Stefan Zorcic

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EDUCATION

University of Waterloo Waterloo, ON

- Bachelor of Computer Science **(GPA: 3.98)** *Expected Graduation: May 2028*

EXPERIENCE

Theoretical Computer Science Research Assistant August 2023 - Present

University of Waterloo, Department of Computer Science *Waterloo, ON*

- Created and tested various discrete finite automata with output for verification of properties in various series.
- Coded a simulation in Python3 to test various proposed morphism techniques for values under 10000.
- Developed proof techniques using automata theory and the Walnut software.

Software Developer August 2023 - Present

WATonomous Autonomous Software Division *Waterloo, ON*

- Containerized all code with Docker and integrated it into the main codebase on Github using Git.
- Designed and trained a convolutional neural network in Python3 with TensorFlow to detect traffic lights in an input image and determine signal value with an out of sample accuracy of 95%.
- Subscribed to ROS2 nodes to collect data from sensors (LIDAR, Camera, Radar) and verified data with foxglove.

PUBLICATIONS

- Coauthored "**Power-free Complementary Binary Morphisms**" submitted for publication in the *Journal of Combinatorial Theory Series A,* December 11, 2023.
- Special Acknowledgement for "**Proof of Irvine's Conjecture via Mechanized Guessing**" posted on the *Cornell Archives,* November 27, 2023.

RELEVANT SOFTWARE PROJECTS

Hurricane Formation Detection

- *Honorable Mention at NASA Toronto Youth Space Apps Hackathon*
- Scrapped data from website databases using NASA and JSTAR web APIs and stored normalized data using Git.
- Created a AI model to determine hurricane formations in an opensource NASA database with 87% accuracy.
- Preformed image preprocessing on training data using the cv2 library in a custom Python3 script.

AI Paraplegic Mouse Interface

- *Winner of Best Education Hack at the Ignition Hacks Hackathon*
- Developed a Python3 script to allow paraplegics to interface with their computer through their web camera.
- Integrated the cv2 and pyautogui library with an AI face detection model under the MIT creative commons license to perform the logic workload of a custom developed python script.

Twitter NLP Sentiment Detection

- Developed a Python3 script to determine the sentiment of tweets in a public database with 94% accuracy.
- Integrated Scikit-learn's MLP classifier model to preform natural language processing on tokenized data.
- Preformed data preprocessing using the NLTK and string module in python to tokenize the training data.

Live Emotion Deep Learning Detection

- Developed several models to predict the emotion probability vector (anger, contempt, disgust, fear, happiness, neutrality, sadness, surprise) of a face in an image with a 92% data accuracy in classification testing.
- Designed and trained several custom convolutional neural networks using the TensorFlow library.
- Utilized the cv2 library to preprocess training data from an opensource Kaggle dataset.

SKILLS

Git, API, Data Manipulation/Management, Python, NumPy, Pandas, TensorFlow, Scikit-learn, C++, Java, Docker, Bash