Usman Shahid

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Current research

I am currently interested in studying multimodal machine learning. Specifically, I am working towards developing methods that improve knowledge transfer between modalities (co-learning, cross-modal transfer, etc.)

Education

- **University of Illinois at Chicago (UIC)**
  Chicago, IL
  PhD candidate (Computer Science)
- **National University of Computer & Emerging Sciences (FAST-NU)**
  Lahore, Pakistan
  BS(Hons) in Computer Science

Professional Experience

2019- **Research Assistant**
University of Illinois at Chicago (UIC)
Doing my thesis research with Dr. Natalie Parde on multi-modal learning, specifically cross-modal transfer learning and co-learning. Previously, I have worked on medical notes parsing and media bias.

2021 **Applied Science Intern**
Amazon
Interned with the Estimated Defect Modeling (EDM) team at Alexa AI. My work entailed building and evaluating neural multi-modal models to automatically identify which component of Alexa failed during a customer interaction.

2018-2019 **Research Assistant**
University of Illinois at Chicago (UIC)
Conducted research with Dr. Elena Zheleva on model dependence in causal inference from observational network data. In addition to that, I worked on automated moral frame detection in news media.

2016-2017 **Research Assistant**
Technology for People Initiative (TPI) Lab,
Lahore University of Management Sciences (LUMS), Lahore, Pakistan
Besides doing research work on intrinsic plagiarism & content spam detection, media analytics and event mining, I helped create a generic system for visualizing tabular data called Statistan and created an NLP pipeline for automatically annotating news articles called Moodistan.

2015 **Research Associate**
Neighborhood for Emerging World Technologies (NEWT) Lab
Information Technology University (ITU), Lahore, Pakistan
Conducted research on Information and Communication Technologies for Development (ICT4D) and helped develop tools (VillageApps & SpeakMyText) to facilitate underprivileged communities.

Publications

- Khaziev R., **Shahid U.**, Röding T., Chada R., Kapanci E., Natarajan P. (2022 July). FPI: Failure Point Isolation in Large-scale Conversational Assistants. In the *Annual Conference of the North American Chapter of the Association for Computational Linguistics, (NAACL'22)*
- **Shahid U.**, Di Eugenio, B., Rojecki A., Zheleva E. (2020 July). Detecting and understanding moral biases in news. In the *Association for Computational Linguistics workshop on Narrative Understanding, Storylines, and Events, (ACL-NUSE'20)*
- **Shahid U.**, Zheleva E. (2019 March). Empirical study of model dependence in counterfactual learning from networks. In the *AAAI Spring Symposium on Beyond Curve Fitting - Causation, Counterfactuals and Imagination-Based AI (2019)*
- **Shahid U.**, Farooqi S., Ahmad R., Shafiq Z., Srinivasan P., Zaffar F. (2017 Nov.). Accurate Detection of Automatically Spun Content via Stylometric Analysis. In the *IEEE International Conference on Data Mining (IEEE ICDM'17)*
- Rafaqat A., **Shahid U.**, Ali M., Ho J. (2017 March). High-level Concepts for Affective understanding of Images. In the *IEEE Winter Conference on Applications of Computer Vision (IEEE WACV '17)*
- Ghaznavi I., Randhawa S., **Shahid U.**, Saleem B., Saif U. (2016 Nov.). Speakmytext: A platform to support crowd-sourced text-to-audio translations. *In proceedings of the first International Conference AfriCHI (AfriCHI, an ACM SIGCHI in-cooperation conference)*
- Ghaznavi I., Muneer U., **Shahid U.**, Randhawa S., Ali K., Parikh T., Saif U. (2015 May). VillageApps: a platform to educate underprivileged communities in their mother tongue. *In proceedings of the Seventh International Conference on Information and Communication Technologies and Development (ACM ICTD '15)*

Projects

Failure Point Isolation in Alexa
As a summer intern at Amazon, I worked on automatically identifying errors in different modules of Alexa (speech recognition, language understanding etc.). These errors can potentially cascade through the system and are infeasible to manually analyze given the large volume of traffic. I assisted the Estimated Defect Modeling (EDM) team in creating a transformer based model which utilizes request, context and additional metadata to automatically identify the Alexa module that failed during a customer interaction. Besides creating a scalable PyTorch Lightning based framework for training and evaluation of models, I performed analysis on the results and ablation studies to identify the effectiveness of different training approaches and encoders. This work was published in NAACL'22.

Clinical Variable Extraction
I worked in collaboration with a team of researchers at UIC on the extraction of clinical variables from free-form medical notes of CoViD patients. Besides assisting with the creation of a dataset and annotation protocol, I have employed state of the art language models to automatically label clinical variables which would help medical experts in further analysis and informed decision making.

Causal Inference from Network Data
Worked on developing an understanding of model dependence as a result of network representation and matching method used in estimating causal effect from observational network data within the potential outcomes framework. This work was published in AAAI Spring Symposium (2019) on Beyond Curve Fitting - Causation, Counterfactuals and Imagination-Based AI

Frame Analysis
Developed methods for automated frame analysis based on Moral Foundations Theory (MFT) to reveal biases in news sources. As a part of this research, I developed methods for frame detection and helped with the creation of novel datasets to identify and analyze moral frames across a spectrum of social issues. This work was published in ACL-NUSE (2020).

Text Spinning
Developed a framework for detecting text spinning on the web by using a combination of intrinsic and extrinsic plagiarism detection techniques that employ supervised machine learning. I have studied plagiarism detection and spinning methodologies, designed and performed multiple experiments for the generation, analysis, and detection of spun content. This work was published in ICDM (2017).

Media Analytics
Worked at TPI, LUMS on Statistan; a generic web-based data portal which facilitates visualization, management, and distribution of data. I also created a Media Analytics (NLP) pipeline to study social trends such as changes in attitudes and reporting biases. Using this pipeline I have developed Moodistan, an end-to-end, distributed Aspect Based Sentiment Analysis (ABSA) system with the ability to extract entity aspect pairs and perform sentiment analysis on large volumes of data from different sources of news and social media. By extending this pipeline, I also created an event extraction system to mine events of interest from newspapers.

Affective Image Understanding
Worked with Dr. Mohsen Ali at ITU to explore the relationship between image content and the viewer's emotional response by using High-Level Concepts (HLCs). I have computed and analyzed high level features of images such as objects and places and used them to predict emotion distributions using SVR based machine learning models. This work was published in IEEE-WACV (2017).

ICT for Education
Worked with Dr. Umar Saif at NEWT Lab, ITU to develop VillageApps in order to help educate the underprivileged communities through content translation and SpeakMyText to facilitate people with reading disabilities. Case studies were published in ICTD 2015 and Africhi 2016.

Moodle Extension for OpenCourseWare
For my undergraduate thesis, I helped extend Moodle Learning Management System (LMS) to connect independent Moodle installations in a Semantic Overlay Network (SON). I have designed and implemented the SON layer which enabled efficient search within the shared content by clustering together semantically related nodes.

Rescue Base Station
As a part of my internship at NEWT lab I worked on Rescue Base Station (RBS) project. RBS is a drop-in, solar power compatible, open-source GSM communication system. It is designed to expedite relief efforts by intelligently connecting people through conventional GSM services in a calamity struck area. I designed and implemented call and SMS based services which were an important component of this project.

Technical Skills

Languages:	Python, C/C++, Rust, Java, javascript, MATLAB script
ML Libararies:	PyTorch, Pytorch Lightning, Keras, sklearn
Web.:	ROR, Firebase, React, NextJS
Misc.:	MySQL, RabbitMQ, SFML, Bevy