesh Ramakrishnan (Dept. of CSE, IIT Bombay)**

Central Drug Research Institute (CSIR-CDRI)   *Lucknow, India*

REMOTE INTERN   *Jan. 2019 - Mar. 2019*

- Studied & summarized various machine learning based approaches for Brain Machine Interface
- Built a web scraper for monitoring the web-based Indian news coverage on various diseases
- Analysed the scraped news-articles data with topic modeling & graph-based text ranking algorithms
- **Supervised By: Dr. Sukant Khurana (Neuroscientist, CSIR-CDRI)**

Publications

DRIFT: A Toolkit for Diachronic Analysis of Scientific Literature*

Under Review*

[PDF]

2021

Abheesht Sharma*, Gunjan Chhablani*, Harshit Pandey*, **Rajaswa Patil***

Using Diachronic Distributed Word Representations as Models of Lexical Development in Children*

Manuscript*

[PDF]

2021

Arijit Gupta*, **Rajaswa Patil***, Veeky Baths

Vyākarana: A Colorless Green Benchmark for Syntactic Evaluation in Indic Languages

ACL-IJCNLP 2021 (SRW)

[PDF] [DATASET]

2021

Rajaswa Patil*, Jasleen Dhillon, Siddhant Mahurkar, Saumitra Kulkarni, Manav Malhotra, Veeky Baths

Towards Modelling Coherence in Spoken Discourse*

Under Review*

[PDF] [DATASET]

2021

Rajaswa Patil*, Yaman Kumar*, Rajiv Ratn Shah, Mika Hama, Roger Zimmermann

BPGC at SemEval-2020 Task 11: Propaganda Detection in News Articles with Multi-Granularity Knowledge Sharing and Linguistic Features based Ensemble Learning

SemEval @ COLING

[PDF] [CODE] [DATASET]

2020

Rajaswa Patil*, Somesh Singh*, Swati Agarwal

CNRL at SemEval-2020 Task 5: Modelling Causal Reasoning in Language with Multi-Head Self-Attention Weights based Counterfactual Detection

SemEval @ COLING

[PDF] [CODE] [DATASET] [POSTER]

2020

Rajaswa Patil*, Veeky Baths

LRG at SemEval-2020 Task 7: Assessing the Ability of BERT and Derivative Models to Perform Short-Edits based Humor Grading

SemEval @ COLING

[PDF] [CODE] [DATASET] [POSTER]

2020

Siddhant Mahurkar, **Rajaswa Patil**

Word2Brain2Image: Visual Reconstruction from Spoken Word Representations

ACCS

[POSTER]

2019

Ajay Subramanian*, **Rajaswa Patil***, Veeky Baths

Citta: A Lite Semantic Recommendation Framework for Digital Libraries

NDLI-UNESCO KEDL

[POSTER] [CODE]

2019

Rajaswa Patil*, Siddhant Mahurkar

Teaching

2020-21	**Teaching Assistant**, Introduction to Cognitive Neuroscience	*Elective Course*
2020-21	**Teaching Assistant**, Neuroscience and AI	*Reading Course*
2019-20	**Instructor**, Introduction to Machine Learning & Deep Learning	*Technical Course*
2019-20	**Project Lead**, Applied Machine Learning (NLP Applications)	*Technical Project*
2019-20	**Project Mentor**, Deep Learning with PyTorch	*Summer Project*

Projects

DRIFT

NLP & DL

OPEN SOURCED LIBRARY [GITHUB] [PAPER]

Apr. 2021 - Present

- DRIFT is a toolkit for DiachRonic analysis of scientIFic liTerature
- DRIFT offers UI utilities for convenient training of Diachronic Embeddings for Scientific Corpora
- DRIFT offers UI utilities for nine analysis methods: **word cloud**, **productivity & frequency plot**, **acceleration plot**, **semantic drift**, **tracking clusters**, **acceleration heatmap**, **similarity trends**, **keyword visualization**, and **LDA topic modeling**.

DecepticoNLP

NLP & DL

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May. 2020 - Present

- DecepticoNLP is a Python library for robustness monitoring and adversarial debugging of NLP models
- DecepticoNLP has implementations of various character & word level adversarial perturbations for text

Semantic Search Framework for Digital Libraries *NLP & IR*
Web Application [Github] *Nov. 2019 - Dec. 2019*
- Developed a semantic search framework for Digital Libraries with a BERT-based approach
- Built a Python-Flask based web-app for the semantic search framework

Twitter-Bot for Disaster Management *NLP & IR*
Web Application [Github] *Sept. 2018 - Oct. 2018*
- Built a pipeline involving Twitter-API based Tweet Streaming, Deep Learning based text-classification & ILP based text-summarization
- Deployed the bot on Microsoft Azure cloud & tested successfully with the data from Indonesia 2018 earthquake

Grants & Awards

Grants

2021	**25,000 INR,** Cognitive Models of Lexicon Development	*CNRL, BITS Goa*
2020	**25,000 INR,** Syntactic Evaluation & Processing in Indic Languages	*CNRL, BITS Goa*
2019	**20,000 INR,** Low-level Visual Representations of Spoken Word Processing	*CNRL, BITS Goa*

Awards

2019	**Best Poster Award**, International Symposium on Knowledge Engineering for Digital Library Design	*KEDL, IIT Delhi*

Community

LRG	Group Lead at the Student Language Research Group (LRG - BITS Goa) [**website**]
Kaggle	Expert on the Kaggle Competitions platform [**profile**]
SAiDL	Core Member at the Society for AI & Deep Learning (SAiDL - BITS Goa) [**website**]
Nirmaan	Volunteer work for Employment Operations at Nirmaan NGO (2019) [**website**]
iBRAIN	Selected for a round table panel at ERASMUS iBRAIN CCCP conference (2020) [**website**]
Google AI	Selected to attend the AI Summer School by Google Research India (2020) [**website**]
Neuromatch	Contributing to a tutorial on transformers at the Neuromatch DL summer school (2021), to be taught by Prof. He He, NYU [**website**]
SMLP	Selected for the 5th Summer School on Statistical Methods for Linguistics and Psychology (2021) [**website**]

Relevant Coursework

Machine Learning	[1] Neural Networks & Fuzzy Logic; [2] Convex Optimization; [3] Probability & Statistics; [4] Meta Learning
Computer Science	[1] Object Oriented Programming; [2] Data Structures & Algorithms; [3] Computer Programming
Psychology	[1] Computational Neuroscience; [2] Cognitive Neuroscience
Mathematics	[1] Linear Algebra; [2] Multivariate Calculus; [3] Discrete Mathematics
Electrical Sciences	[1] Digital Image Processing; [2] Communication Systems; [3] Control Systems

Research Interests

Natural Language Processing	[1] Discourse & Pragmatics; [2] Conversational AI; [3] Speech Processing; [4] Multilingual NLP
Cognitive Science	[1] Computational Psycholinguistics; [2] Syntax & Parsing; [3] Cognitive Modeling
Machine Learning	[1] Meta-Learning; [2] Abstract Reasoning; [3] Compositional Generalization

References

Prof. Veeky Baths
Director, Cog. Neuro. Lab
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Dept. of Biological Sciences
BITS Pilani (Goa Campus)
South Goa, India
veeky@goa.bits-pilani.ac.in

Prof. Rajiv Ratn Shah
Director, MIDAS Lab
Assistant Professor
Dept. of CSE & HCD
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Prof. Swati Agarwal
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Dept. of Computer Science
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