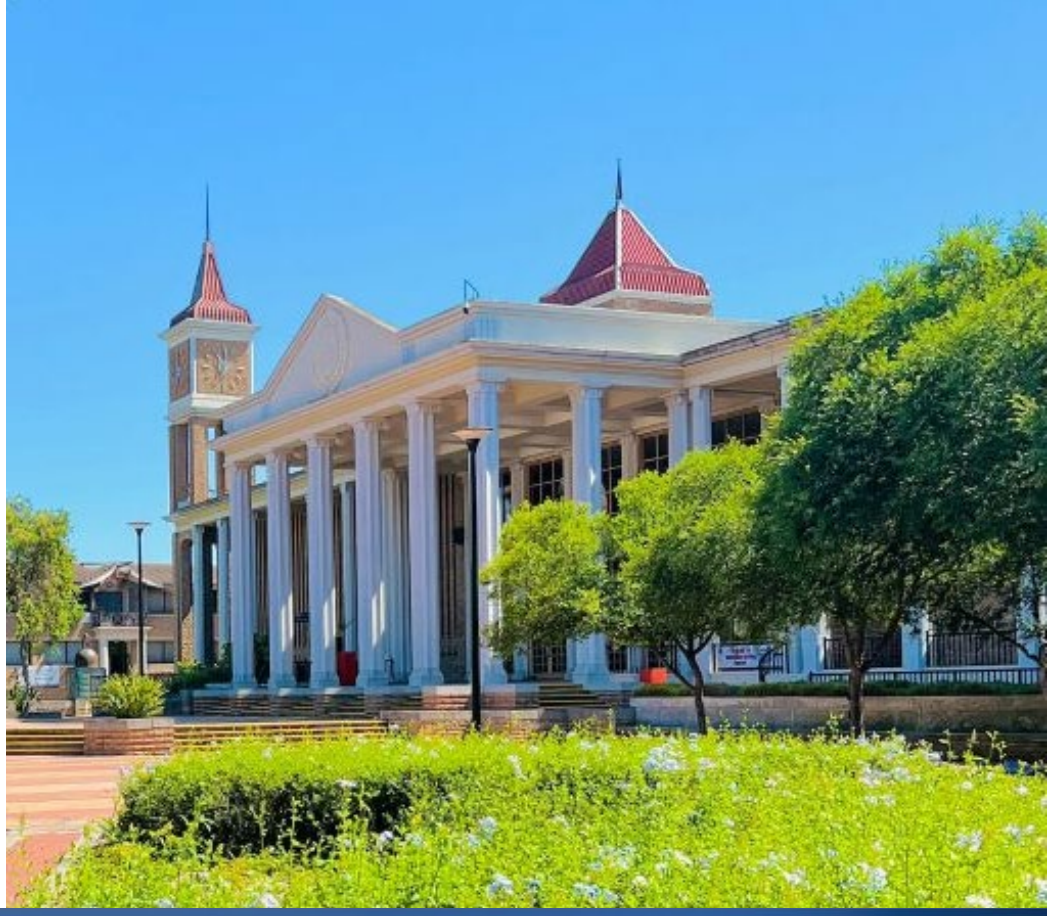
UNIVERSITY of the WESTERN CAPE

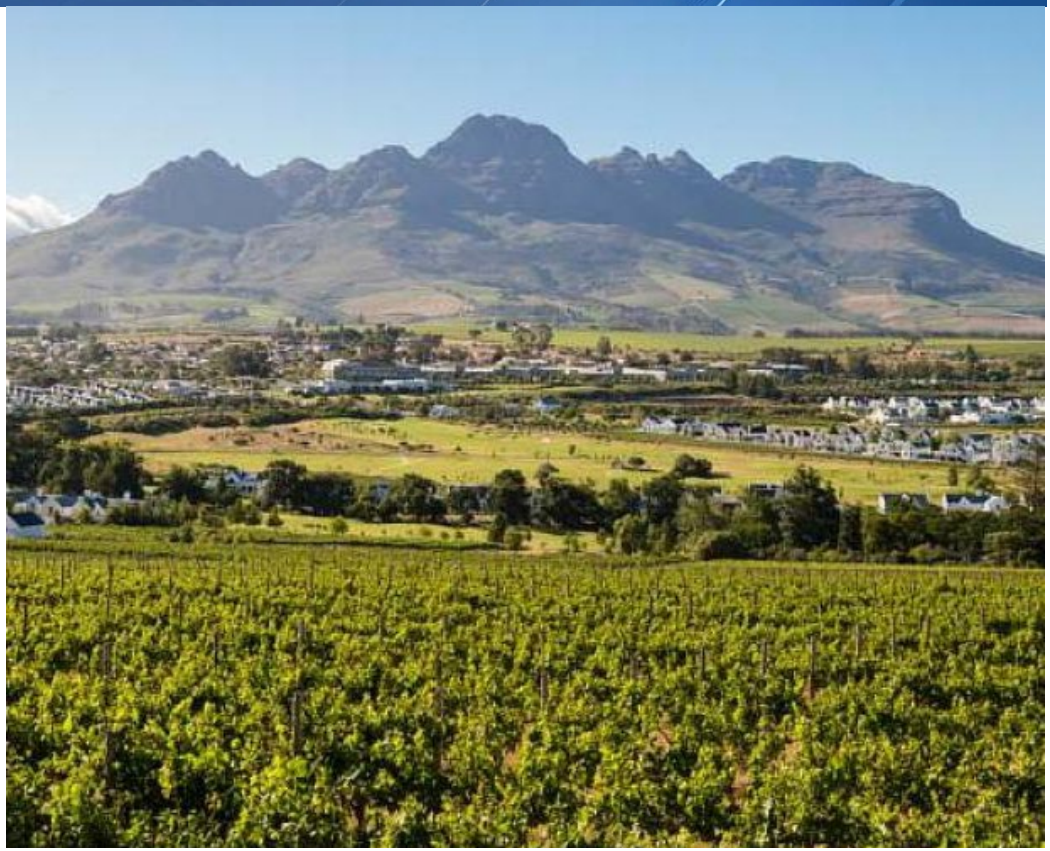


65th Annual Conference of the SOUTH AFRICAN STATISTICAL ASSOCIATION

STELLENBOSCH, CAPE TOWN | 18 -22 NOV 2024

SASA

South African Statistical Association



Welcome message

Every year the statistics community in South Africa (and from further abroad) gathers for the annual South African Statistical Association (SASA) conference to share our ideas, research, network and more importantly catch up with colleagues and friends after a busy year.

The University of the Western Cape and the Department of Statistics and Population Studies is proud to host this year's 65th iteration of the conference at the stunning Protea Hotel in Techno Park, Stellenbosch. Set in the beautiful winelands of Cape Town, the captivating views will hopefully be the catalyst for yet another invaluable SASA conference.

As we welcome all conference delegates, we have packed this year's conference programme with several topics related to statistics, including a number of keynote and plenary sessions to keep you informed, curious and engaged. And we hope that the most demanding issue you will face during the conference will be which parallel session to attend.

We look forward to hosting you!

Dr Humphrey Brydon (on behalf of the Local Organising Committee and Scientific Committee)

Local organising committee
Dr Humphrey Brydon (Chair)
Dr Retha Luus
Prof Renétte Blignaut
Dr Julia Keddie
Mrs Chanel Morkel

Scientific committee
Prof Rénette Blignaut (Chair)
Dr Retha Luus
Dr Julia Keddie
Prof Sarel Steel
Dr Morné Lamont
Dr Neill Smit

Conference overview

The SASA 2024 scientific committee invited participants to submit oral or poster presentations on a variety of topics:

Applied statistics	Bayesian statistics	Biostatistics	Computational statistics	Data science	Experimental design	Industrial & business statistics
Multivariate data analysis	Official statistics	Spatial statistics	Statistics in education	Statistics in sport	Theoretical statistics	Financial statistics

For further information regarding the presentations, see the full programme on pages 15 - 23.

Programme

Pre-conference workshops are on 18 and 19 November 2024 from 08h30 to 17h00. See pages 10 and 11 for workshop facilitators and programme.

Posters will be available to view from 20 – 22 November in the tea/coffee area. Presenter guidelines are provided on page 6 and a list of the posters is included on page 25.

The **conference programme** (20 – 22 November 2024) can be found on pages 14 - 22.

Conference sponsors

MaSS DSI-NRF CENTRE OF EXCELLENCE IN MATHEMATICAL & STATISTICAL SCIENCES

National Graduate Academy: Mathematical and Statistical Sciences

NRF National Research Foundation 25

FACULTY of NATURAL SCIENCES UNIVERSITY of the WESTERN CAPE

NITheCS National Institute for Theoretical and Computational Sciences

SACNASP South African Council for Natural Scientific Professions

General information

Registration

Registration for the conference will take place in the ground floor foyer and first floor foyer areas during the following times:

- Monday, 18 November: 08h00 – 09h00 and 13h30 – 17h00
- Tuesday, 19 November: 08h00 – 09h00 and 13h30 – 17h00
- Wednesday, 20 November: 08h00 – 13h00
- Thursday, 21 November: 08h00 – 13h00

Name tags provided to delegates at registration must be worn at all times to gain access to the venues, tea breaks, lunches and social functions.

Tea and lunch

- Morning and afternoon tea will be served in the following areas:
  - Ground floor foyer: Monday and Tuesday
  - First floor in Bridge 1: Wednesday, Thursday and Friday
- Lunch will be served in the on-premises restaurant. Any overflow of delegates will be served in the Bridge 2 venue on the first floor.

Parking

Limited parking is available on a first come first served basis at the front of the hotel. Additional parking is available on the outside of the hotel along Techno Avenue.

Contact information

UCT CMC is the appointed conference organisers for SASA 2024. For any conference related queries, please get in touch with Yvonne Brown at:

✉ yvonne.brown@uct.ac.za
☎ +27 21 650 3915

Presentation guidelines

Chairpersons

- Report to the venue 10 minutes before the start of the session.
- Check the attendance of all presenters at the start of the session. Ensure that all presentations have been loaded on to the computer by the assistant.
- No changes are to be made to the programme. All presentations must start at the time indicated in the programme.
- If a presenter does not arrive on time or does not show up at all, please do not rearrange the programme.
- Report any problems or absent presenters to the assistant.
- Open the session by welcoming the delegates and speakers and be sure to make the following announcements:
    - All cell phones must be switched off.
    - State the theme of the session.
    - For each presentation, state the presenter's name and the title of the presentation.
- Timecards will be provided for each venue.
- For full length oral presentations, warn presenters 5 minutes before the end of the 15 minutes allocated to each presenter and again when the 15 minutes is up. Allow questions according to time (the presentation and all questions must not exceed 20 minutes).
- For speed oral presentations, warn presenters 2 minutes before the end of the 8 minutes allocated to each presenter and again when the 8 minutes is up. Questions should be kept until all speed presentations have been completed. The 2 minutes between each presentation will be used to switch between presentations.
- At the end of the session, please thank all presenters and delegates.

Oral presenters

- Confirm the date and time of your presentation (see conference website).
- Presenters are not allowed to move their presentations to a different time slot.
- Report to the chairperson of the session at least 10 minutes before the session starts.
- All oral presentations need to be submitted to the technical assistant at the help desk by 09h00 on the day of the presentation. If you prefer to email your presentation, you can send it to sasa2024@sastat.org. Please use the following filename format for your presentation: surname_stream_day. Any delay caused by not meeting this deadline will be subtracted from the allocated presentation time.
- Laser pointers will be available in the venues.
- Each presenter is allocated 15 minutes for their presentation and 5 minutes for questions. Please keep to this time allocation. The session chair will give a 5 minute warning before the end of the allocated 15 minutes and then a final warning when the 15 minutes is up. Once the chairperson has indicated the end of your presentation, please stop immediately.

Speed presenters

- Confirm the date and time of your presentation.
- Presenters are not allowed to move their presentations to a different time slot.
- Report to the chairperson of the session at least 10 minutes before the session starts.
- All oral presentations need to be submitted to the technical assistant at the help desk by 09h00 on the day of the presentation. If you prefer to email your presentation, you can send it to sasa2024@sastat.org. Please use the following filename format for your presentation: surname_stream_day. Any delay caused by not meeting this deadline will be subtracted from the allocated presentation time.
- Laser pointers will be available in the venues.
- Each presenter is allocated 8 minutes for their presentation. Please keep to this time allocation. The session chair will give a 2 minute warning before the end of the allocated 8 minutes and then a final warning when the 8 minutes is up. Once the chairperson has indicated the end of your presentation, please stop immediately. Questions will be taken at the end of the speed session.

Poster presenters

- Posters will be displayed in tea/coffee area.
- Presenters must set up their posters by 10h40 on day 1 of the conference, 20 November 2024.
- Presenters must be available for discussion and questions on 20 November 2024 from 10h40 to 11h00 (morning tea) and again from 15h40 to 16h00 (afternoon tea).
- Each presenter's name will be allocated to their specific board. Please use the board that has been allocated to you and do not remove names from the boards.
- As per the information circulated to delegates prior to the conference, a board which can take a poster of size A1 in portrait format will be available for each delegate.
- Pins will be provided to affix the poster to the board.
- Posters are to remain up until 11h30 on the last day, 22 November 2024.

Conference proceedings

SASA will once again be producing proceedings of peer-reviewed papers from its annual conference. Presenters who would like to submit contributions for review and publication in the proceedings are invited to submit their papers directly to the Proceedings Editor (proceedings.editor@sastat.org). Papers should contain original research on theoretical or applied statistics.

Submissions for the conference proceedings open on 1 November 2024 and the deadline for submission is 31 January 2025.

Please refer to the Conference Proceedings page on the conference website for more information.

Keynote speakers

Prof. Tanja Verster

North-West University, South Africa

Tanja Verster, a professor at the Centre for Business Mathematics and Informatics at North-West University in South Africa, launched her career with a master's degree in quantitative risk management. She initially worked as a quantitative analyst at First National Bank before transitioning to academia as a lecturer at North-West University in May 2003. She earned her PhD in Risk Analysis, with a focus on credit scoring, from the Centre for BMI in 2007. Currently, she teaches postgraduate courses in credit scoring, predictive modelling, and data mining, and engages in applied research projects mostly related to predictive modelling in credit. Over the past 21 years at BMI, Tanja has published over 30 peer-reviewed papers, completed more than 40 industry-directed research projects, and supervised numerous PhD and master's students. She was recognized as a C-rated researcher by the National Research Foundation (NRF) in 2020.

Dr. Alex Shabala

Capitec, South Africa

Dr Alex Shabala is the Group Head of Data Science at Capitec. He holds a PhD in Applied Mathematics from the University of Oxford. Over the past decade, he has worked in both academia and industry, applying Machine Learning and Artificial Intelligence (AI) in fields as varied as Climate Research and Financial Services. He is passionate about Machine Learning and its potential to improve peoples' lives. At Capitec, he is leading the use of AI products that deliver on its four fundamental pillars of Simplicity, Affordability, Accessibility and Personalised Experience.

Plenary sessions

Prof. Mohammad Arashi

Ferdowsi University of Mashhad, Iran

Mohammad Arashi is a Professor of Statistics and Director of the Data Science Laboratory at the Ferdowsi University of Mashhad in Iran and an Extraordinary Professor at the University of Pretoria in South Africa. He is the co-author of three books with Wiley, co-editor of one book with Springer, and an elected member of ISI.

Prof. Carlos Coelho

NOVA University of Lisbon, Portugal

Carlos A. Coelho is a Full Professor of Statistics at the Mathematics Department of NOVA School of Science and Technology of NOVA University of Lisbon. He holds a Ph.D. in Biostatistics by The University of Michigan, Ann Arbor, MI, U.S.A., where he was a Fulbrighter. His main area of research is Multivariate Analysis, namely the development of likelihood ratio tests for elaborate covariance structures and for MANOVA models, also with elaborate covariance structures, together with the study of the exact distribution and the development of near-exact distributions for the associated test statistics. Related with this area, other areas of interest are Mathematical Statistics and Distribution Theory, as well as Estimation, Univariate and Multivariate Linear, Generalized Linear and Mixed Models.

More recently, he also got interested in tests for high-dimensionality and the application of Multivariate Analysis techniques to Statistical Disclosure Control problems. Carlos A. Coelho has served in the Editorial Boards of Discussiones Mathematicae—Probability and Statistics, REVSTAT-Statistical Journal, the Journal of Interdisciplinary Mathematics and the Journal of Applied Statistics and currently serves in the Editorial Boards of the Journal of Statistical Theory and Practice, the American Journal of Mathematical and Management Sciences. He is also Associate Editor of the Springer Book series "Emerging Topics in Statistics and Biostatistics" and a member of the International Council of the "Business World" Library of the Tsenov Academy of Economics (Svishtov, Bulgaria). Currently, Carlos A. Coelho also serves as President of Fulbrighters Portugal, the Portuguese Fulbright Alumni Association.

Prof. Maxim Finkelstein

University of the Free State, South Africa

Professor Maxim Finkelstein had obtained the M.Sc. degree in mathematical physics from Leningrad State University, St. Petersburg, Russia in 1971; the Ph.D. degree in operations research and the Doctor of Science (habilitation) degree in operations research from the Elektropribor Institute, St. Petersburg, Russia in 1979 and 1993, respectively. He is currently a Distinguished Professor with the Department of Mathematical Statistics, University of the Free State, Bloemfontein, South Africa, where he works since 1998. He is awarded the highest A1 ranking by the National Research Foundation of South Africa and is a recipient of 3 Sichel Medals (for the best publications) from the South African Statistical Association. Currently, he is also a Visiting Professor at the Department of Management Science of Strathclyde University, Glasgow, UK (since 2021). He had published around 300 papers and six books on different aspects of mathematical reliability theory and stochastic modelling. His main research interests are reliability theory and applications, survival analysis, risk and safety modelling and relevant stochastic processes. His last book (co-authored with prof. J.H. Cha) "Point Processes for Reliability Analysis. Shocks and Repairable Systems" was published by Springer in 2018. From 2003 to 2018, he was also a Visiting Professor at the Max Planck Institute for Demographic Research, Rostock, Germany, where he was applying methods of stochastic modelling used for engineering systems to populations of organisms including human populations. Prof. Finkelstein serves as a board member or/and an associate editor for numerous international journals in his field.

Mr. Lucas van der Meer

University of Salzburg, Austria

Lucas van der Meer is a doctoral researcher in geoinformatics at the University of Salzburg in Austria. He obtained a bachelor in spatial planning at the University of Groningen in The Netherlands, with an academic minor in mathematics and statistics. His master in Geospatial Technologies was a joint degree from the University of Münster in Germany and the Nova Information Management School in Lisbon, Portugal. His research lies on the intersection between spatial data science and human behavioural science. It focuses on quantitative model development within human-centric urban planning practices, geospatial network analysis, and the assessment of sustainable transport accessibility in particular. Lucas is an advocate for open, reproducible science, and has authored multiple software packages in both R and Python.

Workshops

Pre-conference workshops are on 18 and 19 November 2024. The facilitators of the workshops are as follows:

Workshop	Facilitator	18 November	19 November
Neural Networks and Deep Learning (with R and Python)	Mohammad Arashi		08h30 - 17h00
Meta-Analysis and Network Meta-Analysis in Public Health Applications	Din Chen and Najmeh Nakhaeirad	08h30 - 13h00	
Insights into NRF Grant Writing and Rating Applications	StatsNetSA	08h30 - 17h00	
User-friendly biplots in R with biplotEZ	MDAG	14h00 - 17h00	
Likelihood Ratio Tests in Multivariate Analysis whose statistics have quite simple finite form representations for their distribution	Carlos Coelho		08h30 - 13h00
Credit Scorecard Development Tools	Tanja Verster		14h00 - 17h00
Analyzing geospatial networks in R with sfnetworks	Lucas van der Meer		08h30 - 13h00

Please scan the QR code to access the workshop information on the conference website.

Venues for workshops

Venue 1	Venue 2	Venue 3
Magnifica 1	Magnifica 2	Magnifica 3

Workshop schedule

Monday, 18 November 2024			
08h00 – 08h30	Registration		
08h30 – 13h00	**Morning Workshops**		
Venue: Facilitator(s):	**Magnifica 1** *Din Chen and Najmeh Nakhaeirad*	**Magnifica 2**	**Magnifica 3** *StatSNetSA*
08h30 - 10h30	Session 1		Session 1
10h30 - 11h00	**Morning Tea**		
11h00 - 13h00	Session 2		Session 2
13h00 - 14h00	**Lunch**		
13h30 – 14h00	Registration		
14h00 – 17h00	**Afternoon Workshops**		
Venue: Facilitator(s):	**Magnifica 1** *MDAG*	**Magnifica 2**	**Magnifica 3** *StatSNetSA*
14h00 - 15h30	Session 1		Session 3
15h30 - 16h00	**Afternoon Tea**		
16h00 - 17h00	Session 2		Session 4

Tuesday, 19 November 2024			
08h00 – 08h30	Registration		
08h30 – 13h00	**Morning Workshops**		
Venue: Facilitator(s):	**Magnifica 1** *Mohammad Arashi*	**Magnifica 2** *Lucas van der Meer*	**Magnifica 3** *Carlos Coelho*
08h30 - 10h30	Session 1	Session 1	Session 1
10h30 - 11h00	**Morning Tea**		
11h00 - 13h00	Session 2	Session 2	Session 2
13h00 - 14h00	**Lunch**		
13h30 – 14h00	Registration		
14h00 – 17h00	**Afternoon Workshops**		
Venue: Facilitator(s):	**Magnifica 1** *Mohammad Arashi*	**Magnifica 2**	**Magnifica 3** *Tanja Verster*
14h00 - 15h30	Session 3		Session 1
15h30 - 16h00	**Afternoon Tea**		
16h00 - 17h00	Session 4		Session 2

Meetings

Meeting / Function	Time	Venue
SASA Executive meeting	Tues, 19 Nov, 16h00 – 17h00	Magnifica 2
Interest group meetings	Wed, 20 Nov, 17h00 – 18h00	See full programme
SASA AGM	Thurs, 21 Nov, 17h00 – 18h00	Magnifica 4/5
HOD meeting Roundtable discussion: Sustainability of an "Institute for Mathematical Sciences"	Thurs, 21 Nov, 18h00 – 19h00	Magnifica 3

Social events

Meeting / Function	Time	Venue
Opening ceremony	Wed, 20 Nov, 08h30 – 09h40	Magnifica 4/5
Welcome function	Wed, 20 Nov, 18h00 – 20h00	Omega
Young Statisticians' function	Wed, 20 Nov, 20h00 – 23h00	Omega
Gala dinner	Thurs, 21 Nov, 19h30 – 23h00	Magnifica 4/5

Full Programme

**Presenter is part of Young Statisticians competition*

Wednesday, 20 November 2024

08h00 – 13h00	**Registration**			
08h30 – 09h40	**Opening Ceremony**			
08h30 08h40 09h00	Welcome: Prof. Tyrone Pretorius President's address: Prof. Inger Fabris-Rotelli Awards: SAS awards Postgraduate paper competition winner Sichel Medal Fellowship and Honorary Members Thought Leader (sponsored by SAS)			
09h40 – 10h40	**Plenary Session: Prof. Tanja Verster** *Turning Challenges into Opportunities: Leveraging Industry-Related Research in Predictive Financial Modelling through Machine Learning, Fintech and Financial Crises* **Chair:** Prof. Inger Fabris-Rotelli			
10h40 – 11h00	**Morning Tea**			
11h00 – 12h00	**Plenary Session: Prof. Carlos Coelho** *Likelihood Ratio Tests for Profile Analysis in the high-dimensional case* **Chair:** Dr Humphrey Brydon			
12h00 – 13h00	**Parallel Sessions**			
Venue: Stream: Chair:	**Magnifica 1** **Computational Statistics** *Andre Kleynhans*	**Magnifica 2** **Applied Statistics** *Wessel Moolman*	**Magnifica 3** **Biostatistics** *Esme Jordaan*	**Magnifica 4/5** **Data Science** *Lindani Dube*
12h00 – 12h20	Comparing the asymptotic relative efficiency of the CMP model with the negative binomial model *Yuvraj Sunecher*	The GARCH-EVT – Gumbel copula approach to quantifying portfolio diversification effects *Thabani Ndlovu**	Analysis of predictors related to diagnosis of hypertension correlated with heart attacks in South Africa *Ruffin Mutambayi*	The future of programming in the age of GenAI *Andre Zitzke*
12h20 – 12h40	Divergence-based approach in bivariate tail dependence coefficient estimation *Richard Minkah*	Extreme value dependence analysis to BitCoin/US Dollar and South African Rand/US Dollar exchange rates *Katleho Makatjane*	Cytokine profiles as predictors of HIV incidence using machine learning survival models and statistical interpretable techniques *Sarah Ogutu**	Transferability of GANs-UNet model for informal road detection in underdeveloped areas Luandrie Potgieter
12h40 – 13h00	Entropy penalised self-paced learning *Andre Kleynhans*	Estimation of covariance function of a stationary ARMA process *Wessel Moolman*	Analysing exercise-associated muscle cramping in ultramarathon runners using predictive modelling *Xabsa Mohumed**	Understanding the impact of parameter estimates on model performance *Lindani Dube*

Wednesday, 20 November 2024 (continued)

13h00 – 14h00	**Lunch**			
14h00 – 15h40	**Parallel Sessions**			
Venue: Stream: Chair:	**Magnifica 1** **Statistics in Education** *Johan Ferreira*	**Magnifica 2** **Applied Statistics** *Caston Sigauke*	**Magnifica 3** **Multivariate Analysis** *Esme Jordaan*	**Magnifica 4/5** **Biostatistics** *Bonginkosi Ndlovu*
14h00 – 14h20	Trends in quantity and demographic composition of statistics graduates at South African universities, 1986-2022 *Thomas Farrar*	Non-parametric methods for forecasting South African maize and wheat prices *Emelia Kammies*	The past, present and future of visualising sentiments *Zoë-Mae Adams**	Application of joint modelling and longitudinal latent modelling to antiretroviral adherence monitoring *Campbell Mcduling*
14h20 – 14h40	Profiling students at risk of dropout at a university in South Africa *Piet Ntema*	A discrete-time competing risk analysis of students' academic behaviour: cause-specific and subdistribution hazards approach *Lionel Kemda*	Understanding macroeconomic factors' influence on South African maize production and food security: VECM analysis *Cynthia Ngwane*	Proportion and risk factors associated with 'Never tested for HIV' amongst women in Tanzania *Sizwe Mbona*
14h40 – 15h00	An illustration of gender differential item functioning analysis in mathematics from national benchmark tests *Precious Mudavanhu*	Predictors of emotional and physical abuse towards Kenyan men: a logistic regression analysis *Tshaudi Motsima*	Comparing the power of multivariate test statistics for three-factor interaction in a 3-way contingency table *Precious Mokoena*	Dynamic prediction and standard prediction models for type 2 diabetic individuals in the Western Cape *Frissiano Honwana*
15h00 – 15h20	Identifying contributing factors to profile non-completing students in the Faculty of Natural Sciences *Edwin Mahlangu* / Kesia Phigeland**	Logistic regression analysis to identify the determinants of concurrent sexual partnership among Kenyan women *Banele Mdakane*	Application of marginal theory for variable selection in partially linear models *Mina Norouzirad*	Emailed publication invitations received by biostatisticians: academically sound versus potentially predatory journals *Gina Joubert*
15h20 – 15h40	Development and implementation of fictional narratives for enriched teaching of university-level statistics *Johan Ferreira*	Data-driven approaches for predicting electricity demand *Caston Sigauke*	The impact of environmental shocks due to climate change on intimate partner violence: A SEM *Esme Jordaan*	A nonparametric estimation of cumulative incidence functions in the presence of cured subjects *Bonginkosi Ndlovu*

Wednesday, 20 November 2024 (continued)

15h40 – 16h00	**Afternoon Tea**			
16h00 – 17h00	**Plenary Session: Prof. Maxim Finkelstein** *Heterogeneity ruses: some surprising effects and paradoxes of survival* **Chair:** Dr Retha Luus			
17h00 – 18h00	**Interest Group Sessions**			**Magnifica 4/5**
Venue:	**Magnifica 1**	**Magnifica 2**	**Magnifica 3**	
17h00 – 17h30	MDAG	Extreme Value Theory	Forecasting	Spatial Statistics
17h30 – 18h00	Biostatistics	Statistics Education		StatSNetSA
18h00 – 20h00	**Welcome Function**			
20h00 – 23h00	**Young Statisticians' Function**			

	Thursday, 21 November 2024			
08h00 – 13h00	**Registration**			
09h00 – 10h00	**Plenary Session: Dr Alex Shabala** *Navigating the AI Wave: Practical Insights from the Financial Services industry* **Chair:** Prof Renétte Blignaut			
10h00 – 11h20	**Parallel Sessions**			
Venue: Stream: Chair:	**Magnifica 1** **Spatial Statistics** *Rene Stander*	**Magnifica 2** **SARCHI Biostatistics** *Din Chen*	**Magnifica 3** **Multivariate Analysis** *Sugnet Lubbe*	**Magnifica 4/5** **Financial Statistics** *Modisane Seitshiro*
10h00 – 10h20	Optimal grid selection in spatial statistics *Jamie-Lee Nel**	Seasonal catchment areas using an attribute based fuzzy lattice data structure *Michelle de Klerk*	GPAbin biplots for continuous data: a methodology for combining biplots of completed continuous data sets *Mokgeseng Ramaisa**	Valuation of life insurance business with deep neural networks *Jan Blomerus*
10h20 – 10h40	Investigating the robustness of clustered point pattern simulation *Amy Pieters**	Sample size calculations in diagnostic accuracy studies with frequentist and Bayesian approaches *Lizelle Venter*	Compositional biplot approaches *Phuti Sebatjane*	Goodness-of-fit tests with applications in risk modelling *Leoni Snyman*
10h40 – 11h00	Enhanced point pattern analysis on nonconvex spatial domains *Kabelo Mahloromela*	Virtual screening of plants and compounds against various disease targets using machine learning *Alexander Kelbrick**	Mapping linguistic beauty: biplot analysis of 228 world language patterns *Raeesa Ganey*	Application of extreme value theory to finance data *Daniel Mashilo**
11h00 – 11h20	An improved test for the accuracy of spatial point pattern tests *Rene Stander*	Geospatial small area estimation of hemoglobin levels of women and children in official statistics *Seyifemickael Amare Yilema*	Timeseries PCA biplots *Sugnet Lubbe*	Enhancing financial market risk measures: a comparative analysis of long-memory GARCH-type models *Modisane Seitshiro*
11h20 – 11h40	**Morning Tea**			

Thursday, 21 November 2024 (continued)

11h40 – 13h00	**Parallel Sessions**			
Venue: Stream: Chair:	**Magnifica 1** **Bayes** *Neill Smit*	**Magnifica 2** **SARCHI Biostatistics** *Din Chen*	**Magnifica 3** **Applied Statistics** *Ariane Neethling*	**Magnifica 4/5** **Industrial and Business Statistics** *Fabio Correa*
11h40 – 12h00	Bayesian variable selection for skew-normal models *Arnold van Wyk*	Exploring the bidirectional pathway between intimate partner violence and depression from a cluster randomised trial *Nada Abdelatif*	The analysis of the cosmological parameters using maximum likelihood estimator and chi-square *Sinenhlanhla Nxumalo**	Use of some important statistical methods in electrical energy generation and their applications *Vincent Micali*
12h00 – 12h20	Bayesian approach to the estimation of asymptotic dependence and independence in joint tails *Nicholas Kwaramba*	An analytical and empirical comparison of meta-analysis methods for individual participant binary data *Abigail Mberi*	Generalising the molecular speed distribution of Maxwell *Iain MacDonald*	Quantifying loss to the SA wholesale and retail industries using interrupted time series models *Thabiso Masena**
12h20 – 12h40	A quantile regression model for bounded longitudinal data and survival data *Sean van der Merwe*	Parametric analysis of multistate survival modelling for birth parity transitions in rural South Africa *Portia Nevhungoni*	Quantifying the directional relationship between natural hydrogen depressions and fault lines in Mpumalanga, South Africa *Calvin Jens Botha**	Distribution-free generalised EWMA control charts using two-sample tests with application in froth flotation process *Palesa Makena*
12h40 – 13h00	A threshold-search approximate Bayesian computation algorithm for parameter estimation *Neill Smit*	Multivariate Bayesian small area estimation of health statistics indicators *Samuel Manda*	Designing an optimal survey sample with predetermined sample sizes for subgroups *Ariane Neethling*	Enhanced process monitoring: the bootstrapped cumulative sum-exponentially weighted moving average (BCUSUM-EWMA) control chart approach *Braimah Joseph Odunayo*
13h00 – 14h00	**Lunch**			
14h00 – 14h40	**Plenary Session: Prof. Mohammad Arashi** *Bayesian Learning in Graphical Models* **Chair:** Dr Humphrey Brydon			

Thursday, 21 November 2024 (continued)

14h40 – 15h40	Parallel Sessions			
Venue: Stream: Chair:	**Magnifica 1** **Theoretical Statistics** *Andriette Bekker*	**Magnifica 2** **SARCHI Biostatistics** *Inger Fabris-Rotelli*	**Magnifica 3** **Multivariate Analysis** *Legesse Debusho*	**Magnifica 4/5** **Industrial and Business Statistics** *Majika Malela*
14h40 – 15h00	Insights into the construction of alternative bivariate cardioid distributions *Delene van Wyk-de Ridder**	Spatial dependency modelling of disjoint spatial areas - SAPRIN urban node analysis *Ephent Selahle*	Multivariate stratified sampling allocation *Georgi Borros*	A generalised homogeneously weighted moving average scheme for monitoring the process mean *Maonatlala Thanwane*
15h00 – 15h20	A contaminated negative binomial model for count health data *Arno Otto**	Modelling toroidal data for representation and analysis of protein dihedral angles *Claudio Jardim**	Type I multivariate Pólya-Aeppli distributions with applications *Claire Geldenhuys*	The importance of specification of the deterministic components in the co-integration model: using data on employment costs and gross earnings to show the impact of model misspecification *Sagaren Pillay*
15h20 – 15h40	Soft clustering missing at random (MAR) data *Jason Pillay**	The road not taken: spatial network optimisation on South African informal settlements *Charlotte van Zyl*	Application of longitudinal multilevel aero-inflated Poisson regression in modelling infectious diseases among infants in Ethiopia *Bezalem Yirdaw**	A rank-based EWMA TBEA control chart *Majika Malela*
15h40 – 16h00	**Afternoon Tea**			

Thursday, 21 November 2024 (continued)				
16h00 – 17h00	**Parallel Speed Sessions**			
Venue: Stream: Chair:	**Magnifica 1** **Speed Presentations 1** *Renétte Blignaut*	**Magnifica 2** **Speed Presentations 2** *Julia Keddie*	**Magnifica 3** **Speed Presentations 3** *Retha Luus*	**Magnifica 4/5** **Speed Presentations 4** *Humphrey Brydon*
16h00 – 16h10	Logratio analysis (LRA) and compositional biplots of milk fatty acids *Raeesa Ganey*	Modelling divest South African stock prices using mixture distribution *Martin Chanza*	Estimating the incubation period of COVID-19 *Lebogang Baloi*	Identifying differences between batters in Twenty20 cricket using principal component analysis and biplots *Cameron Howe-Dreyer**
16h10 – 16h20	Design of spatial capture recapture (SCR) surveys for stratified populations *Greg Distiller*	Shewhart X control charts for monitoring the mean of autocorrelated AR(1) data *Mandla Diko*	The impact of clustering in randomised clinical trials: scoping review and comparative statistical analysis *Mikateko Mazinu*	An R Shiny application for optimising mixed medley team selection in Masters swimming *San-Mari Ackerman**
16h20 – 16h30	Statistical data analysis of a multidimensional binary data using chi-square tests and correspondence analysis *Nombasa Ntushelo*	Seasonal volatility patterns in SAFEX grain futures: analysing environmental and supply-side risks *Chun-sung Huang*	bipl5: An R package for reactive calibrated axes biplots *Ruan Buys*	An adjustive rating system for rugby union based on exponential smoothing *Paul van Staden*
16h30 – 16h40	Network analysis and disruption simulation of a South African cash-in-transit criminal network *Stefan Britz*	New classes of tests for the Weibull distribution in the presence of random right censoring *Elzanie Bothma*		Exploratory spatial analysis of early grade reading data in KwaZulu-Natal *Joshua Engelbrecht*
16h40 – 16h50	A noncentral Poison-Lindley distribution contextualised in a process monitoring framework *Ané van der Merwe*	Bayesian prior elicitation for malaria modelling *Makwelantle Sehlabana*	A methodology for wave detection in epidemics *Nada Abdelatif*	Enhancin3g research guidance in statistics supervision: adapting to the generative AI era *Danielle Roberts*
16h50 – 17h00	Distributions of wet and dry spells *Nothabo Ndebele*	Economic recession prediction using modified gradient boosting and principal component neural network algorithms *Anuroop Krishnannair*	Decomposing factors influencing teenage pregnancy and motherhood in Nigeria, 2003 – 2018 *Rotimi Afolabi*	Unravelling the dynamics of GGE biplots as visualisation tool to interpret and present agricultural trials *Mardé Booyse*
17h00 – 18h00	**SASA AGM**			
19h30	**Gala Dinner**			

	Friday, 22 November 2024			
09h00 – 10h00	**Plenary Session: Mr Lucas van der Meer** *What's so special about geospatial networks?* **Chair:** Prof. Inger Fabris-Rotelli			
10h00 – 11h20	**Parallel Sessions**			
Venue: Stream: Chair:	**Magnifica 1** **Applied Statistics** *Ansie Smit*	**Vista** **Official Statistics** *Yeganew Shiferaw*	**Omega** **Experimental Design** *Roelof Coetzer*	**Magnifica 4/5** **Data Science** *Ruffin Mutambayi*
10h00 – 10h20	Comparative analysis of the return level estimates based on block maxima and POT extreme value theory approaches *Anna Seimela*	Fiducial and Bayesian Estimation for Cronbach's Alpha *Sharkay Izally*	A consolidated approach to linear mixed models with factors having both fixed and random levels *Lyson Chaka*	Taking data science collaboration to new heights in a study to better understand perceived versus actual digital behaviour *Fallo Khanye**
10h20 – 10h40	A stochastic modelling of South African COVID-19 mortality, new infections and vaccination dynamics *Malandala Kajingulu*	Modelling determinants of contraceptive use among women in Nigeria using a hybrid ensemble approach *Rotimi Afolabi*	Construction and analyses of complete diallel cross through partially balanced incomplete block designs *Anteneh Yalew*	Clustering and classifying global food insecurity index and crop production using machine learning algorithms *Jaden Pieterse**
10h40 – 11h00	Stochastic modelling on rainfall variability in Northern Nigeria *John Olaomi*	Quantifying how fast South Africa's new car sales recovered from the COVID-19 pandemic using time series intervention analysis *Tendai Makoni*	A theoretical framework for correcting misspecification in geo-experiment ad campaigns *Iman Al Hasani*	An assessment of the impact of spatial connectivity structures on spatial model fit: machine-learning approach *Claris Siyamayambo*
11h00 – 11h20	Profile-likelihood based confidence intervals in earthquake hazard assessment models *Siyamthanda Prusent**	Estimating disability rates in South African districts using area-level Poisson mixed models *Yegnanew Shiferaw*	Experimental designs for estimating non-linear models in mixture variables *Roelof Coetzer*	Determination of predictors related to high blood pressure in South Africa using machine learning techniques *Nhlonipho Mbhele*
11h20 – 11h40	**Morning Tea**			

Friday, 22 November 2024 (continued)

11h40 – 12h40	Parallel Sessions			
	Magnifica 1 **Theoretical Statistics** *Charl Pretorius*	**Vista** **Spatial Statistics** *Inger Fabris-Rotelli*	**Omega** **Biostatistics** *Isaac Singini*	**Magnifica 4/5** **Data Science** *Stephan van der Westhuizen*
Venue: Stream: Chair:				
11h40 – 12h00	A combined point process for better-than-minimal, minimal, and worse-than-minimal repairs *Amy Langston*	From hotspot detection to accessibility: a spatial network analysis of informal settlements *Rainier van der Walt**	Heteroscedastic accelerated failure time model for length-biased right-censored data *Mahboubeh Akbari Lakeh*	Survival analysis of time-to-credit default in the presence of time-varying covariates *Lusanda Mdhlalose*
12h00 – 12h20	On precedence tests with double sampling *Niladri Chakraborty*	A statistical exploration of the effect of road network structure on road-based accessibility *Renate Thiede*	Prevalence and risk factors associated with HIV infection among pregnant antenatal attendees in Limpopo Province *Donald Tshabalala*	Stakeholder focused explainable artificial intelligence *Gandhi Jafta**
12h20 – 12h40	Break detection in high-dimensional panel data *Charl Pretorius*	Spatial linear network Voronoi analysis to quantify accessibility of police stations in SA *Arthur Antonio*	Joint modelling for longitudinal and interval censored survival data *Isaac Singini*	Mapping soil thickness by accounting for right-censored data with survival probabilities and machine learning *Stephan van der Westhuizen*
13h00 – 13h30	**Closing Ceremony**			

Abstracts: Keynote and plenary sessions

Turning Challenges into Opportunities: Leveraging Industry-Related Research in Predictive Financial Modelling through Machine Learning, Fintech, and Financial Crises

Prof. Tanja Verster | *North-West University, South Africa*

This talk explores several factors influencing predictive financial credit risk modelling. The first factor is machine learning. As the field of machine learning grows, it becomes essential to understand how these techniques function and how they can be applied. The second factor is financial crises. Predictive models often assume that the future will mirror the past, but financial crises can disrupt this assumption. This necessitates new research on adjusting predictive models to incorporate forward-looking conditions, including anticipated financial crises. The third factor examines the impact of financial technology (Fintech) on the future of predictive modelling. Fintech introduces new applications for predictive modelling, expanding the possibilities within the field. These evolving factors present challenges, but challenges can be seen as opportunities. One way to leverage these opportunities and manage associated risks is through industry collaboration. Academics can collaborate with industry to develop industry-focused training and industry-focused research to effectively manage these challenges and seize opportunities for mutual benefit.

Navigating the AI Wave: Practical Insights from the Financial Services industry

Dr. Alex Shabala | *Capitec, South Africa*

What do recent advances in Generative AI mean for the future of industry applications? Drawing from on-the-ground experience in financial services, this talk will offer insights into current trends and potential future developments in AI adoption. We'll explore real-world examples of how Generative AI is being integrated into existing processes and how this changes the landscape for practitioners. The presentation will conclude with reflections on the key factors that will shape success in this AI-enhanced future.

Bayesian Learning in Graphical Models

Prof. Mohammad Arashi | *Ferdowsi University of Mashhad, Iran*

Directed acyclic graphs (DAGs) are solid structures that can represent and infer the connections among variables in multivariate contexts. It is crucial to fully grasp the specific model that produces DAGs for causal discovery and estimation. Specifically, we address the Bayesian Gaussian DAG learning in graphical models. Our proposed Bayesian DAG model benefits from a modified Cholescky decomposition for learning the covariance structure. Then, we estimate the posterior probability in the Gaussian DAG with the correct prior specification on the Cholesky parameters. We will go over some computational details and numerical studies will go into more detail about networks' benefits, causality, and Bayesian learning.

Likelihood Ratio Tests for Profile Analysis in the high-dimensional case

Prof. Carlos Coelho | *NOVA University of Lisbon, Portugal*

Likelihood Ratio Tests (LRTs) for a full profile analysis in the high-dimensional case are introduced. Tests for profile parallelism, profile coincidence and profile horizontality, which may be used in the high-dimensional case, are derived. The distributions for the associated statistics are obtained, and finite closed forms are derived for most cases, while for the other cases sharp asymptotic approximations are established. Applications with real soil moisture data are presented to illustrate the several steps in profile analysis.

Heterogeneity ruses: some surprising effects and paradoxes of survival

Prof. Maxim Finkelstein | *University of the Free State*, South Africa

Homogeneity of objects is the unique property that is very rare in nature and in industry. It can be created in laboratory, but not outside it. Therefore, one can hardly find homogeneous populations in real life, however, most of statistical modelling deals with the homogeneous case. Due to instability of production processes, environmental and other factors, most populations of manufactured items in real life are heterogeneous. Similar considerations are obviously true for biological items (organisms). Neglecting heterogeneity can lead to serious flaws in assessing properties of the corresponding lifetime distributions. This talk focuses on some a priori not so evident effects of heterogeneity on the failure rates of heterogeneous populations. Several settings that lead to survival paradoxes will be presented and analysed.

What's so special about geospatial networks?

Mr. Lucas van der Meer | *University of Salzburg, Austria*

Geospatial networks consist of nodes and edges embedded in geographical space. In the analysis of these networks, it is crucial to explicitly take space into account, since the graph topology alone does not contain all relevant information. This is said to make geospatial networks special. In this talk, I will explain in more detail what spatial networks are, why they are special, and how we use them in practice to model and analyze real-world complex systems. Specifically, I will focus on the application of geospatial networks to better understand our urban transport system, and its ongoing transition towards a more sustainable design. For which purposes are they useful, and where do they fall short? Finally, I will stress the benefits of open-source software and reproducibility to facilitate an integrated workflow between spatial data science and network science.

Abstracts: parallel sessions

Titles and abstracts, including presenter information of parallel sessions can be found in the abstract book by scanning the below QR code.

Poster sessions

Posters will be available for viewing from Wednesday, 20 November at 10h40 until Friday, 22 November at 11h30 in the tea/coffee area. Presenters will be available on 20 November 2024 from 10h40 to 11h00 (morning tea) and again from 15h40 to 16h00 (afternoon tea) for discussion and questions.

Presenter	Title
Tolulope Adeniji	Application of mixture Weibull-generalised pareto distribution
Edward Baleni*	Autonomous anomaly detection of orchard tree crown delineations
Thembhani Chavalala	Markov-switching volatility models with heavy-tailed distributions for COVID-19 death cases in South Africa
Nicolene Cochrane	Progress on the national sunflower-, soybean- and maize cultivar recommendations in South Africa
Tagen de Wet	Automated analysis of penguin-borne videos using deep learning
Zama Khumalo*	Comparison of malaria prevalence among children under five years of age in Mali and Nigeria
Maria Lekganyane	Development of robust imputation techniques with a view to applications in machine learning
Kgethego Sharina Makgolane	A statistical analysis of factors associated with hypertension among elderly persons in South Africa
Happy Maluleke	Study of risk factors associated with hypertension: a case study of Dikgale Village, Limpopo Province
Mduduzi Maphosa	Fault detection and diagnostic analysis in multivariate compositional data
Dzulani Mashavhela	Exploring the dynamics of the ZAR/USD exchange rate volatility using FGARCH and First-Order Beta-Skew-T-EGARCH models
Gezani Richman Miyambu	Changes on students preferred learning style over a period of three years (2021 – 2023)
Samuel Mnisi	A Bayesian statistical evaluation of the competition indices used in eucalyptus tree growth modelling
Mamelang Molaba	Survival analysis of patients with hypernephroma
Tshilidzi Benedicta Mulaudzi	A shared frailty model for left-truncated and right-censored under-five child mortality data in South Africa
Roland Fomum Nde	Impact of college location on learner's mathematics performance in Limpopo: a correspondence analysis approach
Nomly Ngubeni	Recent advances in spatial statistics methods for rail networks
Thobeka Nombebe	On classes of consistent tests for the Type I Pareto distribution based on a characterisation involving order statistics
Macdonald Phasa	Multinomial regression models: An applied approach to model consumer utility and preference
Phelo Pitsha*	A comparison of the Robust Zero-Inflated and Hurdle Models with an application to maternal mortality
Gomolemo Rakale	The prevalence and spatial dynamics of housebreaking and home robbery hotspots in South Africa
Audrey Tshepho Ramachela	Comparison of the discrete-time survival model and machine learning models
Tshepo Ramarumo	Work integrated learning challenges in a specific academic department of a Gauteng-based university
Thakhani Ravele	Predicting the closing price of cryptocurrency Ethereum
Getachew Tekle*	A new alpha power Weibull model for analysing time-to-event data: application to diabetes mellitus data
Marieta van der Rijst	Multivariate techniques application to reveal mutual trends among data sources: a consumer research case study
Monalisa Williams	Modelling the probability of default using logistic regression and threshold-logistic regression
Teklu Nega Yimenu*	Modelling and forecasting headline inflation in Ethiopia by supervised machine learning approach

**Presenter is part of Young Statisticians competition*

Please scan the QR code to access the poster abstracts.