SEFALA RAESETJE BONJO

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EDUCATION

Feb 2018-Current

MSc Computer Science, *University of the Witwatersrand*, Johannesburg

- **Topic**: Using satellite images and computer vision to study the evolution and effects of spatial apartheid in South Africa.
- **Advisors**: Dr Richard Klein, Nyalleng Moorosi and Dr Timnit Gebru
  This project explores South Africa using satellite images. One of the main problems South Africa is grappling with is how to remove many of the legacies of Apartheid - a former policy of political and economic discrimination and segregation against non-European groups in South Africa. For example, aerial photographs taken by photographer Johnny Miller show the legacy of spatial apartheid - completely segregated communities of townships next to gated wealthy neighbourhoods that have largely remained unaffected by the ending of apartheid [https://www.citylab.com/equity/2016/06/apartheids-urban-legacy-instriking-aerial-photographs-south-africa-cities-architectureracism/487808/]. Our research proposes to use computer vision and machine learning to analyse millions of such satellite images of Pretoria, South Africa from 2003 to 2015. Together with the satellite images, we plan to use census and connectivity data to analyse the change in the demographic makeup and economic status of constituents so as to answer questions like 'does de-segregation lead to better economic outcomes for citizens?'

Feb 2017-Dec 2017

BSc (Honours) Big Data Analytics, University of the Witwatersrand, Johannesburg

- **Relevant Modules:** • Computer Vision •Machine Learning • Data Analysis and Exploration • Distributed Computing • Discrete Optimisation • Data Visualisation and Communication •Introduction to research methods • Research report for Big Data Analytics
- **Final year project:** Investigating different CNN architectures on the task of action recognition in videos (https://github.com/sefalab/Honours-Research-Project)

Feb 2014-Dec 2016

BSc Computer Science and Information Systems, University of the Witwatersrand, Johannesburg

- Awards: 9 Certificates of first class in several courses (6 in CS, 2 in Maths, 1 in Electrical circuits)

WORK EXPERIENCE

May 2018-Aug 2018

Data Scientist, Data Science for Social Good fellowship, University of Chicago

- The Data Science for Social Good Fellowship is a University of Chicago summer program to train aspiring data scientists to work on data mining, machine learning, big data, and data science projects with social impact. Working closely with governments and nonprofits, fellows take on real-world problems in education, health, energy, public safety, transportation, economic development, international development, and more. (https://dssg.uchicago.edu/)

- We used object detection and classification to find objects, semantic segmentation to determine where they are (on road/ sidewalk/ wrong lane) and optical flow to determine movement in order to build a video-processing pipeline for the city of Jakarta to extract structured information from raw traffic footage. (https://github.com/dssg/jakarta_smart_city_traffic_safety_public)

Feb 2018-
May 2018

Developer, Wunderman SA

- Part time work. Built a machine learning and computer vision application to classify pictures of dog breeds and predict constituent breeds making up mixed breed dogs. In this work I used Keras and Tensorflow to build a CNN model with GAP layers to perform object localisation and then blurred parts of the image to get constituent breeds making up the mixed breed dog.

Feb 2018-
April 2018

C# Developer, Water reuse sustainability assessment tool

- Part time work. Built an end to end system for assessing water reuse sustainability based on PhD candidate Abiola Abimbade's model in civil engineering.

Jun 2017-
Jul 2017

And

Nov 2017-
Feb 2018

Data Scientist, Data Science for Impact and Decision Enablement (DSIDE), Council for Scientific and Industrial Research (CSIR)

- Data Science for Impact and Decision Enablement (DSIDE) is a vacation work programme hosted at the CSIR with the aim of supporting capacity building in the ever growing field of data science by scheduling recruits to participate in mentor-guided and learn-by-doing problem solving of real world needs as presented by different stakeholders including municipalities, government departments, energy, academics and more. (http://dsideweb.github.io/)

- We used an active learning approach to build an image interest ranking system. Some of the tools we used are a Bayesian ranking algorithm to give scores and precision, a CNN for feature extraction and a Gaussian Process model to smooth the scores taking the features into account. The tool ranked images according to a domain expert's subjective interest and also highlighted the specific content making these images interesting.

May 2016-
Jan 2017

Developer, Blue Ocean VR

- Help build a strategy to promote the new company
- Built a treasure hunt augmented reality app for Blue Ocean VR to promote their Virtual reality business at the rAge gaming expo 2016

May 2016-
Jan 2017

Robotics interest group host, Mathematical Sciences Support, University of the Witwatersrand

- We used inverted learning to teach an introductory course in robotics to a general audience of students from different backgrounds. (https://www.youtube.com/watch?v=_cZUwe0Id1Q&t=17s)

Aug 2015-
Oct 2015

Web Development interest group host, Mathematical Sciences Support, University of the Witwatersrand

- Teaching an introductory course in web development to a general audience of

students from different backgrounds.

Feb 2015-Apr 2016 **Lab technical assistant, Mathematical Sciences Support, University of the Witwatersrand**

- Software installations on Mathematical Sciences laboratory computers
- Fixing Mathematical Sciences laboratory computers
- Maintaining research production servers
- Tutoring for conferences (e.g. tutoring for big data conferences, we assist attendees with using R, PostgreSQL and Hadoop)

ACHIEVEMENTS

- Speaker at the Computer Vision for Global Challenges at CVPR. LA, USA — 2019
- Selected for an oral presentation at the AI for Social Good Workshop at NeurIPS — 2018
  - Won Highlighted paper award at AI for Social Good workshop
- Selected for an oral presentation at the 2nd Black in AI Workshop at NeurIPS. Montreal, Canada — 2018
- Recipient of the best poster presentation prize at the Deep Learning Indaba — 2018
- Recipient of the Data Science for Social Good fellowship at the University of Chicago — 2018
- Recipient of the Sasol Inzalo Foundation scholarship — 2014 - 2017
- Received 9 certificates of first class from Wits university — 2014 - 2016
- Member of the Golden Key International Society — From 2014

COMMUNITY SERVICE

Mentor for several undergrad students, University of the Witwatersrand

- I mentor undergraduate students on both personal projects and school projects which involve computer vision, machine learning or general software development.

PROGRAMMING LANGUAGES AND FRAMEWORKS

- Currently proficient in Python, C#, Java, HTML, CSS, Keras, Theano, Tensorflow, Dash, MySQL, and Php.
- Have worked with C, C++, and JavaScript

REFERENCE

- References available on request