SHARAD CHITLANGIA
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ACADEMIC QUALIFICATION
Bachelor of Engineering in **Electronics & Instrumentation**, BITS Pilani, Goa Campus, 7.79/10; Expected completion 2021

INTERNSHIPS
Safe AI Lab, Carnegie Mellon University, **Pittsburgh (Online)**   *Aug – Dec'20*
- Performing experiments on increasing perception planning of autonomous vehicles by lidar sensor placement optimization
- Designing Surrogate Cost functions to represent the position placement as an optimization problem
- Incorporation of Safety in Image Based Model Based Reinforcement Learning Methods
- Worked with Autonomous Vehicle Simulators including Carla
- Built extensive data collection and training pipelines to allow for massive experiment benchmarking

India Machine Learning, Amazon Research, Bengaluru (Online)   *May – Dec'20*
- Conducting Search Query Disambiguation and Intent Mining by prediction of attributes/facets from Historical Search Data
- Built strong frequency baselines dependent on various types of action signals telling about Customer behaviour including but not limited to Clicks, Purchases and Add to Cart
- Modelled Attribute Extraction problem in a novel value function based Reinforcement Learning Framework
- Worked with TerrascaleAmazon Search Data. Cleaning, Parsing, etc datasets with Massive Distributed/Parallel Computing Technologies - Spark, SQL and Scala.
- Created and designed Task Specific Datasets, e.g. on Query Reformulations, Query Expansions and Refinement Sets
- Created Massive Search Graphs (>1M nodes and edges, avg. degree>3) based on customer behaviour including Query Reformulation
- Performed Training of Graph Neural Networks on Search Graphs for clustering Search query behavior

Microsoft Research, New York City (Online)   *Apr – Jul'20*
One of 6 students (and 1 of only 3 undergrads) selected globally as the Principal Investigator of project; proposal accepted as part of the Reinforcement Learning Open Source Festival with a grant of US$10,000
- Integrated Flatbuffers protocols as an input format into VowpalWabbit; inference speedups increased up to by 60%
- Modified CI/CD DevOps workflows for automatic installation of flatbuffers in Docker Images
- Researched usage of flatbuffers as a file transfer and study of how size of binaries can be accessed to avoid reading the complete buffer. This benefitted by avoiding to read the complete buffer during every run and direct access of the buffer through smart pointer in flatbuffer technology. This also enabled setting up of a preamble based reading methodology resulting into a speedup of 20%.
- Assisted ___ in benchmarking efforts on flatbuffer and facilitated transition from usage of Signed Characters into Unsigned Integers to extend stability of indexing in interactions produced through inter Namespace features

APP Centre for AI Research, BITS Pilani, Goa   *Jan – Jul'20*
- Completed undergraduate project on Increasing Interpretability and Accountability of Neuro-symbolic Machine Learning models in collaboration with TCS Research, New Delhi
- Studied and applied principles from Causal Inference including but not limited to Average Causal Effect and Individual Causal Effect
- Work roughly answered the question, "How does each relational feature affect the prediction?" i.e., attribution of predictions to relational features.
- Developed and researched into iterative versions of Attribution Algorithms
- Backtracked causally attributed features to their first order relations, eg., visualized highly causal chess features on a chess board
- Currently working in reduced capacity on Causal Attribution in Graph Neural Networks. GNNs are of the simple and hypergraph variants. Graphs are created from massively collected healthcare data problems like cancerous molecule prediction, etc.

Edge Computing Lab, Harvard University, Cambridge   *Jun – Aug'19*
- Applied and benchmarked uniform and symmetrical Quantizer based Post Training Quantization techniques on state-of-the-art Reinforcement Learning algorithms such as PPO, A2C, DQN and DDPG common RL environment suites such as Gym, Atari, Pybullet, Mujoco, etc
- Performed experiments on Quantization Aware training for exploring the application of Fake Quantization processes to enable more stable RL agents
- Explored techniques such as mixed precision training, half-precision training for speeding up of reinforcement learning training
- Showed through experiments that quantization noise can result in increase of reward in traditional reinforcement learning training
- Collaborated on brainstorming, designing and evaluating experiments on speeding up distributed reinforcement learning training through a novel training algorithm, ActorQ that runs actors on quantized precision (8/16) to show speedups of up to 1.5-2.5x

- Researched into formulation of Quantization Noise as an Exploration Process; performed experiments on Procgen for evaluating quantization noise

CERN-HSF, Google Summer of Code (Remote)   *May – Aug'19*
Selected among 150 students across India; part of the AI for Social Good Track
- Ported top performing solvers from hosted Kaggle task into a highly sophisticated framework – ACTS
- Developed pipelines for data collection and performing reconstruction of trajectories from data, in one go; enabled running massive parallel reconstructions from exabytes of data produced at the Large Hadron Collider in Switzerland at CERN
- Researched into consolidation of the top algorithms to produce a single algorithm through evolutionary algorithms like the genetic algorithm
- Developed an example of running Pytorch based deep learning models by using Pytorch's C++ frontend libtorch. Showed that using torchscript, reconstruction of trajectories could be possible without specification of the deep learning model's structure in C++. This increased the usability of the code since a model could be developed and trained in Python followed by massive benchmarking in C++ and just specifying the model checkpoint.

Unfound.ai, Mumbai   *May – Jul'18*
- Revamped the existing information retrieval system of this __ to incorporate distributional semantics through the use of embeddings; led to retrieval of more semantically relevant articles
- Developed and fine-tuned contextual embedding based models (ELMO) for all in-house articles (>100k)
- Performed experiments on training, inference of huge Language Models and developed, deployed API services through Flask for these models
- Trained and deployed Stance Detection based Models for the detection of political standpoints of news articles

RESEARCH PROJECTS
Title: GenRL: A Pytorch based Reinforcement Learning Library   *May'20*
Summary: Co-created and maintain a Pytorch based reinforcement learning library. Led a team of >10 open source developers. The library supports Bayesian RL (Bandits, Contextual Bandits), Classical RL (Value Iteration, Q Learning, SARSA), Deep RL (VPG, A2C, DQN, DDPG, TD3, SAC, PPO), Distributed RL (Distributed DDPG), Multi-Agent RL. >300 stars on github. Post reached front page of popular sub-reddits, and MadewithML

Title: Autonomous Drone Navigation   *Aug'18*
Summary: Led a team of 4 to design and develop the complete stack of a fully functioning drone able to navigate forest trails. Project was funded twice – once by the Department of Electrical and Electronics Engineering and second by the Academic – Graduate Studies and Research Division (AGSRD), BITS Pilani. Trained Imitation Learning models on the Forest trails IDSIA dataset by Nvidia.

Title: Neural Voice Cloning with Few Samples   *Jan'18*
Summary: Implementation of the research paper "Neural Voice Cloning with Few Samples," Implementation and results open-source on Github which has >200 stars. Developed code for the 2 types of pipelines – only encoder training and the joint model training (w/ Deep Voice 3).

Title: Pneumonia Detection using Deep Learning   *Oct'18*
Summary: Researched into benchmarking state of the art computer vision models on the RSNA Dataset for Pneumonia Detection on Chest X-ray Images for LovekeshVig, TCS Research. Worked with ResNets, InceptionNets, DenseNets and MaskRCNN.

Title: Epileptic Seizure Detection using Deep Learning   *Aug'18*
Summary: Implementation of End-to-end Deep Learning models used to predict seizures on the 32-channel TUH EEG Dataset. Developed a fast seizure prediction methodology using only the first 60 seconds of EEG Recordings. Performed hyperparameter and model parameter training sweeps across different configurations of common neural network modules like FCs, RNNs, LSTMs, etc.

Title: Fan Speed Sensing and Control   *Apr'19*
Summary: Designed a Microprocessor based system for sensing and controlling the speed of a fan. Designed and consolidated multiple individual chips (8086, 74LS373, 74LS138, 74LS245, ROM, RAM, 8255A, 8284, 8253, LEDs, Push buttons, 74LS04, 74LS32, Active Relay and an AC Induction Motor). Performed mapping of memory addresses and pins.

Title: Implementation of Basic Recommender System Algorithms   *Apr'19*
Summary: Implemented User-user based and Item-item based collaborative filtering algorithms. Clustering through K-nearest neighbours followed by prediction. Created MongoDB datasets from ml-20m movie ratings dataset.

Title: Human Swarm Intelligence using Reconaissance   *Nov'18*
Summary: Researched into use of drone systems and swarm AI algorithms together with Humans for Reconaissance. First Phase involved building way points controllers of multi-drone systems in ROS.

Title: Basic Linear Algebra library written in C for OpenGL usage   *Nov'18*

Summary: Wrote a simple library in C that ported basic functions of OpenGL mathematics. Implemented basic operations in C including for 2d, 3d, 4d vectors and 2d matrices for fast inference.

Title: SAiDL Winter Assignment   *Dec'17*
Summary: Solved the Induction Assignment for SAiDL. Implemented Neural Networks in numpy, convolutional neural networks, denoising autoencoders in Pytorch.

ACADEMIC PROJECTS
Title: Particle Track Reconstruction using Machine Learning   *Jan – Apr'19*
Summary: Created Machine Learning solutions for reconstruction of trajectories from hits left by particles left on silicon detectors. Employed high level Particle Physics concepts to algorithms in C++ for fast reconstruction. Project ranked 6th in final competition on Codalab.

Title: Real time Interfacing using Spiking Neural Networks   *Aug* – *Dec'19*
Summary: Tested and evaluated the capabilities of spiking neural networks for real time interfacing using SpineCreator. Implemented dynamics of IzhikevichConductance based Neurons. Also tested capabilities of STDP learning rule Basal Ganglion.

PUBLICATIONS
- Maximilian Lam, Sharad Chitlangia, Srivatsan Krishnan, Zishen Wan, Gabriel Barth-Maron, Aleskandra Faust, Vijay JanapaReddi, "***Quantized Reinforcement Learning***", Under Review at 4th Conference on Machine Learning and Systems 2021, Accepted at the Resource Constrained Machine Learning Workshops at 3rd Machine Learning and Systems Conference 2020 (https://arxiv.org/abs/1910.01055)
- Ajay Subramanian, Sharad Chitlangia, Veeky Baths, "***Psychological and Neural Evidence for Reinforcement Learning***", Under Review (https://arxiv.org/abs/2007.01099)

AWARDS & ACHIEVEMENTS
- Selected among 250 candidates to take part in Montreal Institute of Learning Algorithms' Deep Learning and Reinforcement Learning Summer School (DLRL SS); also presented poster on QuaRL at the same venue
- Winner of the special Bounty Prize (US$500) at HackInOut, India's biggest Community Hackathon
- One of the 1200 students selected for Google Summer of Code and 40 students out of that for CERN-HSF in 2018.
- Incubated an AI Research Society – SAiDL (Coordinator followed by President). Mentored and led more than 15 undergraduates to pursue undergraduate research independently.

SEMINARS/CONFERENCES/PRESENTATION
- Delivered seminar on 'Pushing the limits of VowpalWabbit with Flatbuffers' at Microsoft Research NYC, Redmond, Montreal, Jul'20
- Attended 8th International Conference on Learning Representations 2020 and 37th International Conference on Machine Learning 2020 organized by the IMLS (International Machine Learning Society, Apr'20 & Jul'20, respectively
- Attended 34th Conference on Neural Information Processing Systems organized by the NeurIPS Foundation, Dec'20
- Invited to give a talk on the recent advances in the field of Machine Learning during ASCII Orientation, __
- Co-delivered a talk on Google Summer of Code __
- Presented a virtual __ on 'Quantized Reinforcement Learning' at Montreal Institute of Learning Algorithms, Aug'20

ADDITIONAL CERTIFICATIONS
- 'Deep Learning' and 'Reinforcement Learning,' Centre for Technical Education, BITS Pilani Goa, 2017
- Stanford's CS231n, Online, 2017
- Machine Learning, __ (Coursera), 2017
- UCB's CS284, Online, 2018

STUDENT LEADERSHIP/TEACHING EXPERIENCE
- Society for Artificial Intelligence and Deep Learning, BITS Pilani Goa
  - President (May'19 – May'20)
    - Co-organized an AI Research Symposium with >3000 attendees featuring 15+ top researchers globally
    - Strengthened connections with BITS Goa's APP Centre for AI Research, co-leading initiatives including 1 year long-mentorship programs and simplification of concepts in ML/AI
    - Conducted 10+ projects spanning Reinforcement Learning, Neuroscience + AI, Generative Modelling, Full Stack ML, etc
    - Organized a Season of Code during the summer of 2020 with the aim of introducing students to building machine learning packages in the world of open source. 7 different projects (Deep Contextual Bandits, Adversarial NLP, CV for Sports Analytics, etc)
  - Coordinator (Jan'19 – May'19)
    - Assisted and led free courses in college on Machine Learning, Deep Learning for first/second year students
    - Bootstrapped initiatives such as reading groups, project presentations, etc
    - Designed the induction assignments and designed and updated group website
- Informal Teaching Assistant for Reading Course on Research between Cognitive Neuroscience and Artificial Intelligence, __

- Panel Coordinator in Quark 2020 (College's technical festival); co-organized competitive coding, reverse coding, codejam, etc. and a 30-hour hackathon with 1k+ applicants; raised sponsored prizes worth >US$800K
- Course Instructor in student-led free courses in [Deep Learning](); designed course slides, assignments, conducted doubt solving and hands-on sessions
- Project Mentor for TIP Project on Learning to play games with Reinforcement Learning

MEMBERSHIPS
- Anuradha and Prashanth Palakurthi Centre for Artificial Intelligence Research (APPCAIR), BITS Pilani Goa, undergraduate student researcher and member
- Society for Artificial Intelligence and Deep Learning, BITS Pilani Goa
- Society for Computer Architecture, BITS Pilani Goa
- AI + Neuroscience Journal Club, Cognitive Neuroscience Lab, BITS Pilani Goa

TECHNICAL SKILLS
- Python, C++, Java, JavaScript, Scala, Spark
- Ubuntu, CentOS, Unix, MacOS, Windows
- Pytorch, TensorFlow, Sklearn
- AWS EC2, GCP, TravisCI, CircleCI, Docker, Git, Hadoop, LATEX, Continuous Integration & Deployment, DevOps

EXTRACURRICULAR ACTIVITIES/COMMUNITY SERVICE
- Volunteer, Department of Arts and Decoration, BITS Pilani, Goa (___); helped plan and design exhibits of college's cultural and technical festivals
- Volunteer, Department of Creative Works, BITS Pilani, Goa; helped in planning and management of events in college's cultural festival
- Part of hostel's futsal and cricket teams, ___