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SIMPLE SHAPES CLASSIFICATION USING CONVOLUTIONAL NEURAL NETWORKS

Problem:
- To classify the simple shapes of triangles, circles, squares and rectangles.

Solution:
- A nine-layered convolutional neural network model trained for approximately 3 hours. Using a test set of 20,000 images, the model performed at 90% accuracy with 1% loss on unscaled images and 80% accuracy with 3% loss on scaled images.

Improvements:
- To increase generalization for unscaled and uncropped images, improve on data augmentation function.
- Use regions of interest pooling to detect the shapes through an additional RNN layer.

Technologies:
- Keras, Tensorflow, Numpy, Google Cloud, Scikit-learn, Multiprocessing, OpenCV, GPU computing.

DDOS ANALYSIS: MIRAI BOTNET

Problem:
- To execute the malware Mirai locally between two Linux servers and analyze the code.
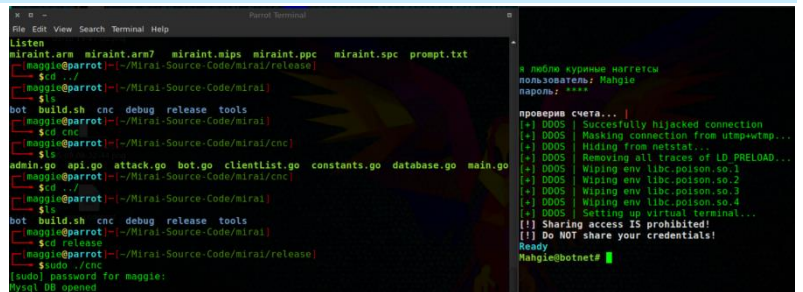
Solution:
- Through cross-compiling ARM processors using golang and C, the MySQL commander is listening for bots to connect with IoT vulnerabilities.

Improvements:
- No bots connected to the commander, could it be server configuration issues?

Technologies:
- mySQL, Linux servers, Linux command line interface

SYSTEMS PROGRAMMING

Uniq emulator:
- Prints out all the unique lines from a file using delimiters and a copy of the original buffer.

Running child processes:
- Executes child processes and wait for a child under a set time.

"Grep" emulator:
- Searches text patterns of files using multi-threading.

Pipe emulator:
- Emulates pipes using popen and pclose for child and parent processes.

Signal Handler:
- Ignores SIGUP And SIGQUIT signals and then executes another program.

Technologies:
- System Calls, C

Alien Language:
- Finds the number of words that matches the Alien language pattern.

Minimum Scalar Product:
- Finds the minimum scalar product between two vectors.

Rotate Connect-K:
- Board class of two players where each player can rotate the board once with a connect-k winner horizontally, vertically and diagonally.
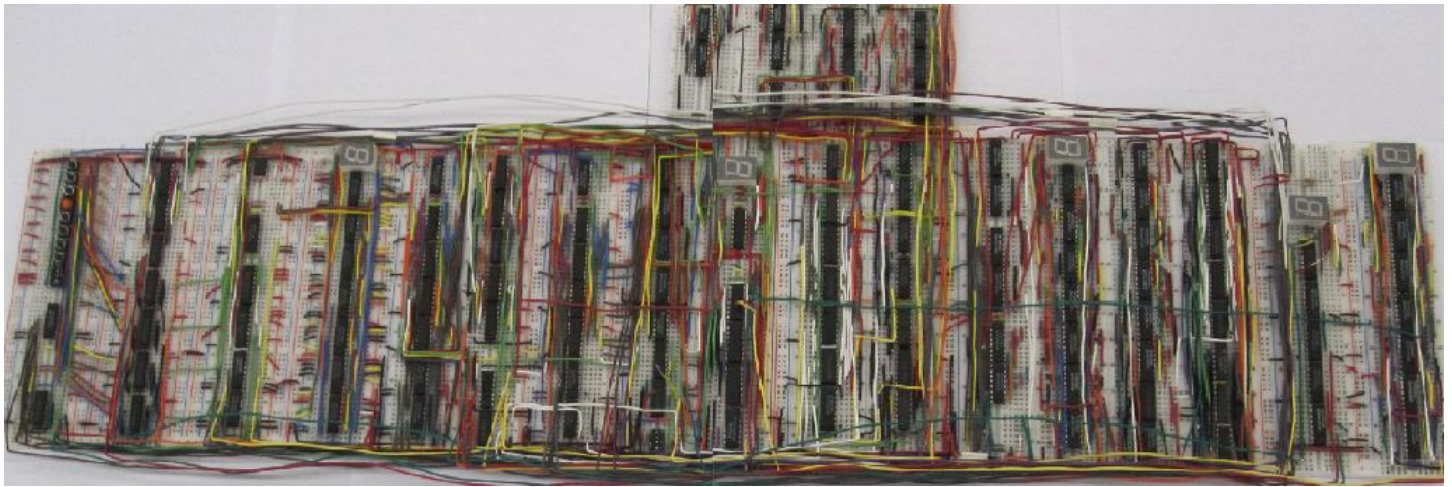
SIMPLE ENIGMA MACHINE

Problem:
- To create a digital logic implementation of the Enigma machine from letters A-H.

Solution:
- A design consisting of multiplexers, and gates, xor gates, or gates, push buttons and digit displays.

Improvements:
- Use a programmable memory chip to reduce the number of gates.

Technologies:
- Analog logic

PROJECTS IN DEVELOPMENT:

Classifying and detecting ambiguous illustrations using GANs:
- Aims for a generative purpose AI that differentiates parts and wholes of images with multiple meanings.

Techniques for recognizing visual data (attention-span inspired):
- Finds efficient ways for image recognition instead of the network randomly guessing boundaries in Regions of Interest pooling.

Modern Enigma Machine
- Fancies up the original encryption machine with state-of-the-art encryption algorithms in a software emulator.

Game mobile application using Unity
- Team effort to develop a fun game for the market.