

Southern African Institute of Forestry



Delivering a professional service to forestry

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From the President's desk

Data Science in Forestry

The volume of data in the world has increased significantly and is doubling each year. With this explosion of data, the concept of "big data" has been established. Data is generated from numerous sources through continuous monitoring using advanced technologies that provide opportunities to adjust and align processes and resources. Forestry is no different, where accurate, reliable data can be obtained providing a major opportunity to practice smart precision forestry. The improvement in precision and speed of data acquisition requires a realignment of analysis tools and storage technologies away from traditional approaches. Forestry big data management and analysis has brought new solutions by effectively organizing large amounts of data and calculating with speed.

To operate an intelligent forestry system or programme reliable data forms the basis for data mining to assist forestry decision makers. Monitoring in forestry relies on remote sensing and location technology to capture a variety of data, including remote sensing platforms,



Photograph by Sipele Masondo (Mpumalanga Branch) from the 2020 Calendar showing a familiar scene from a pine harvesting operation from a different angle. The photo was taken at the KLF Wilgeboom Plantation.

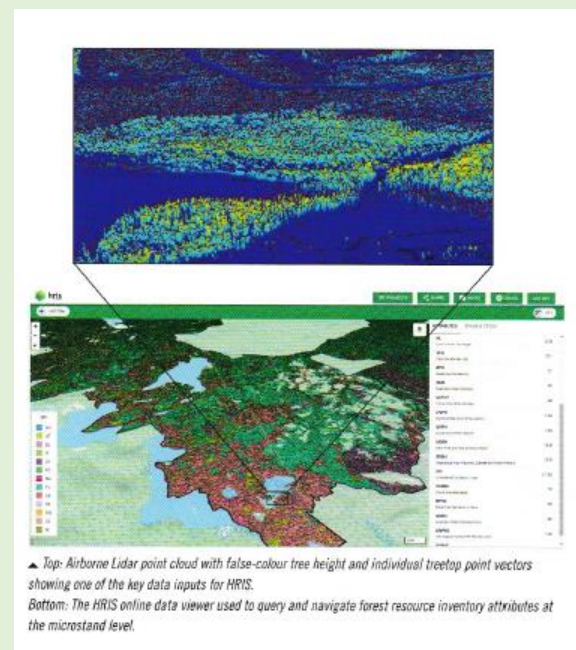


such as ground-based systems, aircraft, satellites and global positioning systems (GPS). Integration of these systems has enabled the remote sensing technology to be comprehensively upgraded and applied in business. Applying big data technology to forestry can simplify the computational complexity, which not only facilitates the mining and utilization of data, but also improves the processing efficiency of forestry data.

By optimizing the storage, query and analysis of forestry data based on big data technology it is possible to improve the response performance and robustness of current forestry applications. With real-time calculation and analysis of forestry data, it is possible to predict changes in the state of plantations to make informed decisions. For example, by monitoring plantations it is possible to detect spectral characteristic changes in tree canopies that may identify pests and disease outbreaks and enable appropriate action to be taken.

Artificial Intelligence (AI) technology can also be applied to improve the ability to intelligently process information when collecting data. According to Dr Riyad Ismail from Sappi, AI helps us find patterns in data and ultimately improves our understanding of processes and phenomena. Machine Learning is a branch of AI and has been used in the environmental sciences in various applications that include oceanography, hydrology, atmospheric sciences and forest ecosystems. The recent availability and accessibility of geo-spatial datasets (i.e. LiDAR, Satellite Imagery, Drone Images)

has provided the impetus for a number of forestry related applications that have used machine learning to learn patterns in the data and then apply these patterns on other similar datasets to generate predictions for data-driven classification and regression problems. South African researchers have derived models to address challenges and problems related to inventory management, forest health and vitality, harvesting and terrain classification, pest and disease management, timber logistics, site productivity and classification and forest fire risk management. While these Machine Learning applications have improved our understanding and hence problem-solving capacity, there is ample opportunity to leverage the latest advancements in AI to derive solutions that convert data to action.



Images shown above taken from article in GIM International Sept/Oct 2019



Rob Thompson's Food for Thought

Will we prevail?

You'll have to take my word for it that I had not been smoking or drinking any particularly strong mind-bending substances prior to writing this article.

I must admit however that, in reading it again, the thought process employed, does appear rather erratic and disparate, albeit defensible in terms of the underlying analysis and conclusion drawn. Before reporting this behaviour to the SAIF Council, understand that absolutely no persons or animals were hurt in the production of the article (at least any that I am aware of).

A friend and colleague recently informed me that his son, a newly qualified civil engineer and now fully engaged in the sport of job hunting, became the victim of a smash and grab at the Cape Town airport, the venue for a scheduled interview. He lost 1) his windscreen, 2) a brand new cell phone - removed skilfully out of its dash cradle and 3) a great deal of faith in his fellow countrymen. All three can be replaced, although number 3 might require some time and considerable patience going forward.

The organisation I work for, relocated last year to Cascades, on the northern side of the City of Pietermaritzburg. It was refreshing to escape the dirt and grime that has rapidly become the default situation of many cities across the country. Almost 12 months later however, it appears as if the potholes, so often encountered on the approach roads to the city, have colluded towards an apocalyptic

assault on the northern reaches. On the positive side, soccer Mums on route to school and foresters on their way to work can now engage that previously undiscovered and totally underused 4X4 control on the dash of their LUV and smile as they pass the low profile racers negotiating eroded canyons in the tar.

Not so long ago a Chinese guy ate a snake in Wuhan after having purchased such from an open-air natural produce market (read: bush and domestic animal meat emporium). He was not to know that the combination of free flowing protein (read: gross blood and gore) within the market would create a bridge for a corona virus, once specific to the snake species that he was consuming, to cross over to himself and mutate into a virulent strain of flu that he would ultimately pass on to the greater population of Wuhan, with further scattered dispersals across the globe. The resulting global panic and consternation has been largely unprecedented causing literal national economic slowdowns and a massive underground black-market trade in surgical masks.

Greta Thunberg became the Time Magazine person of the year much to the distain of one Donald Trump, retired business man turned World super power leader, part time assassin via drone and inveterate habitual Tweeter. So great was his ire that he addressed the Davos World Economic Forum with an earnest, well considered and directed appeal for dish washers to be designed in future to dispense more water ... I kid you not!



Donald's constant bickering with his Chinese counterpart Xi Jinping is causing foresters like you and me tremendous stress given the trade barriers that the two adversaries have erected. Reduced consumption of top-end goods equals reduced packaging equals reduced paper consumption equals reduced raw material usage (read: timber sold) equals lower prices equals my budget torn to shreds for the umpteenth time in the quest for cost reductions in an insecure market environment.

And then Australia caught alight.. literally! Bushlands across that massive continent engulfed in flames and thick smoke for literally weeks. Neighbouring New Zealand had the dubious opportunity to share fully in the smoke fall-out whilst space satellites recorded images and videos of arguably one of the worlds largest natural disasters in evident living memory. I use the word "evident" given that most of us have not heard of or seen the rampant fires in the Arctic of all places, and glacial melts in Greenland each of which constitute a devastating disaster in themselves and irrefutable evidence of a changed natural order. I don't envy our colleagues Down Under the task of mopping up and assessing the fire damage in the months to come. A shout out to the Saffers over there however, who, by all accounts, acquitted themselves well in fire-fighting duties. Respect!

With horrendous events and reports hammering our psyche every day it is little wonder that a cool beer is often the go-to tonic with which to relax and unwind. One knows that one has earned a beer after having wrestled off the industrial shrink wrapping from the pack, cut away half a gum trees worth of paper packaging and twisted off a ballistic

resistant metal cap. The pile of detritus that one is left with after the exercise is enough to be declared an official land fill site on its own. Now if only the world's grotesque production of single use plastic and unnecessary packaging would invoke similar hysteria to that caused by the Wuhan virus, resulting in legislated shut-down of plastic production, global clean up campaigns and environmental awareness...oh wait a minute...reality check...it's the beer talking now.

It goes without saying that half of this article was written in the dark. No, not a dark writers block, but rather a more insidious and ever-more ubiquitous Eskom load-shed event. As South Africans, we are getting used to manic four way crossings sans traffic lights, omnipresent generators on business and domestic properties and regular two hour or longer forays back to the Bronze Age as power outages reduce decades of technological advancements to mere plastic boxes full of mute, non-recyclable components. I overheard a conversation over the weekend, highlighting the extent to which most of us have normalised power outage events. A chap was enquiring if his friend had watched the latest Super Rugby game on TV. "Yip" came the response "Good game hey? I could only see the first-half 'cause of load shedding. How did it end?"

Back to matters forestry, have any of you heard of the Wattle semi looper? Ja...Ja...I know most of you work with eucalyptus but those of us more balanced foresters who deal with wattle as well, are encountering an unprecedented outbreak of these caterpillars that totally defoliate wattle trees. These are indigenous beasts turned rogue and are now



infiltrating commercial plantations with ninja-like efficiency. Literally appearing in stands overnight, these stealth loopers are likely to cause immense financial loss to many wattle growers if a solution is not found soon to nuke them (Trump speak). That said, the eucalyptus guys in KZN are not getting off lightly either, what with *Gonipterus* snout beetles now appreciating the warmer winter temperatures, allowing viable and destructive populations of both young, and mature beetles, in eucalyptus stands. As they rejoice in no longer being decimated by the onset of cold winters they merrily decimate *E. dunnii* and GU hybrids with gay abandon. Their creed now?...Winter is not coming!

The poor chap who didn't see the end of his rugby game sums it all up. He was used to it and probably expected the power interruption. Nothing much surprises us anymore. Our reaction to unfolding news events is complacent acceptance. We know where each pothole is on the way to work and dodge them instinctively. We smile impassively at the inane Tweets between world leaders. We eye the jobless guy on the corner carefully and keep our cell phones concealed as we head to the shops for our daily dose of easy consumption. We complain about the high temperatures as we trudge through yet another insect infested stand to survey the damage.

It takes a moment of quiet reflection to realise that literally all the events that cause us angst of some sort are actually related. Human pressure is the catalyst. The more humans, the more demand for resource (for both real or superfluous reasons). The more pressure on resource the more pressure on balance.

Once balance is out of kilter unnatural outbreaks occur, leadership is placed under pressure and given the human condition, strange (read: detrimental) decisions emerge.

I leave it you to decide if we will ever prevail. You and I are likely not influential enough to make a significant difference to the status quo.

A better understanding of the inherent link between global and domestic events, does however, allow one to take informed individual decisions as one navigates the turmoil that constitutes life on this rock.

May the path you choose add value to others and reward you with an easier trajectory.



Gonipterus Snout Beetle

Please Note: The views expressed in any of the articles in this Newsletter represent that of the author and not necessarily represent the views of the Editor and officials of the SAIF



South African Forestry Sector Makes Chainsaw Training Safer With Virtual Reality

In a world first, trainee chainsaw operators will soon be able to use a [virtual reality \(VR\) application](#) to test their theoretical knowledge and hone their skill in a simulated timber plantation.

Developed by Forestry South Africa (FSA), the Fibre Processing and Manufacturing Sector Education and Training Authority (FP&M Seta) and industry partners, this solution trains chainsaw operators in a safe, simulated environment before they test their skills in this high-risk activity in timber plantations.

While the number of chainsaw operators employed in large commercial plantations has declined in recent years, the opposite is true in small-scale and community forestry, where suitably trained chainsaw operators need to be equipped with this scarce and critical skill.

Although forestry has used simulators over the past decade, their use in the training of chainsaw operators is an innovative development.

Mobile, cost-effective, learner-adaptable and injury-free

The cost of practical training has risen substantially. The sector sought a solution that would not only provide a cost-effective coaching medium with minimal risk, but a means whereby trainee operators could gain a feel for their equipment before taking their first steps into the field or forest.

Safety concerns have proved to be a limiting factor in the training of chainsaw operators. Other constraints include unwieldy class sizes and a limited number of trees available for practical instruction.

“Besides the obvious benefits that our industry stands to gain from this project, VR is the future of skills development and training. It transports learners into the environment for which they are being trained, promotes interactivity and improves the retention of information through experience,” says FSA business development director Norman Dlamini.

“I am holding the very first chainsaw in the world that has been wired with sensors and can transport a learner into a virtual timber plantation,” says Dlamini in a [video](#) developed to promote and demonstrate the application.

The solution is remarkably simple to operate and offers significant value for money. All that is needed is a dedicated computer, a VR headset, a specially adapted chainsaw with sensors and a customised mobile gazebo. The total cost of the hardware to run the app is approximately R35 000, while the software is available free of charge to FSA members.

Project partners

The project has been substantially funded by the FP&M Seta. “It uses fourth industrial revolution technology to improve the quality of instruction. Excited by FSA’s proposal, FP&M Seta contributed to this initiative,” says FP&M Seta CEO Felleng Yende, who too



believes that VR is the future of training and skills development. FSA Executive Director Michael Peter explains that capacity building and development are vital to the sustainability of the industry and its future growth. "Our membership includes not only the country's 11 major corporate forestry companies but 1 300 medium-scale plantation owners and around 20 000 small-scale operators. This development will benefit them by enhancing the quality of operator training," he says.

Some FSA members have already committed to testing the technology at their in-house training departments and will be giving constant feedback to the development team to refine the design of the product prior to commercialisation.

Where to next?

According to Peter, the app will meet the need for better quality and safer training in the industry while standardising the level of training and assessment of trainees across the country. Initial demonstrations have been well-received by the industry, with a Version 2.0 already in the making. "During consultation with user groups, we identified two important improvements to enhance the next generation of VR chainsaw training aids," adds Dlamini.

These will incorporate the use of a wireless module to eliminate cables that interfere with the movement of the learner operator as well as VR gloves to improve haptic feedback from the chainsaw during operation. This will add realism to the experience, enabling trainees to sense vibrations and resistance as the chainsaw engages with the virtual tree or timber.

ERRATUM:

Kindly note that one of the photographer's name was spelled incorrectly in our 2020 Calendar. The photo on the last page " Fly agaric, fruiting body of *Pinus patula mycorrhiza*" was taken by Dr. Bill Bainbridge (and not Brainbridge). Our apologies to Dr. Bainbridge.

Champion Trees of Southern Africa

Pinus taeda (Loblolly pine) at MTO Buffelsnek Plantation. This stand of *P.taeda* was planted in May 1924 and therefore almost 96 years old ! It was registered by DAFF (now DEFF) as a Champion Tree in terms of the National Forest Act (Act. No 84 of 1998)

According to recent measurements one of these giants have been recorded as the tallest pine tree measured at 10.1 m and dbh at 1.2m. Sadly one of these trees fell over recently but as can be seen on the photo, most are still standing.

MTO registered the stand as an Area of Special Interest (ASI) and monitor the site every 2-3 years. Hopefully the new manager succeeding MTO will treat these giants with the same respect



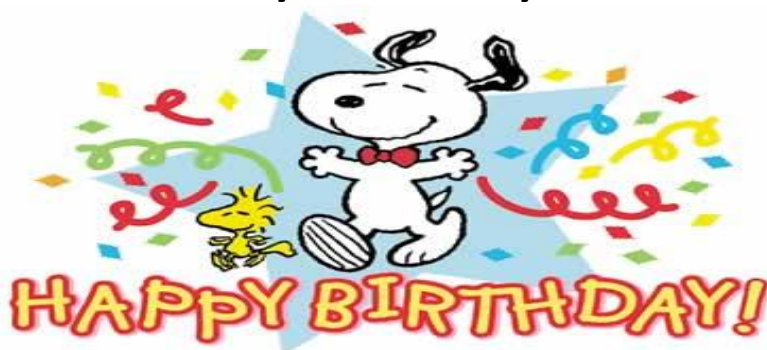
Photo: Buffelsnek compartment B52d : P.taeda

Source : MTO Buffelsnek CMP 2014; Remarkable Trees of South Africa (I. van der Merwe et al, 2016)

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Birthdays – February 2020



BIRTHDAYS : FEBRUARY 2020			
MAKATU A.I.	Feb 02	McEWAN A.M.	Feb 13
ZHANGAZHA F.	Feb 02	ROUX J.	Feb 14
ACKERMAN P.	Feb 03	TJEKETSU T.	Feb 14
DAUGHERTY A.E.	Feb 03	JONES W.R.	Feb 16
DYER C.	Feb 03	SCHAFFER G.N.	Feb 17
JONES N.B.	Feb 04	PAYNE N.A.	Feb 21
MACGREGOR S.	Feb 04	ROSS T.I.	Feb 21
HARRISON G.	Feb 05	SMITH C.W.	Feb 21
HULL R.J.	Feb 05	CHARLTON S.K.	Feb 22
KOTZÈ J.	Feb 06	DAY P.B.B.	Feb 22
NEL J.	Feb 08	HARDY P.H.	Feb 23
MAPETO T.	Feb 09	SCHUTZ C.J.	Feb 24
CUARANHUA C.J.	Feb 12	CARR J.C.M.	Feb 25
KEYWORTH P.J.	Feb 12	NIXON P.R.H.	Feb 28
CRAFFORD S.	Feb 13		



The Southern African Institute of Forestry

Handbook order form

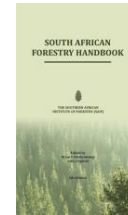
The Southern African Institute of Forestry publishes three industry specific handbooks.

I would like to order:

South African Forestry Handbook

Price: SAIF members: R400

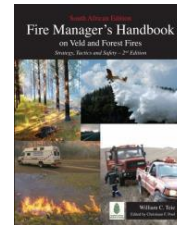
Non members: R500



Fire Manager's Handbook on Veld and Forest Fires

Price: SAIF members: R300

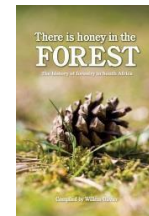
Non members: R400



There's Honey in the Forest

Price: SAIF members: R100

Non members: R150



International orders must contact the Secretariat for a quote due to currency and postage fluctuations.

A bulk discount of 10% applies on orders of 10 or more copies.

Price includes VAT and postage **(within SA)**

I am a member non-member of the SAIF.

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