HARSHVEER SINGH

8427337873 • Ludhiana, Punjab
harshveer321.code@gmail.com • Git: @llStringll • LinkedIn: @llharshveer-singhll

EDUCATION

Thapar Institute of Engineering and Technology (TIET)   July'17 - Jul'21
Bachelor of Engineering(B.E.) in Electronics and Computer Engineering

SKILLS

Data structures and algorithms, Theoretical machine learning and deep learning, Optimisation algorithms, Loss Landscape Analysis, NLP, NLI, Conversational Agents, Bayesian Inference, C, C++, Python, PyTorch, NLTK, ScikitLearn, HuggingFace, NumPy, TensorFlow, Keras, Pandas, Matplotlib, Shell scripting, Statistics, Probability, Linear Algebra.

EXPERIENCE AND TECHNICAL PROJECTS

NLP Engineer, AI Team, Mercer-Mettl   Jun'21 - Present
1. Improved inter-sentence and intra-sentence cohesion measuring pipeline precision by 25%, involved feature understanding, reducing the output feature space of BeRT by putting a posterior on latent space
2. Implemented production ready email formality checking pipeline for business environments, involved topic modeling of a raw real-life email that had noisy lexical structure, through improvised LDA
3. Analyzed on-prod spell-check pipeline and suggested and upgrade with specific fine-tuning, that increased recall and precision of the model by 13% and 32%.

NLP Engineer Intern, AI Team, Mercer-Mettl   Jan'21 - Jun'21
Worked on improving NLI models, improved cohesion detection accuracy on English text by ~16%

Deep Learning Research Intern, CMS Experiment, CERN   Jan'21 - May'21
Worked on building a quasi-linear attention model to isolate 'interesting' events from the background during the collision of protons with low-Z targets.

Research Intern, Deptt. of Mathematics, IIT-Mandi   Dec'19 - Jan'20
Provided an analytical study on the success of Batch Normalisation

Hackathons   2017 - 2018
SATURNALIA Hackathon '17 ranked 1st
PEC-FEST Hackathon '17 ranked 2nd
PEC-FEST Hackathon '18 ranked 1st

RESEARCH EXPERIENCE

Cross-layer residual connection transformer   Oct'20 - Nov'20
Developed a novel architecture, which has a recursively "smooth" loss surface, allowing the possibility of reaching more generalized minima, even in the absence of good parameter initialisation.

Adversarial Training for Facebook's Blender   June'20 - Aug'20
Created a self-play regime for conversational agents, and extending that to a competitive conversation where an agent discriminates the output distribution of the other agent against human dialogue distribution.

Poly encoder regime for fine-tuning decoder-only model (GPT-2)　　　　　　　　May' 20
Showed that a decoder model fine-tuned like such on language modeling apparently is more robust to inductive bias than encoder model even though encoder reached better recall@k/C score
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Analytical study of the success of Batch Norm　　　　　　　　　　　　　Nov'19-Dec'19
Showed that batch normalization smooths the loss surface and how it brings that effect, through the study of eigenvalues of the hessian of weight matrix. [Blog]

Beta2 variation regime for Adam Optimizer　　　　　　　　　　　　　May'18-Jul'18
Developed a regime for varying beta2 hyper-parameter of Adam, preventing Adam from getting stuck in sub-optimal minima. A similar result was also shown in a subsection of Sashank J. Reddi et al.

TALKS AND PRESENTATIONS

Causality and its importance in variational inference and EM, TIET　　　　　　　Jan '20
Inductive bias in machine learning models, TIET　　　　　　　　　　　　Oct '19
Effect of constraining the posterior to Gaussian in VAEs, PEC-FEST　　　　　Nov '17