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Ravi Raja

M Tech Research, CSA IISc Bangalore

Summary

I work at the intersection of Machine Learning and Program Synthesis. I am currently working on Boolean Function Synthesis for my thesis. I am expected to graduate from IISc in December 2021.

Education

Indian Institute Of Science, Bangalore, India *Aug'19-Dec'21(Expected)*
Master of Technology (Research), Computer Science and Engineering,
Labs: Machine Learning / Programming Language Labs
Advisors: Prof. Chiranjib Bhattacharyya and Prof. Deepak D'Souza
Current GPA: 7.7/10

Panjab University SSG Regiional Centre, *Hoshiarpur, India* *Aug'13-May'17*
Bachelor of Engineering, Computer Science and Engineering,
GPA: 7.3/10

Projects

Boolean Function Synthesis using GCLN (team of 1)
Research Project - [On Going] (guided by Prof. Aditya Kanade, Prof. Chiranjib Bhattacharyya and Deepak D'Souza *Jan '21 - On going*

Given a Boolean Relation among variables and given the set of input/output variables, we want the network to predict the output function that satisfies the specification (relation). We are using Gated Continuous Logic Network for learning the Skolem Function that satisfies the Specification.

Generating Grammar Rules for Syntax-Guided Synthesis (team of 1)
Course Project of Topics in Software Engineering taken by (Prof. Aditya Kanade, and Prof. Shirish Shevde) *Oct '20 - Jan '21*

Given a Specification in the form of logical constraints for the SyGuS problem, we trained a Neural Network to predict the Grammar Rules required to get to the solution program. We were able to achieve 91% accuracy

Synthesizing Programs from Logical Constraints using Neural Network (team of 2)
Course Project of Program Synthesis meets Machine Learning (taken by Prof. Chiranjib Bhattacharyya, Deepak D'Souza and Sriram Rajamani(MSR India) *Jan '20 - Jun '20*

In this project our aim was to discover whether the Neural Networks can understand the Semantics of Logical Constraints or not. We experimented with the Conditional Linear Integer Arithmetic track from the SyGuS competition 2019. We modeled a GGNN for encoding the constraints and an RNN for decoding the final programs. We were able to get correct one length programs.

Learning in Sparse Reward Environment (team of 4)
Course Project of Machine Learning taken by (Prof. Chiranjib Bhattacharyya, and Ambedkar Dukkipati) *Jan '20 - Jun '20*

Studied what is sparse reward and how the agent learns to achieve the desired goal even with binary rewards. In this project we implemented the Hindsight Experience Replay. We also studied with the help of experimentation, the effect of Demonstrations. Finally, we even implemented HER for Dynamic environments.

ML Mini Projects

Performed an Experimental study on the effects of Kernel Methods over classic ML problems like regression, classification, and clustering given as course assignment.

B.Tech. Projects

Multiple Compression and Decompression using Encryption and Decryption Technique

- Developed an API to compress the text data using encryption techniques - Project Language: C

Computer Skills

***Languages**: C, Python, LaTeX*
***Tools/Framework**: PyTorch, Tensorflow, CVC4, Z3*

Relevent Courses

- *Linear Algebra and Probability*
- *Computational Methods of Optimisation*
- *Machine Learning*
- *Program Synthesis meets Machine Learning*
- *Topics in Software Engineering*

Position of Responsibility

- ***Coordinator, Placement Cell*** *Panjab University SSG Regional Centre, Hoshiarpur*
  - *Handled the placement session of the academic year 2016-17 leading a team of 40+ members.*

Awards & Achievements

- *Secured an **All India Rank 888** in GATE - 2019, Computer Science and Engineering.*