David Bick

Research Masters student at LTI, CMU
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Education

School of Computer Science, Carnegie Mellon University AUG 2021 - DEC 2022
***M.S.** Language Technologies (CPA: 3.83/4.00)*
Advisor: Prof. Bhiksha Raj

Dietrich College, Carnegie Mellon University AUG 2016 - MAY 2020
***B.S.** Statistics and Machine Learning (CPA: 3.73/4.00)*

Peer-Reviewed Publications

- Muqiao Yang*, Joseph Konan*, **David Bick***, Anurag Kumar, Shinji Watanabe, Bhiksha Raj. "Improving Speech Enhancement through Fine-Grained Speech Characteristics". In **InterSpeech 2022**.
- Yunyang Zeng*, Joseph Konan*, Shuo Han*, **David Bick***, Muqiao Yang*, Anurag Kumar, Shinji Watanabe, Bhiksha Raj. "TAPLoss: A Temporal Acoustic Parameter Loss For Speech Enhancement". In **ICASSP 2023**.
- Muqiao Yang*, Joseph Konan*, **David Bick***, Yunyang Zeng*, Shuo Han*, Anurag Kumar, Shinji Watanabe, Bhiksha Raj. "PAAPLoss: A Phonetic-Aligned Acoustic Parameter Loss For Speech Enhancement". In **ICASSP 2023**.

Research Experience

- **Carnegie Mellon University, Pittsburgh PA** *(Dec 2021 - Jan 2023)*
  Graduate Research Assistant
  - Researched literature to identify fine-grained acoustics that correlated with perceptual quality
  - Built neural estimators for non-differentiable quantities to allow use in optimizing other networks
  - Deepened the use of these features from summary statistics, to time-series, to phoneme-specific weighting of time-series

Industry Experience

- **Cerebras Systems, Sunnyvale CA** *(May 2022 - Aug 2022)*
  ML Engineer
  - Discerned the most relevant prompt-based fine-tuning method for Cerebras
  - Implemented Google Research's prompt-tuning for T5 to guide frozen language models to perform new tasks using a small amount of learnable parameters prepended to input
  - Trained T5 to convergence on SQuAD with both model-tuning and prompt-tuning

Projects

- **Towards Characterizing the Behavior of Mixture-of-Experts in NLP** *(Aug 2022 - Dec 2022)*
  *(**CMU 11-767 Course Project** under Profs. Emma Strubell and Yonatan Bisk)*
  - Conceived idea to test out-of-domain generalization of mixture-of-experts (MoE) models against lower-parameter sparse models with similar inference times
  - Ran multi-GPU distributed training for MoE BERT variant on WILDS dataset to test out-of-domain generalization
- **Prompting GPT-2 with CLIP for Multimodal QA** *(Jan 2022 - Apr 2022)*
  *(**CMU 11-777 Course Project** under Prof. Yonatan Bisk)*
  - Created pipeline to fine-tune GPT-2 on predicting answers, with text embeddings as prompts
  - Implemented end-to-end learning of a 'prefix model' that transfers multimodal CLIP embeddings to a prompt in the GPT-2 semantic space
- **Multiple Contrastive Learning for Few-Shot Text Classification** *(Sep 2021 - Dec 2021)*
  *(**CMU 11-711 Course Project** under Prof. Graham Neubig)*
  - Surveyed literature on few-shot learning and text classification, rated as 'an excellent review' by the Professor
  - Integrated a SimCSE-based contrastive fine-tuning of BERT with PET-inspired contrastive learning between input and cloze-style label prompt
  - Obtained competitive results on Yahoo Answers and AG News