SOL PLAATJE UNIVERSITY

RISK AND VULNERABILITY SCIENCE CENTRE

POST-DOCTORAL RESEARCH FELLOWSHIP (2022-2023)

Machine learning for air pollution prediction
(Reference No. PD/02-2022)

Project description

A dynamic and innovative post-doctoral position is available in the SPU-Risk and Vulnerability Science Centre (RVSC) in the fields of computer, data and environmental sciences. Air quality is crucial to human well-being and globally air pollution is on the rise due to increasing industrial development and human population growth. Monitoring air quality is becoming more of a challenging phenomenon as the nature and unpredictability of contaminants and granules changes. Bringing together skills and content areas within a multi-discplinary environment including computer science, data science, and earth science, the fellow will work in a national and regional context on the following aspects:

- Proposing machine learning/deep learning models that can do spatiotemporal prediction of air quality and can be useful for timely forewarning and control of pollutants;
- Developing a new system that uses ML techniques with a higher prediction accuracy of air quality;
- Developing a web-based Geospatial-Intelligence System (GIS) prototype that will serve as an interface to the users for getting responsive best navigation path for their open-air events like driving, biking, sprinting, exercising, trekking, and others;
- Assessing the performance of the proposed models using state-of-the-art performance measures;

The fellow will register and work under the supervision of Dr. Ibidun Obagbuwa in the Department of Computer Science and Information Technology but will also engage with researchers and academics in the School of Natural and Applied Sciences.

Background

Risk and Vulnerability Science Centres (RVSC) are a flagship programme of the Department of Science and Innovation (DSI) and the National Research Foundation (NRF) Global Change Research Programme and are included under the *'science and technology for global change with a focus on climate change'* Grand Challenge. In this context RVSCs aim to identify and conduct relevant and applied research in global and climate change, the outputs thereof having direct on the ground impacts at the community and/or stakeholder level. The RVSC framework is embedded under the South African Risk and Vulnerability Atlas (SARVA) an ICT-based decision-making support tool within the Global Change Research Plan which supports a central repository of a wide range of climate and environmental data. It is within this framework that the approach of RVSCs is to:

- enhance the scientific understanding of global change focussing on climate change impacts
- develop innovations and technologies to respond to global and climate challenges, and
- understand the social context within which solutions need to be implemented

The RVSC at Sol Plaatje University was established in September 2021 and is uniquely positioned to engage in global change science research in the Northern Cape, a province already under climate risk due to its dry, arid landscapes and frequent drought periods. Agriculture, food security, water management and conservation, natural capital, energy, and other industries are vulnerable to global warming and predicted changes in the region suggest increasing negative impacts on landscapes, communities, and livelihoods. The work of the RVSC looks to address these risks, analyze the vulnerabilities and assess the resilience within the different sectors within the UN Sustainability Development Goals. The RVSC strategy aligns with national, provincial, and institutional strategies in terms of sustainability, science, innovation, and technology.

One of the key focus areas of the RVSC at SPU is to develop the capacity and skills base of postgraduate students in global and climate change science and specifically within the context of arid environments and drylands. Besides undergraduate programmes in the biological sciences that include aspects of climate change and arid zone ecology, and future environmental science courses covering climate change and sustainability, SPU, through the RVSC, offers postgraduate programmes that further develop advanced research approaches through expert supervision, focussed research design courses and engaging and regionally relevant research projects in global change science.

Minimum requirements:

- Completion of a Ph.D. in the last five years
- Proven research experience in the fields of Machine Learning at postgraduate levels
- Academic excellence
- Good publication record
- Valid driver's license

Additional recommendations:

To qualify for this position, the candidate must have a Ph.D. degree in Computer Science or related field with a background in machine learning, computer vision and data analytics. Proven experience with deep learning models and working with artificial neural networks, such as CNN, RNN/LSTM/transformer, will be a strong recommendation. Moreover, the candidate is expected to be accustomed to the supervision of postgraduate students and demonstrate good potential for research. The position requires sound verbal and written communication skills.

Candidates should be proactive, enthusiastic, and interested in doing excellent research that can make a difference and contributes to the objectives of the RVSC, SPU and its partners.

Bursary Value: The fellow will receive a flat rate, a tax-free bursary of R255 000 for one year (to cover living expenses). Extension to a second year will be subject to performance.

Additional project costs: Running and other administrative costs will be covered by the Centre and the relevant supervisor/project leader.

Proposed starting date: no later than 1 June 2022

Application procedure: Each application is to be accompanied by a completed application form (see attached) and the following supporting documents:

- a full CV
- certified copies of ID document
- copy of your academic record
- two letters of reference
- a letter of motivation

Please send all documents to the Director, RVSC, Dr. D. Harebottle (doug.harebottle@spu.ac.za) with "RVSC Post-Doctoral Bursary + Reference No" in the subject line.

Contact details

For project or academic queries: Project leader – Dr. I. Obagbuwa (ibidun.obagbuwa@spu.ac.za)

For questions regarding the application process: Acting RVSC Administrator, Ms. U. Mqongwana (unathi.mqongwana@spu.ac.za)

Applications close: 25 April 2022 at 17:00

Sol Plaatje University and the RVSC reserves the right not to fill this fellowship if no suitable candidates are identified. If no response has been received within 21 days of the closing date, candidates may assume that their applications were unsuccessful.

SPU-RVSC Bursary 2022: Application cover sheet

Personal Information	
Title and Surname:	First Name:
Preferred name:	ID / passport number:
Current Postal Address:	
Telephone / Mobile:	E-mail:

Are you a South African Citizen: YES / NO
if yes, please indicate race: AFRICAN / COLOURED / INDIAN / WHITE

Gender: FEMALE / MALE / OTHER

Do you have a disability? YES / NO	If yes, please specify:

Latest average degree mark (compulsory for Hons, Masters, and Doctoral Applications):	

Project Information	
Proposed Project Title:	
Level: HONOURS or 4TH YEAR / MASTERS / DOCTORAL / POST-DOCTORAL	
Institution:	
Proposed supervisor(s):	
Supervisor's Telephone:	Supervisor's E-mail:
Proposed SANBI team member to act as a supervisor/contact person:	

Submission documents. Tick all that apply, incomplete applications will not be considered.	
Project outline (1 page for Honours; 2 pages for Masters, Doctoral, and Post-doctoral)	
Full CV	
Two letters of reference (academic)	
Statement of acceptance from the supervisor	
Provisional letter of acceptance from university (for Honours)	
Certified copy of academic marks for courses studied	

Certified copy of highest qualification (certified translation if required)	
One or two published/submitted articles (Post-doctoral)	
Certified copy of ID (or Passport for non-RSA residents)	

Deadline for submission: 25 April 2022 at 17:00