Amey Hengle

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Research Interests

Deep Learning, Low-resourced NLP, Speech, Multimodal Systems and Computational Social Science.

Education

Savitribai Phule Pune University (PVG's COET)   **Pune, India**
Bachelor's of Engineering in Computer Science, Major GPA: 8.57/10   2016 – 2020

Pre-prints/ Under Review Papers

1. **Amey Hengle***, Aswini Kumar*, Sahajpreet Singh, Anil Bandhkavi, Md Shad Akhtar, Tanmoy Chakraborty. **Intent-conditioned and Non-toxic Counterspeech Generation using Multi-Task Instruction Tuning with RLAIF** (*Accepted at NAACL 2024*)

2. **Amey Hengle**, Aswini Kumar, Anil Bandhkavi Tanmoy Chakraborty. **Are Large Language Models reliable NLG Evaluators? A Case Study for Automated Evaluation of Counter Responses against Hate Speech** (*To be submitted to EMNLP 2024*)

3. **Amey Hengle***, Atharva Kulkarni*, Rashmi Gupta. **You Might be More Than Just Depressed: Exploring Social Media Discourse Surrounding Comorbid Mental Health Disorders** (*To be submitted to TACL 2024*)

4. **Amey Hengle***, Shivanshu Khatana*, Raya Das, Tanmoy Chakraborty. **Integrating Socio-economic and Spatial Information for Multidimensional Poverty Estimation at District-Level in India** (*Under review at IJCAI 2024*)

Selected Publications (*Google Scholar*) (* denotes equal contribution)

1. Leonie Weissweiler, Valentin Hofmann, Anjali Kantharuban, Anna Cai, Ritam Dutt, **Amey Hengle**, Anubha Kabra, Atharva Kulkarni, Abhishek Vijayakumar, Haofei Yu, Hinrich Schuetze, Kemal Oflazer, David R Mortensen. **Counting the Bugs in ChatGPT's Wugs: A Multilingual Investigation into the Morphological Capabilities of a Large Language Model** (*EMNLP 2023*)

2. **Amey Hengle**, Atharva Kshirsagar, Shaily Desai, Manisha Marathe. **Combining Context-Free and Contextualized Representations for Arabic Sarcasm Detection and Sentiment Identification** (*WANLP EACL 2021*)

3. Atharva Kulkarni, **Amey Hengle**, Pradnya Kulkarni, Manisha Marathe. **Cluster Analysis of Online Mental Health Discourse using Topic-Infused Deep Contextualized Representations** (*LOUHI EACL 2021*)

4. **Amey Hengle** Atharva Kulkarni, Nachiket Bavadekar, Niraj Kulkarni. and Rutuja Udyawar. **Smart Cap: A Deep Learning and IoT Based Assistant for the Visually Impaired** (*ICSSIT 2020*)

Experience

IIT Delhi   **New Delhi, India**
Predoctoral Researcher / Research Associate | Advisor: Prof. Tanmoy Chakraborty   *June 2023 – Present*

- Developed a parameter-efficient, adapter-based LLM fine-tuning framework for handling implied stereotypes in counterspeech generation. Improved the SOTA by **3 Rouge** and **4 Meteor** points.
- Devised a PLM-based, composite reward function to align the LLM outputs towards being non-toxic and persuasive. Improved over baseline by **3% and 4% in toxicity and argument quality** scores, respectively.
- Developed a novel prompt-based method with auto-calibrated chain-of-thoughts for evaluating counter-arguments using LLMs. Improved alignment scores with human ratings by **3 spearman's rank and kendal-tau** points.

SKIT.ai   **Bengaluru, India**
Machine Learning Engineer | Manager: Abhinav Tushar   *August 2021 – June 2023*

- Developed a context-aware, multi-task model to improve dialog act classification (DA) on production data by 9% .
- Open sourced Skit's (spoken language understanding (SLU) toolkit). Integrated the toolkit's dialog act classification (DA) and slot filling (SF) pipelines. Also worked on label-noise detection and unsupervised intent discovery.
- Trained and deployed a neural audio-noise classifier to handle noisy ASR transcripts.
- Leading a project in audio data augmentation using mixup training strategies.

IIT Bombay   **Mumbai, India (remote)**
Research Collaborator | Advisor: Prof. Rashmi Gupta   *August 2022 – Present*

- Curated a novel dataset for mental health and well being analysis from social media data. Worked on linguistic analysis and classification of depression-anxiety comorbid posts from social media.
- Working on **explainable deep neural networks** identifying depression cues from social-media posts.

Optimum Data Analytics   **Pune, India**
— ***ML & NLP Research Intern*** | *Advisor: Rutuja Udyawar*   *August 2020 – Dec 2020*

- Involved in the end-to-end R&D of BuddyBot, a **stress-relieving chatbot** for mental health patients. Improved the chatbot's topic and **dialogue act classification** pipeline using attention-based models. Designed an attention ensemble **CNN-BiLSTM** model for technical domain identification of Marathi texts. (*paper: ICON'20*)***(Shared Task Winner!)***

— ***Capstone Intern***   *August 2019 – April 2020*
- Worked on ODA's flagship venture, **'Bindu Smart Cap'** – a multimodal AI agent designed to assist visually impaired people. Implemented image captioning, face recognition, and OCR. (*paper: ICSSIT'20*) (*video demo*)

Selected Projects

Multi-input, Multi-task Transformer for dialog act classification (DA)

- Designed a transformer-based model to augment a user utterance with dialog history information
- Trained an auxiliary task of domain identification given utterance, improving the classification accuracy by over 9%, beating multiple in-house benchmarks for DA.
- Deployed the model to production kubernetes clusters, where it now handles over a million requests per week.

Hierarchical CNN model with self-attention for audio-noise classification.

* Trained an audio neural classifier using hierarchical 1D-CNNs for classifying noisy automatic speech recognition (ASR) transcripts.
* Integrated the audio classifer with Skit's spoken language understanding (SLU) framework, leading to a robust architecture, and an improved dialog act classifcation (DA) and slot filling (SF) performance

An Attention Ensemble model for Marathi Text Classification (code)

* Worked on a Hybrid CNN-BiLSTM Attention Ensemble model for the task of coarse-grained automatic technical domain identification of short texts in the Marathi Language.
* Our system ranked 1st for the TechDoFication Shared Task organized at ICON 2020. (link)

Topic-infused Deep Contextualized Representations

* Worked on a document representation technique that augments LLMs embeddings with LDA topics using decopuled autoencoders. Used it with HDBSCAN for cluster analysis of discussions related to PTSD on Reddit. (*paper: LOUHI EACL'21*)
* Performaned analysis of discussions related to PTSD on Reddit.
* Improved clustering using HDBSCAN and dimensionality reduction using UMAP.

Dynamic Sea Route Optimization (code)

* Designed Algorithms for finding the distance-based optimal sea route using Depth First Search (DFS), Dynamic Programming (DP), and Beam Search.
* Published *nautical-calculations*, a first-of-its-kind python library that implements the theoretical geo-spatial calculations such as bearing angle, rhumb line and great-circle distance in python.

Extracurricular Experience

- Volunteer: **EACL 2021**, **NAACL 2021**.
- Open Source Contribution: *Language-understanding-toolkit*, *nautical-calculations*, *dialog-systems*

Achievements and awards

- Winner of the ICON 2020 **TechDoFication shared task**.
- Runner up at the **EACL WANLP 2021 shared task**.
- Second place at the **ZS Prize Competition** (link) amongst 33,000 participants. Won a cash prize of **2,00,000 INR** for the project Smart Cap.
- Second place at **ASPIRE 2020**, a national level project competition organized by Computer Society of India (CSI) for Bachelor's Thesis Project.

Achievements and awards

- **Languages:** Python, C++, Golang, SQL
- **Libraries & Frameworks:** Pytorch, Tensorflow, Huggingface, KerasRL, Tensorforce, Scikit-learn, NLTK, Spacy, Gensim, OpenCV, Kubernetes
- **Tools:** Git, Latex