Swarup Ranjan Behera

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AREAS OF EXPERTISE

- **NLP**: Conversational AI, Document Summarization, Sentiment Analysis, Machine Translation, Question Answering, Named Entity Recognition, Semantic Role Labeling, Cross-Lingual Understanding, Low-Resource Language Processing, Adversarial Attacks and Defenses, Generative AI, and Large Language Models (LLM).

- **Audio**: Multimodal Audio Analysis, Sound Event Detection and Classification, Automatic Audio Captioning, Language-Based Audio Retrieval, Audio Question Answering, Adversarial Attacks and Defenses in Audio, Generative Audio Models, Music Information Retrieval, and Environmental Sound Analysis.

- **Computer Vision**: Image Captioning, Visual Question Answering, Audio Visual Question Answering, Transfer Learning and Pretrained Models, and Cross-Modal Integration.

EXPERIENCE

- **Reliance Jio AICoE** — Hyderabad, India
  Senior Research Scientist — *Sep 2021 - Present*
  - **Call Audit Automation**: Automated system for extracting both speech and text-based analytics from the daily influx of calls received at the call center.
    Contribution: Established a pipeline dedicated to collecting, processing, normalizing, and augmenting call center text data. Trained probabilistic language models for ASR systems, leveraging the generated text. Executed sentiment analysis with reasoning on call center call transcripts to uncover customer and agent sentiments as well as reasons both during and after calls, with the aim of enhancing the overall customer experience.
  - **RF Hospital Automatic Speech Recognition**: A tool created to assist doctors in converting spoken patient information into written notes.
    Contribution: Set up a dedicated pipeline for the collection, processing, normalization, and augmentation of clinical text data. Trained probabilistic language models to enhance ASR systems, using the generated text data.
  - **PDF Chatbot**: LLM-powered chatbot system specialized in processing and extracting information from PDF documents. It allows users to ask questions, give commands, or obtain feedback from their PDF files.
    Contribution: Executed the project's end-to-end implementation, covering chatbot architecture design, NLP integration, and PDF parsing capabilities. The chatbot efficiently extracts, interprets, and provides information from PDF files, streamlining document retrieval and enhancing user experiences with large volumes of PDF data.
  - **Text to SQL**: AI system powered by LLM for converting user queries in natural language into SQL queries. It enables users to express their database queries in plain language, improving query accessibility and usability.
    Contribution: Developed two frameworks utilizing LLM for Text to SQL conversion. Designed the architecture, integrated NLP techniques, and optimized the models for accurate SQL query generation.
  - **RASA Voice Bot**: A voice-bot capable of engaging in human-like dialogue, capturing context, and delivering intelligent responses.
    Contribution: Developed a voice assistant by using the RASA framework. This involved creating conversational models, context management, and integration of natural language understanding for contextual responses.

- **Reliance Jio AICoE** — Hyderabad, India
  Research Intern — *Jun 2021 - Aug 2021*
  - **Cricket Analytics for Mumbai Indians**: Developed an end-to-end framework for cricket text commentary collection (from ESPNcricinfo and IPLT20 websites), processing, normalization, and augmentation for ASR.

- **IIT Guwahati** — Guwahati, India
  Teaching Assistant — *Jul 2013 - Dec 2020*
  - **Courses**: Software Engineering (Fall-2018, Fall-2019), Design and Analysis of Algorithms (Fall-2017), Computer Vision using Machine Learning (Fall-2016), Discrete Mathematics (Fall-2015), Probability and Linear Algebra (Spring-2014), Data Communication (Fall-2013).
  - **Labs**: Database (Spring-2015, Spring-2016, Spring-2020, Fall-2020), Computing (Spring-2017, Spring-2018, Spring-2019), Data Structures (Fall-2014).

EDUCATION

- **PhD in Computer Science and Engineering (NLP/Statistical ML)** — Guwahati, India
  IIT Guwahati (Thesis: Learning Player-specific Strategies using Cricket Text Commentary) — *Jul. 2015 – Sep. 2021*

- **M.Tech in Computer Science and Engineering** — Guwahati, India
  IIT Guwahati (CPI: 7.99) — *Jul. 2013 – Jun. 2015*

- **B.Tech in Computer Science and Engineering** — Burla, India
  VSSUT Burla (CPI: 8.30) — *Jul. 2008 – Jun. 2012*

PUBLICATIONS

- **S. R. Behera**, K. M. Injeti, J. S. K. Patibandla, P. K. Pokala, A. M. Tripathi, P. B. Reddy, , G. Duggal, and S. R. M. Prasanna, *AQA-LLM: A Scalable Automated AQA Data Generation Framework Using Large Language Model*, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2024. (Submitted) [Core Rank=A^*]

- A. M. Tripathi, **S. R. Behera**, O. J. Pandey, and R. Hegde, *Few-shot Audio Classification Using An Enhanced Lightweight Prototypical Network*, IEEE/ACM Transactions on Audio, Speech and Language Processing (TASLP), 2023. (Submitted) [H-Index=66, Impact Factor=4.364]

- **S. R. Behera**, P. B. Reddy, A. M. Tripathi, B. R. Megavath, and T. Karavadi, *Towards Multi-Lingual Audio Question Answering*, Conference of the International Speech Communication Association (INTERSPEECH), 2023. [Core Rank=A^*]

- A. M. Tripathi, **S. R. Behera**, and K. Paul, *Reverse Adversarial Attack To Enhance Environmental Sound Classification*, IEEE International Joint Conference on Neural Networks (IJCNN), 2022. [Core Rank=A]

- A. M. Tripathi, **S. R. Behera**, and K. Paul, *K-Defensive Bit Planes: Defense Against Adversarial Attacks*, IEEE International Joint Conference on Neural Networks (IJCNN), 2022. [Core Rank=A]

- A. M. Tripathi, **S. R. Behera**, and K. Paul, *Investigation of Performance of Visual Attention Mechanisms for Environmental Sound Classification: A Comparative Study*, IEEE International Joint Conference on Neural Networks (IJCNN), 2022. [Core Rank=A]

- A. M. Tripathi, **S. R. Behera**, and K. Paul, *Adv-IFD: Adversarial Attack Datasets for An Intelligent Fault Diagnosis*, IEEE International Joint Conference on Neural Networks (IJCNN), 2022. [Core Rank=A]

- **S. R. Behera** and V. S. Vedula, *Mining Temporal Changes in Strengths and Weaknesses of Cricket Players Using Tensor Decomposition*, In proceedings of the 28th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN), Bruges, Belgium, 2020. [Core Rank=B]

- **S. R. Behera**, P. Agrawal, A. Awekar and V. S. Vedula, *Mining Strengths and Weaknesses of Cricket Players Using Short Text Commentary*, 2019 18th IEEE International Conference On Machine Learning And Applications (ICMLA), Boca Raton, FL, USA, 2019. [Core Rank=C]

- **S. R. Behera** and V. S. Vedula, *Learning Strength and Weakness Rules of Cricket Players using Association Rule Mining*, In proceedings of the 8th Workshop on Machine Learning and Data Mining for Sports Analytics (MSLA), ECML-PKDD Workshop, Virtual, 2021.

- **S. R. Behera** and V. S. Vedula, *Stats Aren't Everything; Learning Strengths and Weaknesses of Cricket Players*, In proceedings of the 7th Workshop on Machine Learning and Data Mining for Sports Analytics (MSLA), ECML-PKDD Workshop, Ghent, Belgium, 2020.

- **S. R. Behera**, *Performance Analysis of Batsman against Spin Bowling and Fast Bowling in Cricket*, Ohio State Sports Analytics Association Conference (OSUSAAC), Columbus, United States, 2020. (*Best Research Award*)

- **S. R. Behera** and V. S. Vedula, *Video Data Do More. Tracking Data Do Much. Text Commentary Data Do Much More*, Carnegie Mellon Sports Analytics Conference (CMSAC), Pittsburgh, United States, 2020.

Programming Skills

- **Languages**: Python, R, C, Matlab, SQL
- **Others**: PyTorch, FastText, spaCy, Flair, AllenNLP, TextBlob, Core NLP, Gensim, NLTK, Huggingface, Fairseq, Pandas, NumPy, SciPy, Scikit-learn, Seaborn, Matplotlib, Plotly, R Shiny

Miscellaneous

- **Best Research Award**: Ohio State Sports Analytics Association Conference (OSUSAAC), 2020, Columbus, USA
- **GATE 2013**: All India Rank 696 (99.68 percentile)
- **Program Committee Member**: ECML-PKDD 2020
- **Reviewer**: IEEE VIS 2020, IEEE VIS 2021, IEEE VIS 2022
- **Grants and Fellowships**: MHRD Government of India Fellowship for MTech and PhD
- **Organizer**: Advaya 2015, PG cultural festival at IIT Guwahati
- **Technical Officer**: Student gymkhana council 2014-2015 at IIT Guwahati

Interests

Sports Analytics, Movie Making