

Introduction to the Z3 API, Verification of Neural Nets in Python

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Learning Objectives

- The need for Neural Net Verification
- Fundamentals of using Z3 API
- Practical Experience of using the Z3 API
- How to use Z3 API for Neural Net Verification
- Practical Experience of NNV with Z3 on a TensorFlow model

Masterclass Outline

- Motivation and Z3 API in Python *[20 mins]*
- *Creating A Perceptron [30 min]*
- Lab: Sudoku with Z3 API **and/or** Lab: Neural Nets *[30mins]*
- Neural Net Verification with Z3 *[30mins]*
- Lab: Verification of TensorFlow Neural Net with Z3 *[30mins]*

Need for Neural Net Verification

- AI is not just getting better; it is getting pervasive.
- Neural Nets in Massive Use
- AI is in urgent need of verification: safety, security, robustness to changing conditions and adversarial attacks.

Problems with Neural Nets

What is Z3?

Z3 Demo

Lab Part 1

- Lab: Sudoku with Z3 API
- Lab: Neural Nets

Perceptron

Perceptron Verification

Sapphire Approach

Thank you for listening!

Any Questions?