Sunipa Dev

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Education

- **University of Utah** Aug 2016 – Dec 2020
  PhD Computer Science; Advisor : Jeff M Phillips *Salt Lake City, UT*
  - **Coursework:** Data Mining, Machine Learning, Advanced Algorithms, Data Visualization, NLP, Databases
- **Indian Institute of Science Education and Research, Kolkata** Jul 2011 – Jun 2016
  Integrated Bachelors and Masters in Mathematics and Statistics *Kolkata, India*
  - **Coursework:** Differential Geometry, Topology, Statistical Inference, Probability, Stochastic Processes

Recent Projects

- **Closed Form Word Embedding Alignment** University of Utah
  - Formulated linear transformation between two high dimensional embeddings based on single iteration rotation, translation and scaling to align embeddings generated from different mechanisms (GloVe, Word2Vec) for boosting word embedding performance and multilingual translations with >80 % top 10 accuracy.
- **Subspace Isolation in Word Representations for Bias Mitigation** University of Utah
  - Developed methods to detect the subspaces encoding social biases such as gender, race and age related biases in word representations and also to reduce these biases by projection based methods.
  - Extended methods of subspace detection to noisy embeddings such as user representations in e-commerce settings.
- **Measuring and Mitigating Biased Inferences of Word Embeddings** University of Utah
  - Developed a probe using the extrinsic measure of textual inference to measuring bias in word embeddings
  - Extended methods of detecting and reducing bias in contextual word embeddings ELMo and BERT.
- **Orthogonalize Concept Subspaces and Rectify Biases in Word Embeddings** University of Utah
  - Minimized the meaningful information by instead orthogonalizing concept subspaces which should not have interdependence such as gender and professions. Preserved $> 15\%$ more correctly gendered information than other debiasing techniques, while debiasing to the same extent.

Internships

- **Building Interest Specific Embeddings for a User** Microsoft Bing Ads
  Manager: Yi Zhang; Mentor: Haijing Wang *June 2020 - Aug 2020*
  - Built distinct and adaptive user embeddings for instantaneous personalization based on their preferences, analogous to the contextual vector representations of polysemous words. (Work submitted to WWW)
- **Disentangling Features from Transaction Embedding Space** VISA Research
  Manager: Wei Zhang; Mentor: Yan Zheng *May 2019 - Aug 2019*
  - Built merchant and user embeddings from transaction data for improved reccommendation systems
  - Reduced interdependence of subspaces of cuisine and location from the embedding from 99% to 68% for better translation of user behavior patterns **(patent filed)**

Publications

- **S. Dev**, T. Li, J.M. Phillips and V. Srikumar; "On Measuring and Mitigating Biased Inferences of Word Embeddings"; AAAI 2020, New York City, USA; (oral presentation)
- **S. Dev**, S. Hassan, J.M. Phillips; "Closed Form Word Embedding Alignment"; ICDM 2019, Beijing, China; (oral presentation) **Invited to Special Issue of KAIS for Best Papers**
- **S. Dev**, J.M. Phillips; "Attenuating Bias in Word Vectors"; AISTATS 2019, Okinawa, Japan; (oral presentation)
- **S. Dev**, T. Li, J.M. Phillips and V. Srikumar; "OSCAR: Orthogonal Subspace Correction and Rectification of Biases in Word Embeddings"; under review;

Teaching and Awards

- Teaching Mentee for Data Mining (Spring 2018, 103 students) and Foundations of Data Analysis (Fall 2017, 43 students) : conducted lectures, tutorials, project evaluations and office hours
- **Computing Innovations Fellowship** Award Recipient 2020 (by CRA and NSF; 10% selection rate);
- Grace Hopper Scholar 2019;