Georgios Voulgaris

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I am an EPSRC funded PhD candidate in Deep Learning and a member of the Predictive Analytics Lab (PAL) at the University of Sussex. My research focuses on Computer Vision and Deep Learning, specifically exploring methods to extract salient features for Domain Adaptation and Semantic Segmentation tasks in Remote Sensing systems

SKILLS

- Proficient in Deep Learning for Computer Vision.
- Strong coding skills; efficient code, as well as debugging.
- Experienced use of modern source control (Git).
- Experienced in working with GPU's (CUDA).
- Experienced in using Remote Sensing data.

- Python, NumPy, Scipy, Scikit-learn, Pandas.
- PyTorch
- Embedded C
- MATLAB

RESEARCH PROJECTS

Deep Learning-Based Salient Feature Extraction for Semantic Segmentation Tasks in Aerial Images

School of Engineering and Informatics, University of Sussex (May 2022 – Present)

I Propose Deep Learning architectures that focus on extracting salient image features and investigate their impact on the performance of semantic segmentation for detecting water bodies and scenes under canopy/shadows. Part of this work's findings are In Press at the International Geoscience and Remote Sensing Symposium (IGARSS2023), while another part is Under Peer Review.

https://github.com/gvsam7/GabUNet

British Academy funded research project: Satellite/Aerial image Scene Segmentation

Science Policy Research Unit & the Predictive Analytics Lab, University of Sussex (January 2020 – present)

This is an interdisciplinary project involving the Science Policy Research Unit (SPRU) at the University of Sussex. The aim is to apply deep learning techniques, to map peri-urban agriculture in Ghaziabad India, and research ways of integrating multiple types of data through a web-based mapping and visualisation tool. Thus, support research and stakeholder engagement to understand the trade-offs between Sustainable Development goals (SDGs) in urbanising contexts. For this project I designed a classifier that classifies scenes from aerial images from Ghaziabad India. Classifier predictions are imported to the web application for visualisation.

https://github.com/gvsam7/Deep_Augmentations   *https://wearepal.ai/projects/ssrp*

Deep Learning Coupled with Earth Observation Satellite Data Exploration of Polluting Plants

Satellite Applications Catapult (Internship), Oxford (January 2022 – April 2022)

Aim: Applied Deep Learning on remote sensing data, to classify cement plants in China, by exploiting physical properties such as, plant surrounding temperature and soil moisture.

Datasets: Landsat-8 thermal infrared (bands 10 & 11), short wave infrared (bands 6 & 7), and a geological ratio of the short-wave infrared image chips of two classes (cement plants and the surrounding land cover).

Deep Learning architectures: VGG, ResNet, EfficientNet.

This work's findings were published at the International Geoscience and Remote Sensing Symposium (IGARSS2022).

https://github.com/gvsam7/GeoMap   *https://youtu.be/0xkWbdjIjWk*

Deep Learning Robustness to Domain Shifts During Seasonal Variations

School of Engineering and Informatics, University of Sussex (August 2021 – January 2022)

In South Asia, the landscape changes dramatically between dry and wet seasons. The main factor responsible for this variation is the flora that transforms the landscape between seasons. These transformations can affect the performance of deep learning models trained to analyse satellite images, especially if there are domain shifts between training and testing data distributions. Here we show that a deep network with a Gabor convolutional layer as the first layer focuses on more salient parts of the image than one which uses a standard convolutional layer meaning that removing colour information is less damaging than for the standard network. Further we show that the proposed architecture is robust in the presence of domain shifts due to seasonal data variations. This work was published at the International Geoscience and Remote Sensing Symposium (IGARSS2022).

https://github.com/gvsam7/Deep_Augmentations   *https://youtu.be/Zci4eASXmkQ*

Water Detection from Satellite/Aerial Images

School of Engineering and Informatics, University of Sussex (October 2018 – December 2019)

Applied Computer Vision and Machine Learning techniques to segment water bodies from aerial images.

PUBLICATIONS

Voulgaris, Philippides, & Quadrianto, 2023, July. Aerial Scene Semantic Segmentation: Harnessing Salient Texture Features with a Wide Receptive Field. In BMVC 2023 British Machin Vision Conference (Under peer review).

Voulgaris, Philippides, Dolley, Reffin, Marshall, & Quadrianto, 2023, June. Seasonal Domain Shift Dataset in the Global South: Dataset and Deep Features Analysis. Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, 2023, pp. 2115-2123.

Voulgaris, Philippides, & Quadrianto, 2023, July. Water Physics Aware Semantic Segmentation Through Texture-Biased U-NET Architectures. In IGARSS 2023 IEEE International Geoscience and Remote Sensing Symposium (In Press).

Voulgaris, Philippides, & Quadrianto, 2022, July. Deep Learning Robustness to Domain Shifts During Seasonal Variations. In IGARSS 2022-2022 IEEE International Geoscience and Remote Sensing Symposium (pp. 417-420). IEEE.

Rossi, Tkachenko, Bayaraa, Foster, Reece, Scott, Voulgaris, Christiaen and McCarten, 2022, July. Detection and Characterisation of Pollutant Assets with AI and EO to Prioritise Green Investments: The Geoasset Framework. In IGARSS 2022-2022 IEEE International Geoscience and Remote Sensing Symposium (pp. 7717-7720). IEEE.

PROFESSIONAL EXPERIENCE

Deep Learning Exploration for Polluting Plants

Satellite Applications Catapult (Internship), Oxford (January 2022 – April 2022)

Teaching Assistant

School of Engineering and Informatics, University of Sussex (October 2018 – June 2020)

Teaching Assistant in: -
- Computer Vision.
- Industrial Automation Mechatronics.
- Advance Electronic Systems.

Designed and Developed a Fully Automated Green House

Brighton (May 2013 – October 2018)

Design Engineer Control Systems Oil and Gas

Rockwell Automation, Horsham (September 2006 – May 2013)

EDUCATION

EPSRC PhD Candidate Informatics

University of Sussex (October 2018 – Present)

Computer Vision and Deep Learning Robustness for Remote Sensing Systems.

DISCNET Scholarship

Consortium – University of Sussex, University of Southampton, University of Portsmouth, QMUL, and the Open University (January 2021 – December 2021)

Doctoral training in Machine Learning, High Performance Computing, Big Data, and industrial placement.

Machine Learning Summer School

MLSS-Indonesia (August 2020)

Awards received: - Best Research Proposal, Most Active Participants

MSC Modern Digital Communication Systems

University of Sussex (September 2005 – September 2006)

Obtained a merit.

BEng Hons Electronics with Communication Engineering Modern Digital Communication Systems

University of Brighton (September 2001 – July 2005)

Obtained a 2.2

REFERENCES

Will be given upon request.