Bornali Phukon

Beckman Institute | UIUC | bornali31phukan@gmail.com | LinkedIn | (447-902-4320)
Postdoctoral Researcher integrating LLMs with ASR to enhance voice recognition for diverse speech patterns and disabilities.

Education

July 2023 **Ph.D. Computational Linguistics,** Indian Institute of Technology, Guwahati, India
Focus: Machine Learning, Information Extraction, Lexical Ontology Expansion

June 2012 **M.Tech. Information Technology,** Gauhati University, India
CGPA: 9.01/10, Focus: Natural Language Processing

Work Experience

Postdoctoral Research Associate **University of Illinois Urbana-Champaign**
Sept 2023 - Present | Advisor: Mark Hasegawa-Johnson
Leading projects to advance voice recognition technology, focusing on diverse speech patterns, including Parkinson's and dysarthric speech.

- Improved dysarthric speech recognition by fine-tuning ASR models with specialized data from the Speech Accessibility Project, achieving a 36.70% and 25.90% reduction in Word Error Rate compared to models fine-tuned on 100h and 960h LibriSpeech datasets.**[6]**
- Innovating an evaluation metric for ASR models that emphasizes transcript correctability, leveraging LLMs to enable targeted, cost-effective error correction.
- Working on intent detection and slot filling, training on combined corpora from different domains to enhance natural language understanding in ASR systems.

Senior Research Fellow **Indian Institute of Technology, Guwahati**
Jun 2016 - Jul 2023
Focused on ontology expansion in low-resource languages using complex network analysis. Developed TEAM and LG-TEAM frameworks to improve automatic ontology growth.

- Designed and implemented methods for identifying missing relations in ontologies/taxonomies/knowledge bases. **[3]**
- Enhanced ontology expansion with multi-task learning models integrating local and global network context. **[4], [5]**

Project Fellow **Indian Institute of Technology, Guwahati**
Jun 2015 - Jun 2016
Developed an automatic phonetic alignment tool for under-resourced languages of Northeast India as a Praat plug-in.**[2]**

Research Engineer **Indian Institute of Technology, Bombay**
Aug 2012 - Apr 2013
Developed tools for the IndoWordNet(WordNet for Indian Languages), including a method for automatic tagging of unannotated corpora.

Research Intern **Indian Institute of Technology, Guwahati**
Aug 2011 - May 2012
Contributed to sense projection for Word Sense Disambiguation and developed and enhanced a generic stemmer for all Indian languages.**[1]**

Skills

Programming: Python (scikit-learn, numpy, pandas, matplotlib), C, C++, Pytorch, Tensorflow, Kaldi, GPU-based programming
Technologies: NLP, ASR, Machine Learning, Deep Learning, Information Retrieval, Network Representation, Semantic Network Analysis, Speaker Adaptive Training, Large Language Models (LLMs), Generative AI

Awards and Certificates

- Ph.D. Institute Fellow funded by MHRD, Govt. of India
- Travel Grant, NAACL 2022, Seattle, USA

Selected Publications

[1] Pushpak Bhattacharyya, Ankit Bahuguna, Lavita Talukdar, **Bornali Phukon**, "Facilitating Multi-Lingual Sense Annotation: Human Mediated Lemmatizer," **Global Wordnet Conference (GWC 2014)**

[2] **Bornali Phukon**, Biswajit Dev Sarma, Shakuntala Mahanta, S R M Prassasna, "Automatic Phonetic Alignment Tool Based on Hidden Markov Model as a Plug-in Tool of Praat for the Languages of Northeast India," **LREC 2016 Workshop-WILDRE3 Proceedings**

[3] **Bornali Phukon**, Akash Anil, Sanasam Ranbir Singh, Priyankoo Sarmah, "Synonymy Expansion Using Link Prediction Methods: A Case Study of Assamese WordNet," **ACM Transactions on Asian and Low-Resource Information Processing, Volume 21, Issue 1, January 2022**

[4] **Bornali Phukon**, Anasua Mitra, Sanasam Ranbir Singh, Priyankoo Sarmah, "TEAM- A Multi-task Learning Based Taxonomy Expansion Approach for Attach and Merge," **NAACL Findings 2022**

[5] **Bornali Phukon**, Anasua Mitra, Sanasam Ranbir Singh, Priyankoo Sarmah, "LG-AMXpand: Local and Global Context Aware Multitask Learning Based Taxonomy Expansion Approach for Attach and Merge," **Submitted**

[6] Xiuwen Zheng, **Bornali Phukon**, Mark Hasegawa-Johnson, "Fine-Tuning Automatic Speech Recognition for People with Parkinson's: An Effective Strategy for Enhancing Speech Technology Accessibility," **Interspeech 2024**

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