Sushil Thapa

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Work Experience

- **Fusemachines**
  Machine Learning Engineer — *Sep 2017 - Dec 2020*
  - Led machine learning aspects of a **multimodal** document extraction SAAS product; improved false positive rates by 25% with uncertainty quantification and optimized inference speed by 30% with better Cache handling.
  - Investigated evolutions to a state-of-the-art **multimodal image captioning** system; improved 10% CIDEr score by using visual self-attention and enhanced similarity comparision metrics.
  - Built end-to-end pipeline of **object detection and tracking** on an NVIDIA edge device for a major appliance company; improved accuracy and mAP scores by $\sim$ 15% with pre-training on synthetic data and custom loss function, and FPS by 40% with TensorRT, quantization, and pruning.
- **New Mexico Tech, in collaboration with Los Alamos National Lab**
  Graduate Research Assistant — *Jan 2021 - Present*
  - Investigated BERT and Hierarchical Attention Networks on an extreme multi-label text classification system; improved nDCG score by 10%; investigated ideas on novel loss functions for **ranking** and automatic top-K selection.
  - Improved accuracy of a tissue classifier by 11% using **self-supervised** pretraining and knowledge transfer with TabNet; Analyzed robustness and applicability of determinants of classification from various **interpretable** machine learning algorithms such as TabNet, SHAP, LIME and Saliency maps.
  - Knowledge Distillation and its impact on transferability, interpretability, generalization, and robustness (Thesis).
- **Spark Tech Pvt. Ltd.**
  Research & Development Engineer — *Sep 2016 - Sep 2017*
  - Improved audio segmentation and tagging accuracy by 15% using audio fingerprint hashing algorithm.

Other Experiences

- **Researcher: Stanford AI Lab, Stanford University**
  Collaborated on multimodal data augmentation transfer via gradient-free optimization — *Jul 2021 - Nov 2021*
- **Robotics Engineer: Robotics and Automation Center** — Nepal
  Represented country *(Nepal) and won awards in international robotics competitions* — *Nov 2014 - Sep 2016*
- **Google DSC Lead: New Mexico Tech** — New Mexico, US
  Established and led ***Google****-recognized student club in university; organized tech events* — *Jun 2021 - Jun 2022*

Education

- **New Mexico Tech** — New Mexico, US
  Master's in Computer Science, deep learning thesis — *Jan 2021 - August 2022 (Expected)*
- **Columbia University in the City of New York**
  Artificial Intelligence MicroMasters® — *2017 - 2018*
- **Tribhuvan University, Institute of Engineering** — Kathmandu, Nepal
  Electronics and Communication Engineering, machine learning thesis — *2012 - 2016 (Attended)*

Skills

- **Languages** Python, C++
- **Tools** PyTorch, TensorFlow2 (Keras), Jax/Flax, Numpy, Pandas, OpenCV, Scikit-learn, Transformers

Projects and Misc.

- **Posture Recognition System (rectif-ai):**Built a body keypoint tracking and bad posture detection system based on Posenet for international Pytorch Hackathon 2019; improved posture keypoint classification by 30% with simple ANNs; Opensource and published: *'pip install rectif-ai'*
- **Hawaiian Automatic Speech Recognition System(Hawaiian-ASR):** Built Hawaiian language speech recognition system starting from data scraping, annotation with the forced alignment to training with DeepSpeech2; improved CTC decoding error rate by 8% using custom trained Hawaiian language models. (2017)
- **PUBLICATION:**"A Simple and Effective Baseline for Out-of-distribution detection and Robustness to Distributional Shift" 20th International Conference on Machine Learning and Applications (ICMLA), 2021, pp. 278-285
  - Currently state-of-the-art in paperswithcode.com leaderboard in vision and NLP OOD detection benchmarks
- "ICLR 2022 Highlighted Reviewer (top 10%)", "NeurIPS 2022 Reviewer"
- **Machine Learning Summer Schools:** CIFAR DLRL 2022, EEML 2022 & 2021, MLSS 2021 & 2022, PAISS 2021