Gagandeep Singh

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WORK EXPERIENCE

PROFESSIONAL

Machine Learning Engineer, Yaar Inc. Jan 2018 – Present

- Currently working full-time with a Toronto based start-up that is developing a smart virtual assistant. I work on developing the speech interface for the assistant.
- Projects worked on include: keyword-spotting, speaker verification (text dependent and text independent), and text-to-speech synthesis. I have been the only full-time employee working on all the projects mentioned below.
- *Keyword spotting*: Used CNNs for developing low-footprint keyword spotting model using Tensorflow that runs natively in javascript. It has already been deployed to our system.
- *Text-independent Speaker Verification*: Used TDNNs for developing text-independent speaker-verification system that is built as a C++ library using Kaldi backend. It has also been deployed to our system.
- *Text-independent speaker Verification*: Currently working on creating a text-dependent speaker verification system using LSTMs, built using Tensorflow.
- *Text-to-speech synthesis*: Worked on text-to-speech synthesis using an autoregressive deep neural network architecture built using pytorch. The system can generate intelligible speech, however the fine-tuning is still in progress.
- Designed the speech pipeline for our product, which includes integrating the fully finished components mentioned above along with using a third party API for speech recognition (ASR).
- Other responsibilities include working closely with the engineering team for deployment of the developed ML components, and with the NLP and computer vision teams in brain-storming new ideas and providing feedback.

Part-time consultant, Speax Inc. May 2017 – Jun 2017

- Worked with a Toronto based start-up to enhance the speech recognition component for an iOS application. The application used CMU sphinx library for implementing the ASR.

RESEARCH

Research Assistant, Computational linguistics group, University of Toronto Jun 2016 – Dec 2017

- Built a text-to-speech synthesis system using linear dynamical and autoregressive models.
- The project involved developing continuous state space acoustic models for TTS and and comparing their performance with deep neural network based models.
- Supervisor: Prof. Gerald Penn, Professor, Department of CS, UofT

Side Project, Vector Institute, Toronto Sep 2018 – Present

- Collaborating with a PhD student at the Vector Institute on a language modelling project.
- The project aims to improve upon some of the limitations of language models due to training using hard ground truths at each time step.
- Collaborator: Arvid Frydenlund, Vector Institute

Research Assistant, Network Research Laboratory, University of Toronto Aug 2015 – May 2016

- Added components to Lotos, a simulation software tool written in Java for building overlay networks. Implemented CSMA-CA protocol for wireless nodes and added option for generating multiple tracks for simulating wireless nodes installed on trains.
- Supervisor: Prof. Jörg Liebeherr, Professor, Department of ECE, UofT

Bachelor's Thesis Project, IIT Guwahati Aug 2014 – May 2015

- Using a simple rateless encoding scheme, several opportunistic multicast routing algorithms were proposed and their performance was studied in test networks using simulations.
- Supervisor: Prof. Sanjay K. Bose, Professor, Department of EEE, IIT Guwahati

TEACHING

Teaching Assistant, University of Toronto Sep 2015 – Dec 2017

- Worked as a teaching assistant for the following courses:
  - Advanced Engineering Mathematics
  - Introduction to Computing
  - Electrical Fundamentals

EDUCATION

M.Sc. Computer Science Jun 2016 – Dec 2017
University of Toronto, Toronto

- Research Area: Computational Linguistics
- Supervisor: Prof. Gerald Penn
- Focus: Statistical parametric text-to-speech synthesis

B.Tech. Electronics and Communication Engineering Jul 2011 – May 2015
Indian Institute of Technology Guwahati, Guwahati, India

- Cumulative GPA: 9.27/10.00

TECHNICAL SKILLS

- Languages: Python, C++/C, Matlab
- Frameworks: Tensorflow, PyTorch, Kaldi
- General: speech processing, signal processing, natural language processing, machine learning

PUBLICATIONS

- Singh, Gagandeep; **"Speech Synthesis Using Linear Dynamical Models"** (Master's thesis) *University of Toronto*, Dec. 2017
- Singh, Gagandeep; Landau, Lukas; Fettweis, Gerhard; **"Finite Length Reconstructible ASK-Sequences Received with 1-bit Quantization and Oversampling"** *SCC 2015; 10th International ITG Conference on Systems, Communications and Coding; Proceedings of*, vol., no., pp.1,6, 2-5 Feb. 2015
- Das, Priyanka; Mehta, Neelesh B.; Singh, Gagandeep; **"Novel Relay Selection Rules for Average Interference-Constrained Cognitive AF Relay Networks"** *Wireless Communications, IEEE Transactions on*, vol.PP, no.99, pp.1,1
- Shankar, G. Barath; Singh, Gagandeep; Bose, Sanjay K.; Zhong, Wende, **"Multicasting in Wireless Networks using Rateless Codes and Opportunistic Routing,"** *2015 10th International Conference on Information, Communications and Signal Processing (ICICS)*, Singapore, 2015, pp. 1-5.

GRADUATE COURSES TAKEN

- Inference Algorithms & Machine Learning
- Natural Language Computing
- Computational Linguistics
- Random Processes
- Software Defined Networking
- Introduction to Graph Theory
- Communication Networks

LANGUAGE PROFICIENCIES

- English: full professional proficiency
- Punjabi: native language
- Hindi: bilingual proficiency