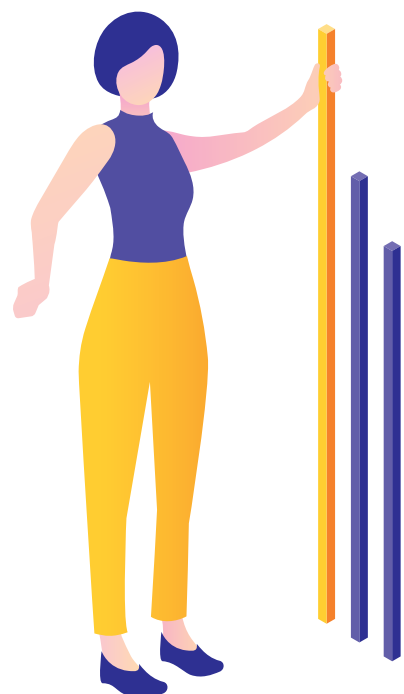


Data scientists use SAS Viya on Microsoft Azure to develop big innovations

Latest SAS hackathon results in AI and analytics projects that will help build a better world

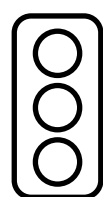




There is no doubt: AI has the potential to transform the way whole industries operate. That transformative power sparked many remarkable innovations during the most recent SAS Global Hackathon.

The Hackathon was made possible with support and participation from SAS Partners Microsoft, Intel and Accenture and was entirely conducted on a Microsoft Azure cloud infrastructure to facilitate the agile analysis and visualization of big data.

More than 100 teams from 31 countries around the world brought their data and challenges to the competition, hoping to have their ideas recognized – and potentially commercialized for public use. In this e-book, we’re highlighting a few of the top hackathon projects across industries, including:



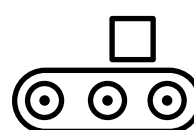
SAVING LIVES

by coordinating traffic lights for emergency vehicles’ safe passage.



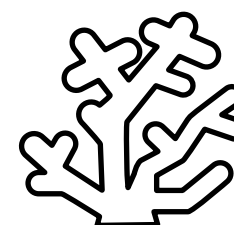
SAVING TIME

by helping consumers find the shortest line in the store.



SAVING MONEY

by predicting manufacturing machinery maintenance events or failure.



SAVING ENTIRE ECOSYSTEMS

such as the world’s fragile coral reefs.



Read more

articles



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01

AI and IoT to the rescue: Traffic lights for life

CHALLENGE

Too often, first-responder emergency vehicles are involved in collisions, typically at intersections. Hundreds of responders and civilians die each year in emergency vehicle collisions and emergency vehicle collisions are the second-leading cause of deaths for US firefighters. Team Hackanadians believe these injuries and deaths could be avoided with the help of an AI-based solution.



Read more

SOLUTION

Their project, Traffic Lights for Life (TL4L), is an AI-based system that allows traffic lights to “listen” for emergency vehicles through audio-sensing, in-cloud deep learning and intersection control to manage traffic and prioritize emergency vehicle safety.

Existing solutions that perform a similar function are based on sound, strobe, sonar and GPS and typically require multi-million-dollar investments by the cities that want to install them. The existing technologies are expensive because they require interactive units installed in each emergency vehicle, as well as infrastructure, physical networks and communications systems. The machine learning and AI-based solution offered by the Hackathon team would cost a fraction of existing solutions, less than \$1,000 per intersection, making it a feasible option for most, if not all, municipalities across the globe.



Watch team video

“The application of artificial intelligence, the Internet of Things and discrete event simulation has allowed us to offer an end-to-end solution to traffic intersection management for the benefit of the public good.”

Heather Friesen, *Hackanadian team leader*



Next story:

Saving coral reefs with accessible AI



02 Saving coral reefs with accessible AI

CHALLENGE

Coral reef disease and destruction is increasing at an alarming rate worldwide due to climate change, human activity and a variety of other unknown factors. IoT, data analytics and modeling can help conservationists, but most conservation organizations don't have the resources or knowledge to apply data analytics and modeling. In addition, the available data is sparse and varied, and risk profiling is difficult due to time delays with reef protection efforts and rapid changes in the environment.



Read more

SOLUTION

The Gondwana Hackathon team, consisting of scientists from Greece, Nepal, India and the US, describes themselves as providing ecological defense microservices. Using SAS Viya on Microsoft Azure, the team modeled major risk factors affecting the health of the world's coral reefs.

The team identified three major risk factors, including: overexploitation of land, overexploitation of species and climate change as well as four predominant indicators to measure reef health, including: light, temperature, salinity and sedimentation. From that, they built a model that can be shared among multiple conservation organizations to help save the world's coral reefs. The goal is to concentrate all of the organizations' efforts and amplify their impact by making the power of AI and analytics accessible to them.

The model the team developed using SAS Viya on Microsoft Azure delivered:

- Efficient data planning and preparation.
- Intelligent decisioning capabilities.
- Quicker insights, leading to quicker outcomes.
- An integrated multi-mode, multi-model suite of solutions.
- Reliability and robustness.
- Speed and scalability.



Project details

"The solution is desirable, feasible and viable ... we can leverage this to solve additional environmental protection issues."

Faiz Ikramulla, *Gondwana team leader*



Next story:

Visualizing the sustainability performance of banking portfolios

03

Visualizing the sustainability performance of banking portfolios

CHALLENGE

The ifb4 Sustainability Hackathon team wanted to create an effective framework for integrating the United Nations Sustainable Development Goals (SDG) into finance. The team's objective is to foster an environment where responsible banking becomes the standard so that the financial sector is able to satisfy its customers and have a positive impact on the planet.



Read more

SOLUTION

By incorporating sustainable development goals from the UN to evaluate investment portfolios, investors can see how portfolios are performing in terms of sustainability. The team's Positive Impact Analyzer for Banking, based on the UNEP Positive Impact Analysis Tool, calculates the bank portfolio SDG index score and displays the results in a dashboard that allows investors to visualize and investigate the current, historical and future level of sustainability performance.

The team's portfolio analysis tool enables easy data uploading, sorting, and analyzing in six steps:

1. Set strategic sustainability goals.
2. Import bank portfolio data.
3. Perform analysis in SAS and Python.
4. Inspect the analysis results.
5. Visualize the analysis results.
6. Identify the potential for sustainability.



Watch the team video

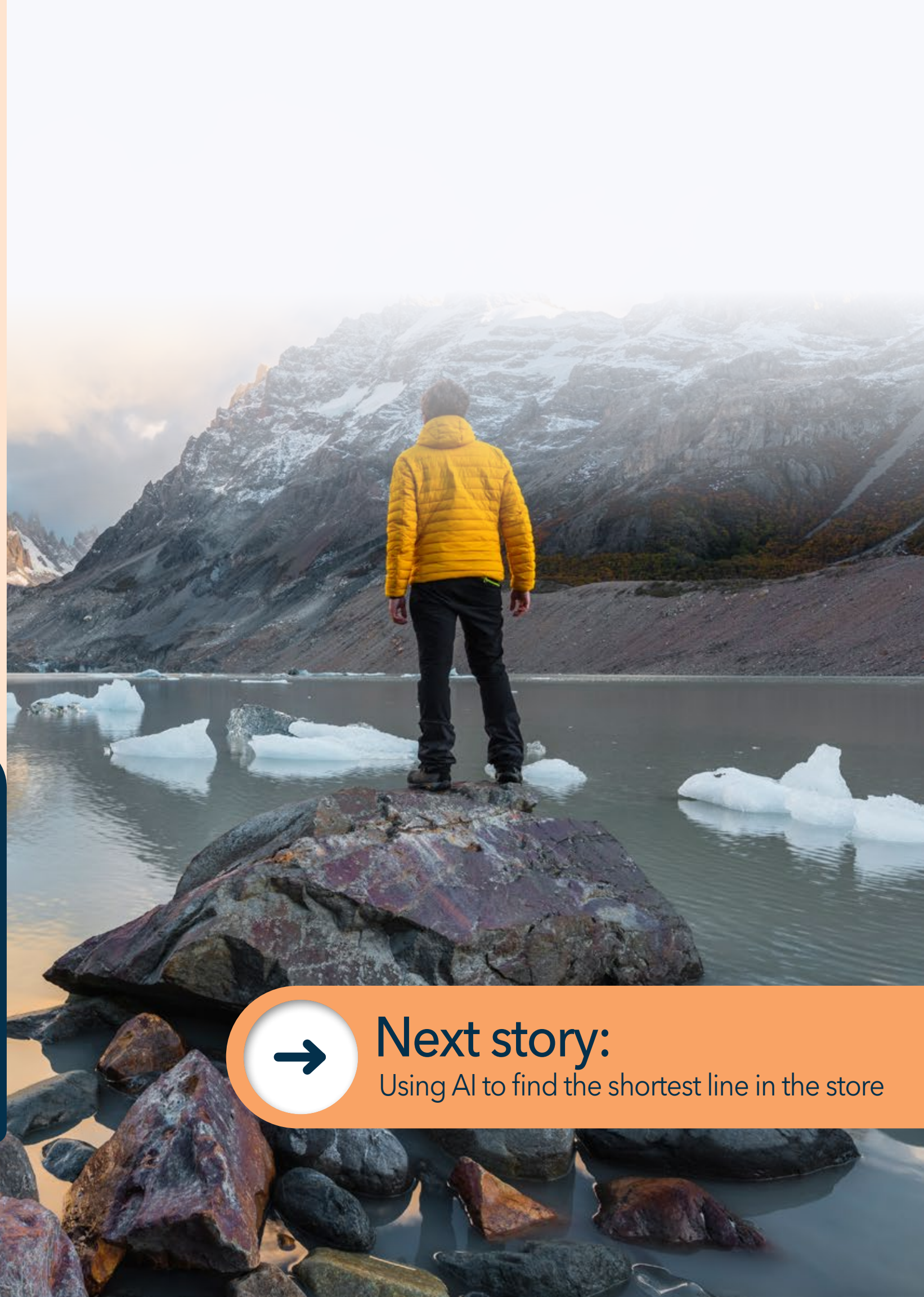
"The idea for the Positive Impact Analyzer came from our younger colleagues' attitudes toward sustainability, which we then validated with our customers, so our opportunity was to connect it meaningfully with credit and investment portfolios."

Paul Canals y Trocha, *Team Lead, ifb4 Sustainability*



Next story:

Using AI to find the shortest line in the store



04 Using AI to find the shortest line in the store

CHALLENGE

The 3KTechnologies Hackathon team from India focused on improving the process of queue formation and management in various retail environments, an experience that affects consumers and retailers alike.



Read more

SOLUTION

The team developed a Video-Based Queue Analysis System using computer vision based on SAS VDMML. The idea is to monitor the queue and analyze the average turnaround time with [SAS Event Stream Processing](#).

The analyses generated by this queue management system generates alerts that could be used to change the flow and manage wait time to enhance customers' experience. The system also has a SAS Visual Analytics dashboard with customizable reports that could be analyzed to help make longer-term staffing decisions and potentially pinpoint necessary changes, such as different hours of operation.

The team's queue management system has nine benefits:

1. Reduces wait times.
2. Improves service quality.
3. Increases customer loyalty.
4. Streamlines communication.
5. Improves staff satisfaction.
6. Increases staff efficiency.
7. Utilizes customer data.
8. Reduces operational costs.
9. Increases revenue.



Project details

"The queue system does not have to be limited to queues of people. It can be applied to any form of queue – of vehicles, or any other kind."

Sushant Gote, Team Lead, 3KT Technologies



Next story:

Saving indigenous African cultures with NLP fueled translations



05

Saving indigenous African cultures with NLP fueled translations

CHALLENGE

According to UN statistics, Africa has more than 1,000 languages, and at least 200 of these languages have less than 500 speakers. For a language to be considered “alive,” it needs at least 100,000 speakers. The electronic use of indigenous African languages is not encouraging. Very few of them are implemented in devices like computers or smart phones, which are typically limited to English or French.

International experts find it difficult to collaborate with local experts because they don’t speak the language, and it becomes a vicious cycle because the lack of documentation of these languages hinders the digitalization that could contribute to their survival. This is further exacerbated by policies that don’t encourage the national integration of local African languages, deterring youths from learning the traditional languages and further eroding use of the language and the cultures they support.



Read more

SOLUTION

The LangTech team from Cameroon created a simple translation web application by collecting indigenous terminology and loading it into [SAS Visual Analytics](#) as Excel databases. They built models using a Jupyter Python notebook in a Viya #BootMonitor with Keras as the principal natural language processing (NLP) library and SAS Deep Learning Models via [SAS Model Manager](#). The models are hosted using flask rest API. The result is a demo based on four of the 274 living indigenous languages of Cameroon.

When successfully implemented and serving Cameroon, the team's project could help preserve a greater diversity of African languages and cultures across the continent, which would create additional benefits, including:

- Promoting African languages and fostering national integration by allowing governments to communicate with all constituents more fully and equally.
- Improving service levels of international agencies by helping them engage with local populations in their native languages.
- Improving customer service for organizations (like utilities and telecommunication providers) that serve wide geographic areas by allowing them to communicate in multiple native languages.



Project details

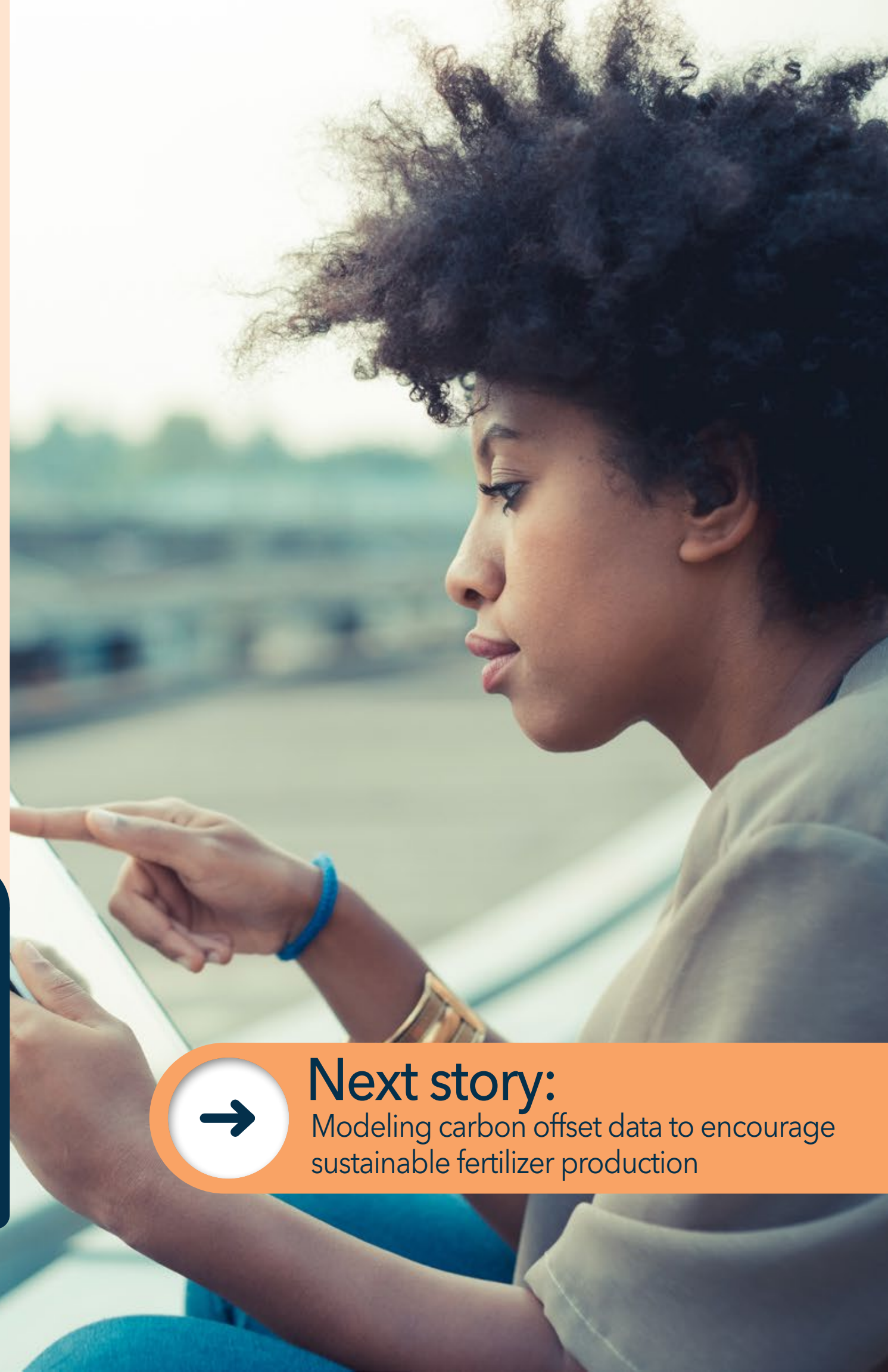
"We have little documentation on some languages and this makes those languages unstructured -- and when those languages aren't structured or documented, it's challenging to digitalize the language."

Swi Innocent Che, *Langtech team leader*



Next story:

Modeling carbon offset data to encourage sustainable fertilizer production



06 Modeling carbon offset data to encourage sustainable fertilizer production

CHALLENGE

Today, most nitrogen-based fertilizers are manufactured in facilities that consume 1% of the global energy supply. At the same time, growing demand for animal protein has led to an abundance of manure that goes to waste while the corn and soy grown to feed those cows, pigs and chickens uses chemical fertilizers.

Why can't those crops use all of that animal manure as fertilizer? Because recycling manure into fertilizer that can be transported for widespread distribution requires dehydration -- a costly and energy-intensive process. But the benefit of dehydration is that it offsets carbon output both on these animal farms and in the new fields where the fertilizer could be applied. And that's what the NPK4ever Hackathon team is all about - fertilizer going in a sustainable circle.



Read more

SOLUTION

This project provides a new approach to agriculture by modeling the price for carbon offsets to replace manufactured synthetic fertilizers with locally-generated, manure-based fertilizers. The model incorporates environmental impacts, logistics and other cost factors for the distribution and application of synthetic vs. organic fertilizers.

By limiting the counties to those with major confined animal feeding operations across poultry, hog and dairy facilities, the team identified counties, which accounted for 112 - 334 million metric tons of emissions per year. At \$105 per metric ton, solutions emerged for a new, circular fertilizer economy that could function with a combination of depots for dehydrating and consolidating the manure and factories that could process it into fertilizer.



Project details

"The benefit of dehydration is that it's a huge way to offset carbon, both on these animal farms and in the new fields where the fertilizer could be applied. And that's what the NPK4ever Hackathon team is all about - fertilizer going in a sustainable circle."

James Hunt, , *Senior Industry Consultant, SAS*



Next story:

Applying machine learning to keep manufacturing lines moving



07

Applying machine learning to keep manufacturing lines moving

CHALLENGE

The concept of trained technicians listening to diagnose problems from sounds that machines make is a well-established norm. It's one reason why an experienced auto mechanic may drive a car to "hear what's going on" before they start a repair.

However, simply sitting and listening isn't the best use of a technicians' time in a fully automated manufacturing process like computer numerical control (CNC) -- a process whereby machinery performs a set of functions based on instructions fed to it numerically.



Read more

SOLUTION

To solve the problem, the Nanyang Polytechnic team developed an AI model to discern and learn the sounds of critical machining events. The model uses IoT-enabled sensors with auditory detection capabilities deployed to CNC machines and connected to a central processing unit that constantly monitors the machine's real-time working conditions. These newly acquired sensors are helpful in predictive maintenance, operational efficiency assessment and accident prevention.



Project details

"The best operators are excellent at doing many things, but waiting to listen for trouble does not have to be one of them."

Dr. Zhao Zhiqiang, *Team Lead, Nanyang Polytechnic*



Next story:

Data visualization helps ease transitions for military personnel



08

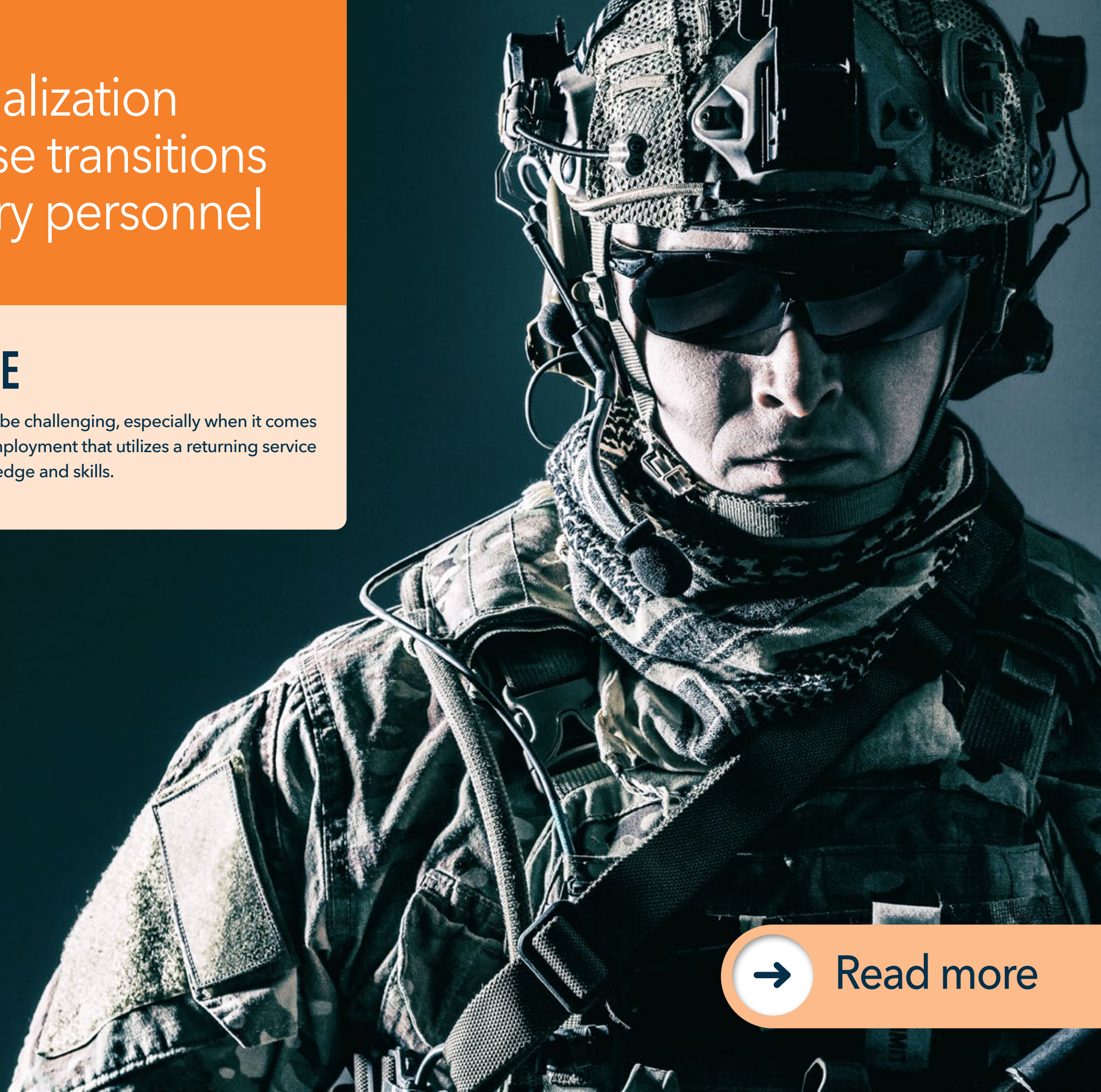
Data visualization helps ease transitions for military personnel

CHALLENGE

Life after the military can be challenging, especially when it comes to finding meaningful employment that utilizes a returning service member's unique knowledge and skills.



Read more



SOLUTION

To help ease the transition, the Zencos Hackathon team developed a model that augments O-Net, a popular job search web app for military service members looking for civilian careers. Using Python, the team performed text mining and topic clustering to align the 900+ job descriptions in O-Net to the Military Occupation Codes that define service member jobs. Then they created a user interface in SAS Viya that will allow service members to quickly explore opportunities that align to their specific skills and interests, helping them make informed decisions about the next step in their career path.

The Viya-enabled user interface is based on SAS Visual Analytics, allowing users to start with a specific Military Occupation Code, or explore based on the entire job market. Beginning with 900+ jobs in O-Net, the team narrowed the field of possibilities down to about 35 job clusters and configured a display to show the size of each job cluster, the amount of training required for the positions within the cluster, and an indicator for average salary (the darker the hue, the higher the average salary).

By making the user interface highly visual and rooted in the Military Occupation Code, the Zencos team has created an application that will make a real difference in the lives of returning service members.



Project details

"We are hopeful that this will make a positive change in the lives of our service members."

Chris St. Jeor, *Senior Consultant, Zencos*





Learn more about the power of SAS Viya on Microsoft Azure



Learn more about SAS Global Hackathons



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