Bipasha Sen

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Research Interests

Multimodal Perception, Self-Supervised Learning, Computer Vision

Education

K.C.College of Engineering, University of Mumbai Jul 2012 - Jun 2016
B.E. in Computer Engineering (8.13/10, First Class with Distinction)

- Thesis: Reinforced and Collaborative Music Recommendation
- Relevant classes taken:
  CPC 703 Artifical Intelligence
  CPE 7023 Image Processing

Kendriya Vidyalaya O.N.G.C. Panvel Apr 2011 - Mar 2012
12^{th} C.B.S.E (82%)

Research Experience

Microsoft Research & Development 2016 - Present
Data Scientist II (Microsoft's Search and Assisted Intelligence) - Outlook Platform

- **Self-Supervised Meeting Summarization (BReSQ)**
  - Building a **self-supervised** framework called BReSQ to generate summaries of long meetings with multiple participants and speakers. **B**revity to reduce the transcript to a short latent space. **Re**levance to evaluate if the summary contains the key points of the meeting. **S**pan to keep the summary from getting too short. **Q**uality to enable readability.
  - Using a combination of **Autoencoders, Generative Adversarial Networks**, and pretrained Question-Answering model.
- **Inline Suggested Attachments**
  - Responsible for building a **high-precision classification model** for the suggestion of potential document as attachments to a half-composed email. Correct suggestion reduces the number of clicks to attach from 4 to 1.
  - My tasks involve analyzing user behavior and discovering non-linear patterns on the dataset to determine the file-type, user-file-affinity of the intended attachment based on limited context (half-composed emails).
- **Meeting Insights Relevance**
  - Responsible for building a **high-recall classification model** for the recommendation of relevant email to meetings.
  - Using AiGraph, a knowledge graph generated using Outlook data, to generate the candidates for recommendation;
  - Using **Graph Neural Networks** to generate embedding (cached); Using simple linear models (to meet the extremely low-latency requirements of 200ms) on the embedding plus 150 handcrafted features for ranking and classification.
  - Training model on a weakly-supervised and massively-imbalanced big data ($\sim$45M unlabelled data, $\sim$ 72k positive data).
  - Meeting Insights power recommendations for more than 100 million users per month.
- **Detection of Business Trips**
  - Planning a trip leads to multiple reservations: Flights, Hotels, Cabs, etc. Keeping track of the several bookings is a taxing job. Trips solve the problem by showing all booking relevant to a trip on a single page.
  - Single-handedly developed the convoluted **algorithm** to club multiple disjoint Flight, Hotel, Bus, and Cab reservation emails on Outlook to form a single logical entity representing an end-to-end trip.
- **Scalable non-template based approach for information extraction on Machine Generated Emails**
  - Developed a **scalable** approach for extracting key information such as Invoice amount, Account number, Due Date from long machine-generated emails. No dependency on sender templates (airbnb.com, icici.com, etc.). Using Microsoft's Program Synthesis using Examples (PROSE) for scalable extraction.
  - Developed an automated pipeline to monitor the soundness of the extracted information.

International Institute of Information Technology - Hyderabad Oct 2019 - Jul 2020
Visiting Researcher - Speech and Vision lab, LTRC

- **Reed: An Approach Towards Quickly Bootstrapping Multilingual Acoustic Models**
  Built a multilingual acoustic model for low resource Indian Languages: Gujarati, Tamil, and Telugu. Used Kaldi for data pre-processing and pytorch-Kaldi for training convolutional neural networks on raw speech signals.

Microsoft Research & Development Dec 2015 - Feb 2016
Data Scientist - Intern (Search Technology Center India)

- **Conversational Shopping Assistant Bot**
  - Built a conversational bot tasked for proactively engaging the users and assisting them in placing an order.
  - Developed the bot from scratch trained by **reinforcement learning**. Defined the optimal policy & reward and integrated Microsoft's Multi-World Testing (MWT), a reinforcement learning-based framework.
  - *Project demoed to David Ku (former CVP and CTO of Microsoft AI+R).*

Publications

Reed: An Approach Towards Quickly Bootstrapping Multilingual Acoustic Models, paper
Bipasha Sen, Aditya Agarwal, Mirishkar Sai Ganesh, Anil Kumar Vuppala
Spoken Language Technology (SLT 2021) [to-be published]

An Approach Towards Action Recognition using Part Based Hierarchical Fusion, paper
Bipasha Sen, Aditya Agarwal
International Symposium on Visual Computing (ISVC 2020)

Sub-Reviewer for ECIR, COMAD, DAFSAA, MLADS - SYNAPSE

Microsoft's Machine Learning and Data Science (MLADS) Publications

Sentence Modelling for Contextual Meeting Segmentation, short-paper
Jay Paranjape, **Bipasha Sen**

AiGraph for Meeting Insights Relevance, short-paper
Bipasha Sen, Prakash Pandey, Rajeev Gupta, Vipin Vangala

Major projects

Reinforced and Collaborative Music Recommendation 2016
Undergraduate Thesis

- Developed an agent that recommended music from the song-library on the mobile phone. The agent continuously learned and evolved based on collaborative (users with similar behavioral patterns) feedback.
- Created a music player with the agent in the backend, supervised a group of 10 people who used the music player for over one month, and observed their behavior and feedback.
- Received the highest O (Outstanding) grade.

Anterior Segment Imaging (MIT Media Lab's REDX Camp) 2015

- REDX is an interdisciplinary platform to enable collaboration between world-renowned medical professionals and engineers to build solutions for society's most pressing healthcare challenges.
- Worked in collaboration with India's leading Eye-Institute, LVPI.
- Developed a low-cost, solid-state device with no moving parts, as a replacement for heavy and bulky Ophthalmic Slit Lamp, to capture and reconstruct a 3D visual model of a patient's cornea (the anterior segment of the eye) reflecting the abnormalities in the cornea.

TheBhaad: Cloud-Based Group-Oriented file-sharing network (video) 2014

- Single-handedly developed a fully-fledged cloud-based file-sharing network with windows like user-interface. Features: Search, Contacts, Groups (Classrooms), Personalized Document Alignment, Discussion Forum.

Awards and Achievements

Spot award for Innovation and Impact by Microsoft MSAI.	January 2021
Invited for talk at MLADS on Quick Bootstrapping of Multilingual Models	July 2020
3rd in Microsoft One Week Hackathon - Mobile Endpoint (3k+ participants)	August 2016
126th in TCS CodeVita '15 Round 2 (19800+ participants)	February 2016
Best Student of the Year (One out of 600+ graduating students)	February 2016
Best Entrepreneur (as the founder of TheBhaad that hosted 5000+ users)	March 2015

Skills

Languages	Python, Spark.net, SQL, C#, C/C++, HTML, CSS, jQuery
Framework	Pytorch, Tensorflow, scikit-learn, pytorch-Kaldi, Kaldi
Techonologies	Apache Spark and HDIInsight, Full-Stack Web Development
Tools	TLC (The Learning Code), Adobe Premiere Pro

Extra-Curricular

I am a musician: vocalist, guitarist, and composer. I've toured around India along with my previous band, Andrometa. I've also traveled to 6 countries, 11 states solo over a period of 5 months and interviewed 70+ independent music bands (180+ artists) about their struggles as independent artists.