AI, Quality and Supply Chain

A revolution driven by Data and AI

Alex Dowdalls, Dylan Hoogduin

October 2024

AXVECO

Look through the lens of data

#KMEvent2024 #Symbol

Hello, our name is Alex Dowdalls

It is now very easy to:

1. Create multiple digital alter-ego's!

2. Connect via LinkedIn ->

© AXVECO 2024. All rights reserved

Hi! My name is Dylan

© AXVECO 2024. All rights reserved

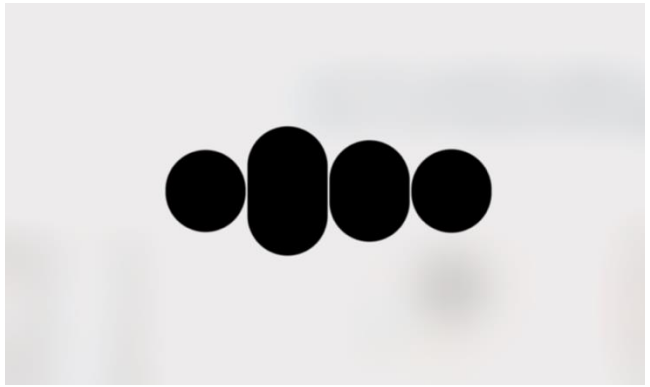
Core message…

Those who use Data and AI are already replacing those who don't:

- **View** the world through the lens of data
- **Manage** data for the machine
- **Generate** *data and AI assets* for your business
- **Grow** with data

© AXVECO 2024. All rights reserved

I am the world’s leading expert on AI in Supply Chain and Quality Management (since yesterday...)



AI verbetert de kwaliteit in supply chain management door nauwkeurige voorspellingen, automatisering en real-time monitoring. Door AI-aangedreven vraagvoorspelling kunnen bedrijven voorraden optimaliseren, terwijl risico's bij leveranciers vroegtijdig worden geïdentificeerd. Predictive maintenance voorkomt uitval van machines en minimaliseert productiedisrupties, wat de kwaliteit waarborgt.

I can also act as your Supply Chain and Quality Management advisor, 24 hoiurs a day, 365 days per year, answering all your questions with patience and dedication.

© AXVECO 2024. All rights reserved

Where should we focus?

1. Introduction: Why Quality Management Matters in SCM

Quality management in supply chain and the challenges companies face—like maintaining consistency, meeting compliance standards, and avoiding defects.

2. AI-Powered Predictive Analytics

How AI can predict demand patterns and risks. This ensures products are always available in the right quality without overstocking or running out. Highlight how it helps with better inventory control and sourcing from suppliers with consistent quality.

3. Real-Time Monitoring & IoT

AI combined with IoT devices can monitor things like temperature, humidity, and transit conditions. Real-time data allows companies to spot issues before they affect product quality, especially for sensitive goods.

4. Automation in Quality Control

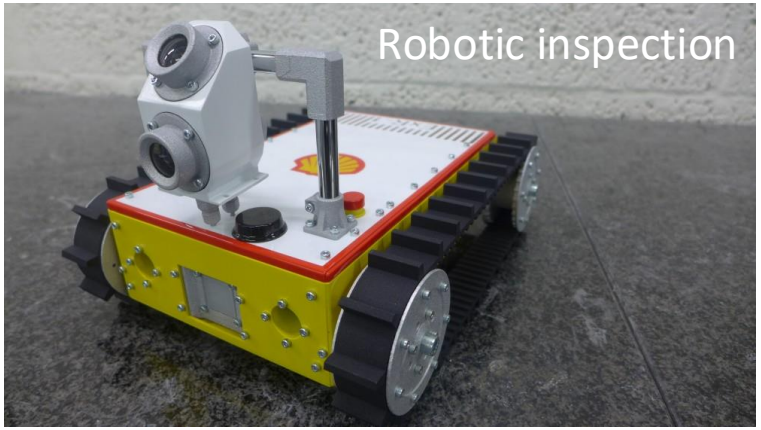
Leveraging AI-driven computer vision systems to improve product inspection, reducing human errors, and catch defects faster, ensuring higher consistency.

5. Continuous Improvement & Customer Feedback

Utilise AI to analyzes customer feedback for quality issues and recommends continuous improvements, helping companies refine their processes.

© AXVECO 2024. All rights reserved

AI in industry and commerce

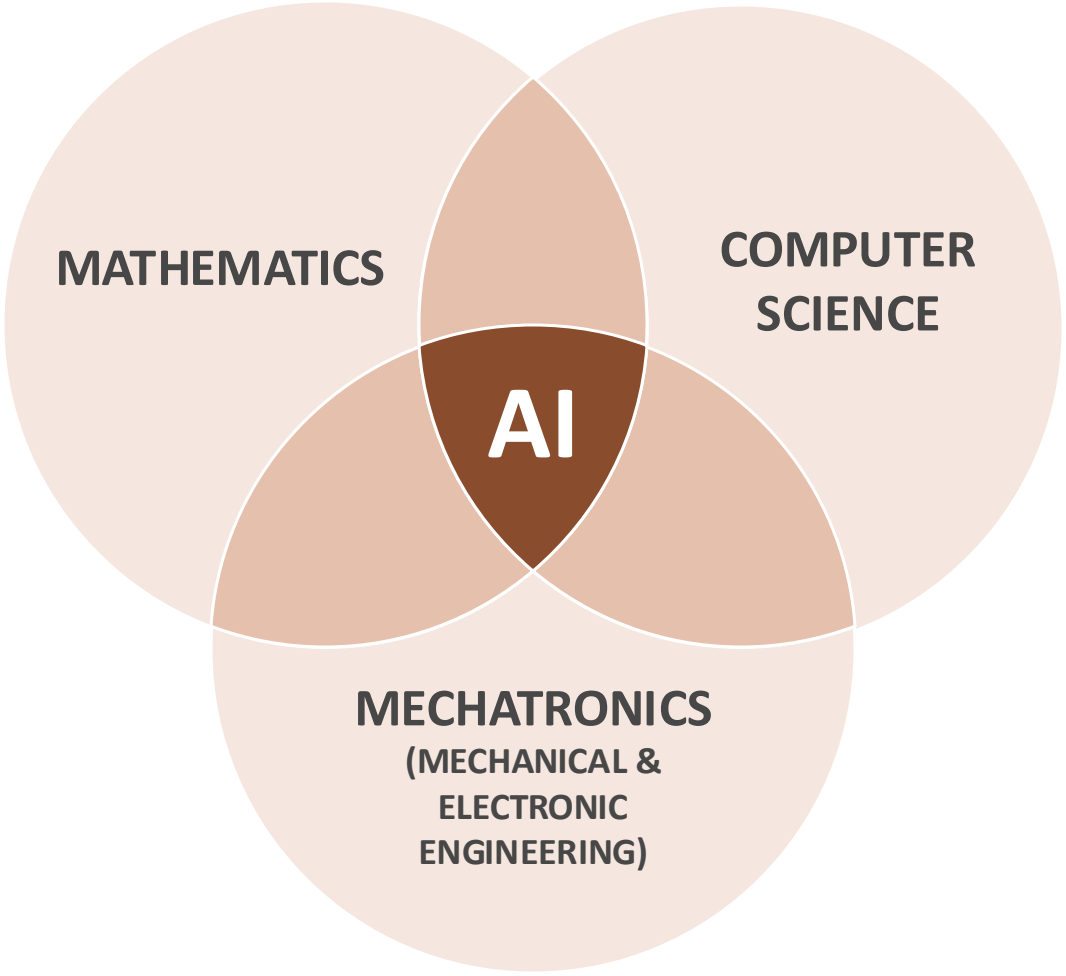


© AXVECO 2024. All rights reserved

The shift in thinking…

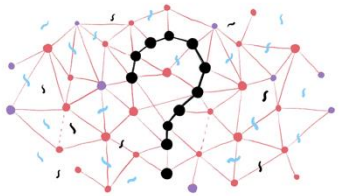
© AXVECO 2024.

AI is a combination of disciplines



© AXVECO 2024. All rights reserved

Which problem types to consider?



Supervised Learning:

CLASSIFICATION	Is this a man/woman – dog/cat – healthy/ill
REGRESSION	Which factor has the greatest influence on outcome
FORECASTING	Are we in an epidemic, how many cases next week?
DEEP LEARNING	Let the computer identify features and associations

Unsupervised Learning:

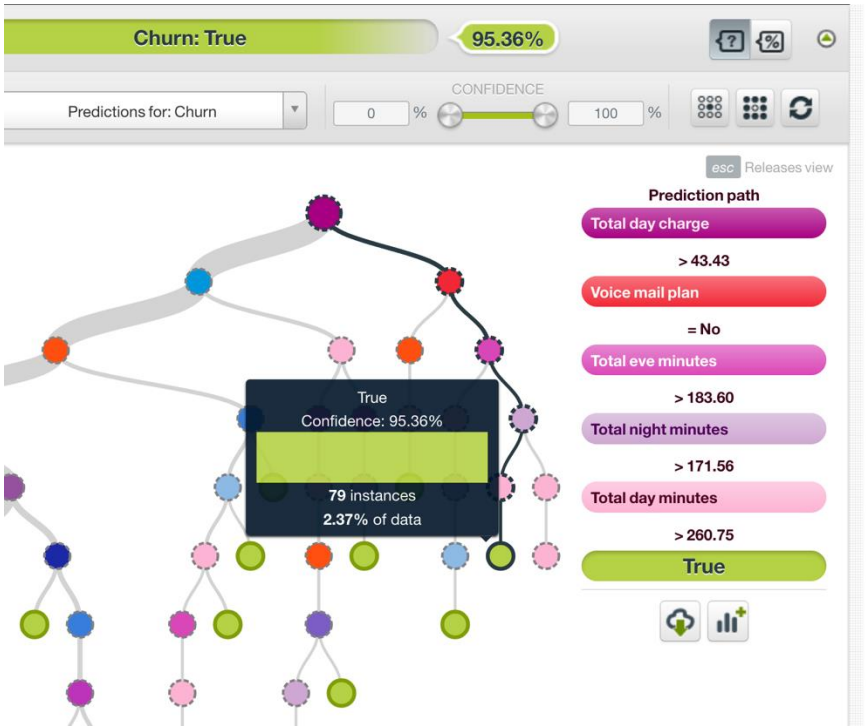
CLUSTER ANALYSIS	Detect patterns in data, common behaviours etc
SEGREGATION	Is a transaction more abnormal than others?
ASSOCIATION DISCOVERY	Which bundles of products do customers buy?
DIMENSIONALITY REDUCTION	Which themes are present in text messages?

Reinforcement Learning:

VALUE-BASED	Maximise the expected rewards given a state and action pair
POLICY-BASED	Update a policy to maximise a given reward

© AXVECO 2024. All rights reserved

Predicting customer behaviour



Using *classification* to predict:

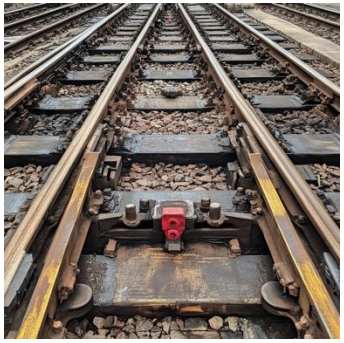
- Conversion (CRO) in sales journey
- Termination of contract (churn)
- Dropout of students in an education program

Use *abnormality detection* to detect:

- Fraud
- Unusual behaviour

© AXVECO 2024. All rights reserved

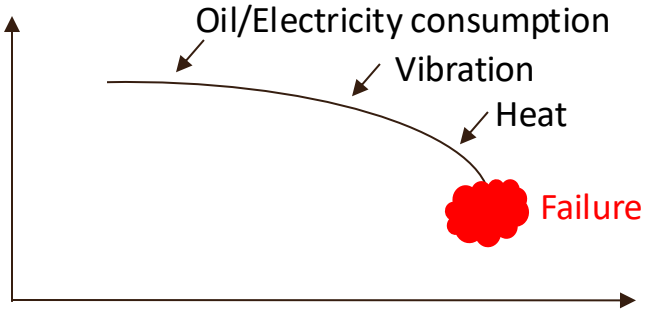
Predictive Maintenance



Using *time series analysis* to predict dropout of technical equipment

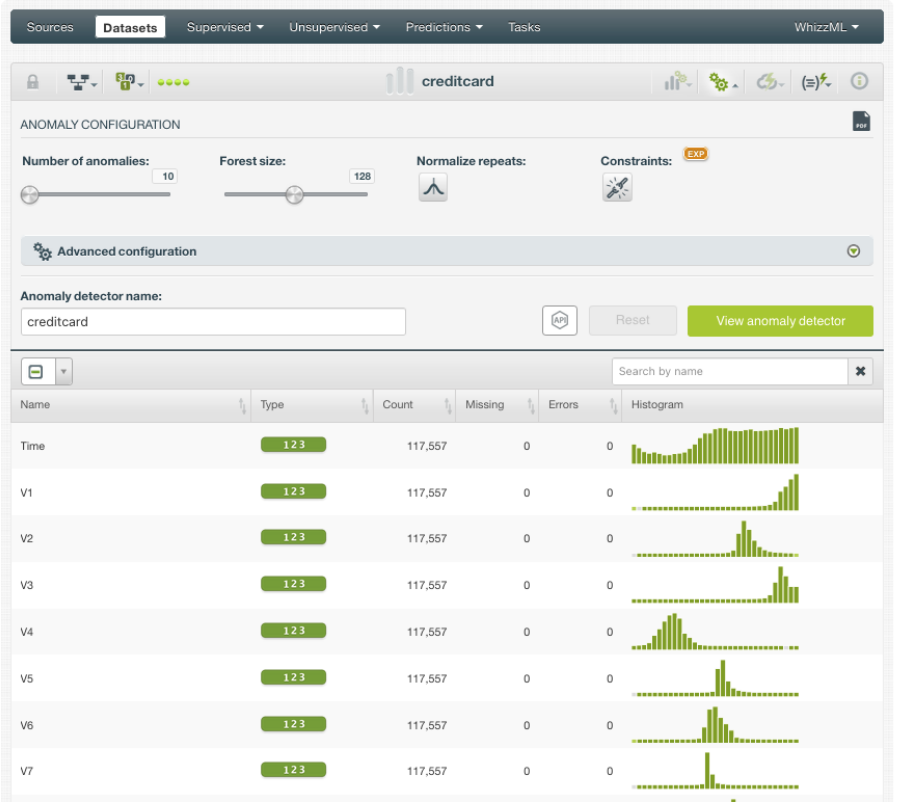
Abnormality detection in performance, vibration, heat or throughput

Plan maintenance based upon predicted wear

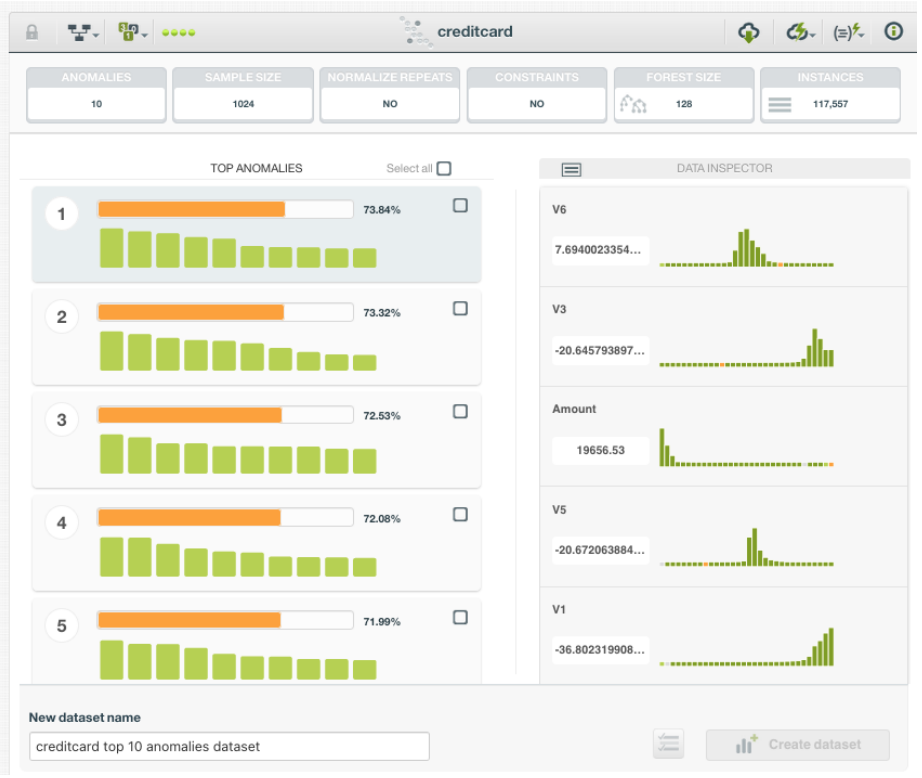


© AXVECO 2024. All rights reserved

Anomaly Detection



Analyse 117.557 transactions and identify possible anomalies

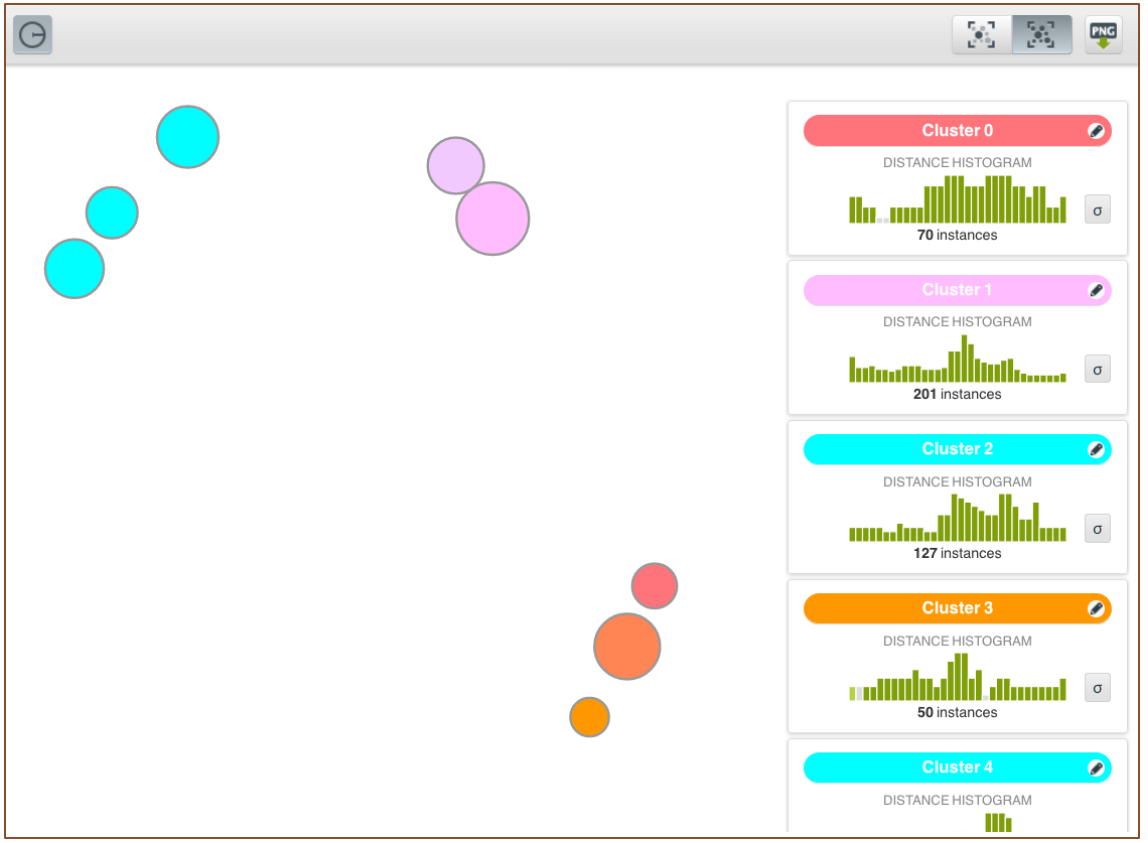


© AXVECO 2024. All rights reserved

Example: Customer segmentation using cluster analysis (k-means)

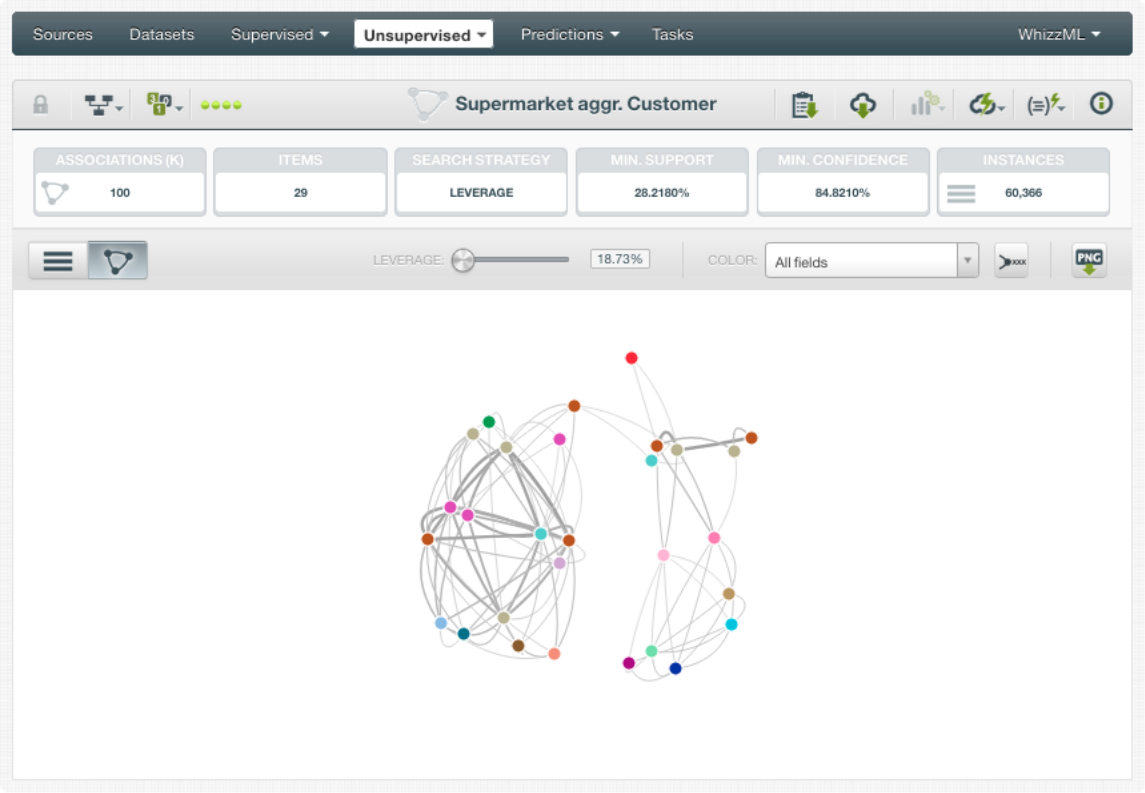
Unsupervised learning

- Machine understands the data (identifies patterns/structures)
- Evaluation is qualitative or indirect
- Does not predict/find anything specific



© AXVECO 2024. All rights reserved

Using association discovery to analyse patterns in behaviour

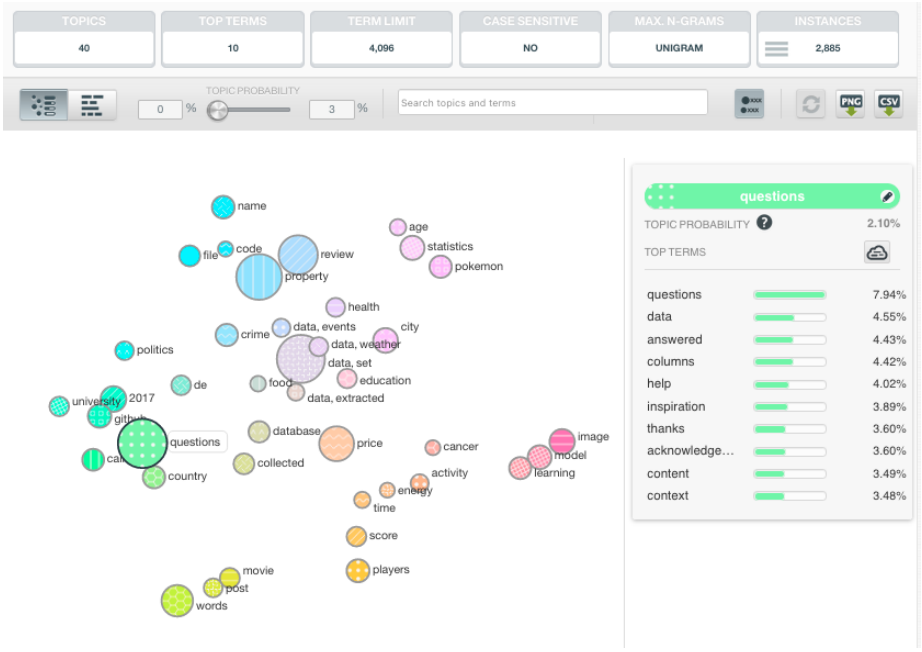


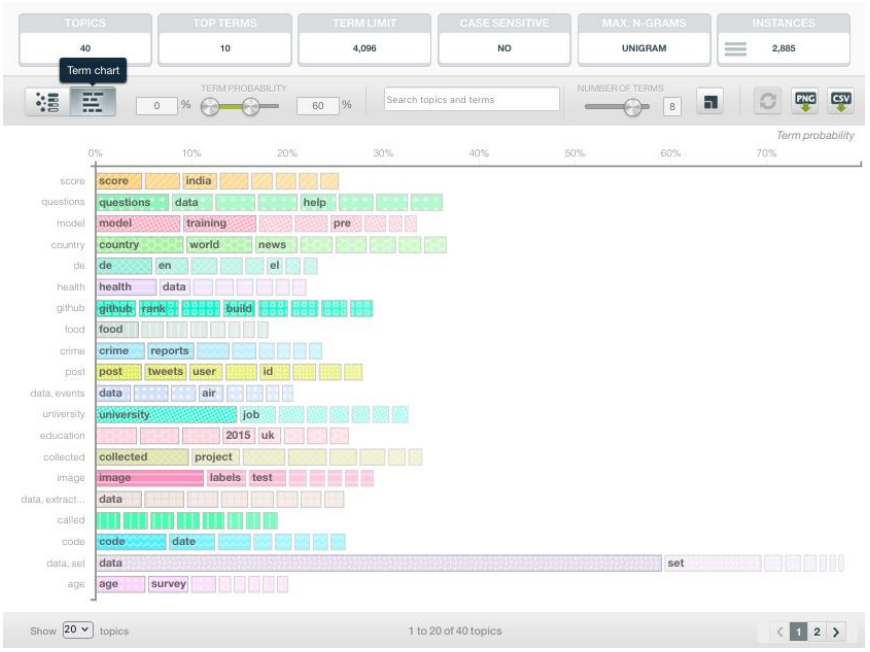
Can I detect bundles of items that can be grouped together in large sets of semi-structured data?

- People who buy beer also buy crisps and peanuts.
- People who buy wine also buy cheese and crackers
- People who buy nappies also buy baby-wipes and cleaning products

© AXVECO 2024. All rights reserved

Topic Modelling – Analysing groupings of words in text bundles e.g. emails, whatsapps, chats etc

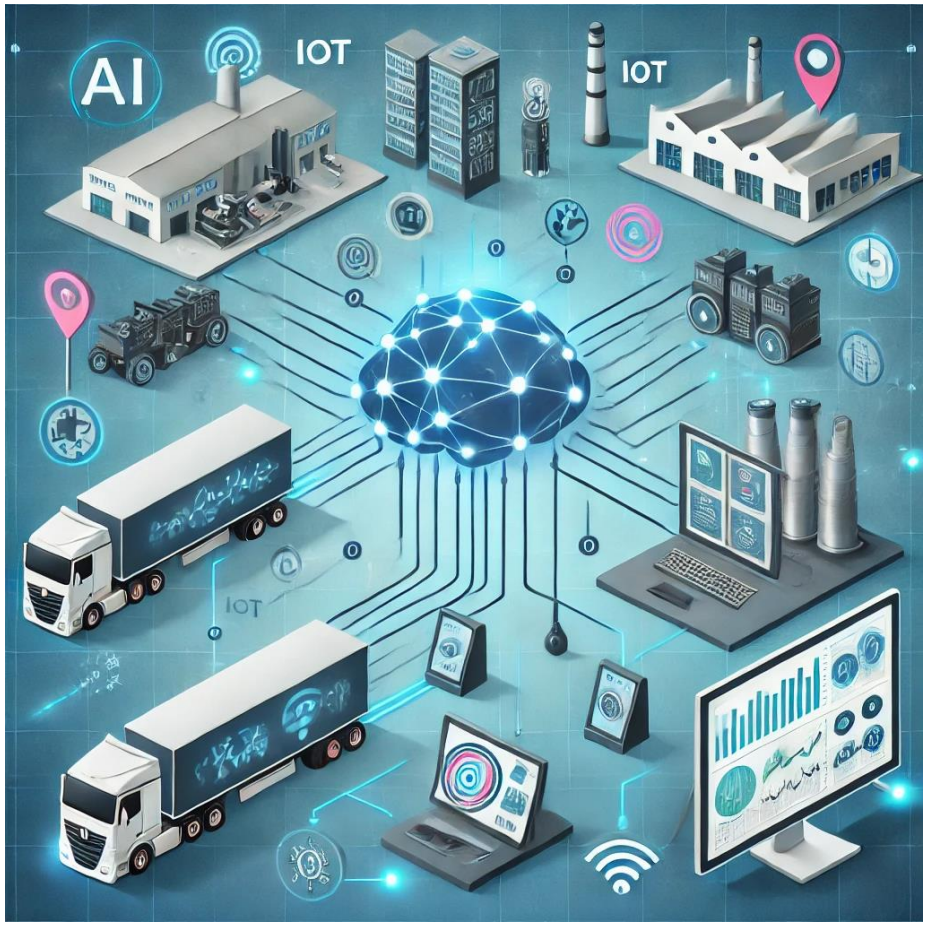




Word groupings can help us to classify messages and therefore analyse large volumes of messages to identify common themes

© AXVECO 2024. All rights reserved

Continual Monitoring of the Supply Chain



AI enhances supply chain monitoring by analysing real-time data from IoT sensors and tracking systems to improve visibility, detect anomalies, and optimize operations.

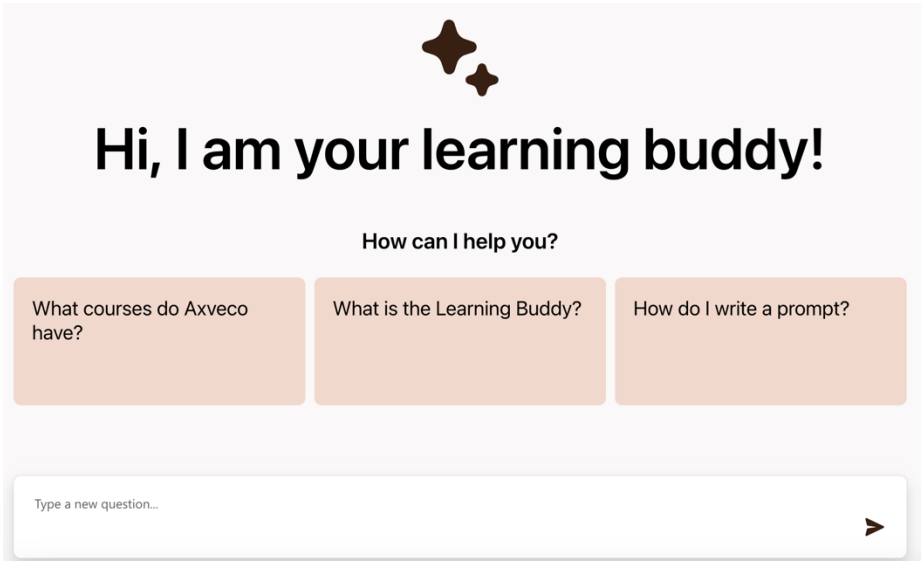
- Key areas of focus include tracking shipment conditions (temperature, humidity, location), predicting equipment failures with predictive maintenance, and identifying inefficiencies in logistics routes.

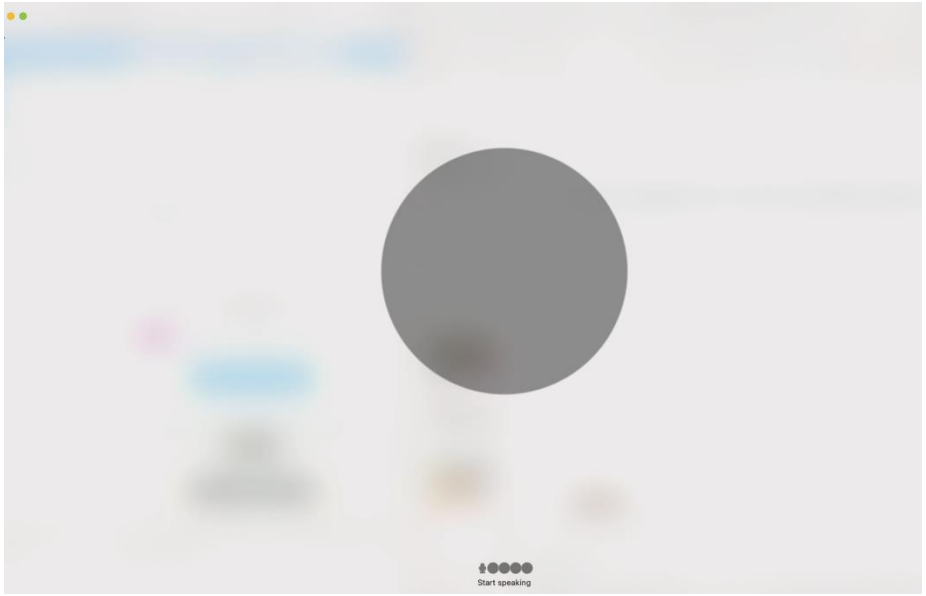
Relevant algorithms include:

- **Anomaly detection**.
- **Neural Networks** for predictive maintenance.
- **Reinforcement Learning** for dynamic route optimization and inventory management.
- **Natural Language Processing (NLP)** to analyze unstructured data, like customer feedback, for quality improvements.

© AXVECO 2024. All rights reserved

Using Smart Agents for communication and process optimisation





Customise a GPT with your knowledge to create a *Smart Agent*

Deploy a Smart Agent to support customer, employee or business partner interaction

© AXVECO 2024. All rights reserved

Prompt Engineering - to generate *any* content

"The specificity of the input leads to the desirability of the output"

Old World

Think → Do → Review

Production

Time: Long
Cost: High
Quality: Good

New World

Think & Prompt → Review

Generation

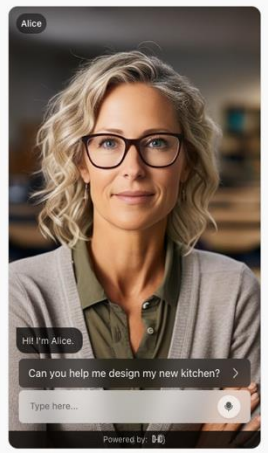
Time: Short
Cost: Low
Quality: Higher

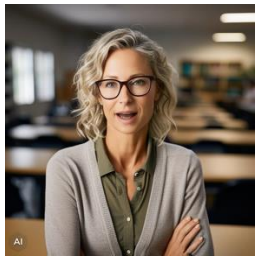
© AXVECO 2024. All rights reserved

Layers of a Smart Agent

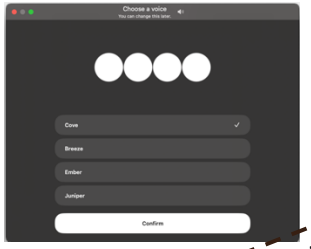
User experience

Live Animation:
- Voice dialogue
- Hi / Lo Fidelity
- Mimickery
- 2D or 3D





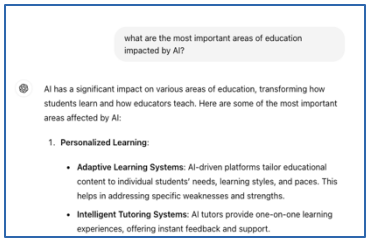
Predefined Animation(s) with voice profile



Voice interface with live interaction

Static character

Text interface



Solution Architecture

Live Animation with interaction

Predefined animation(s)

Voice

Text

Dialogue

GPT LLM

Secure hosting

Character Design

Specific Knowledge

Encoding Vectoring

RAG

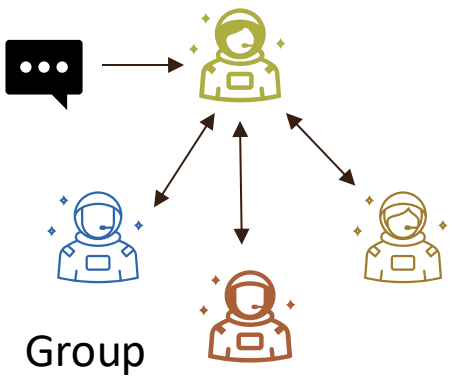
Instruction Fine Tuning

AXVECO

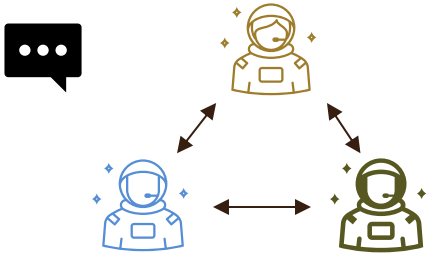
© AXVECO 2024. All rights reserved

Using Smart Agents to automate workflow

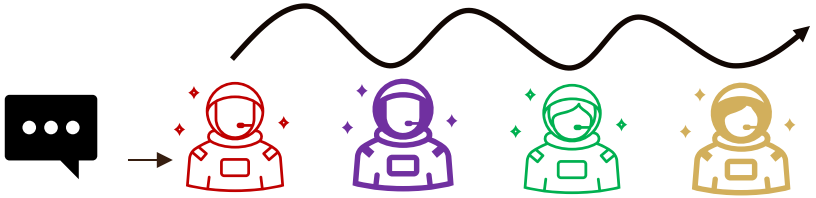
- How agents are set to interact to solve a task…



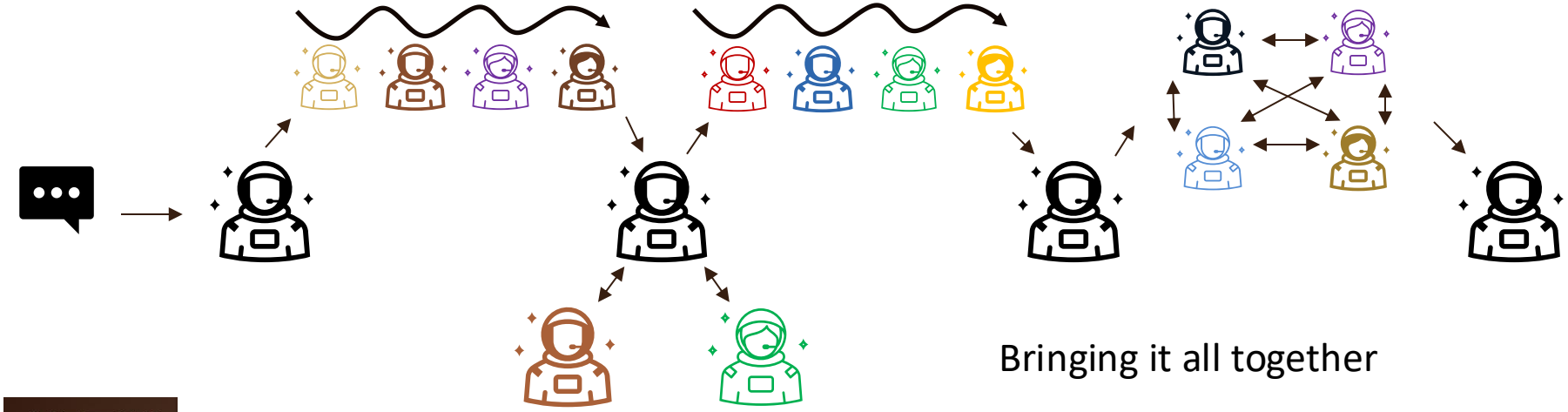
Group Orchestrator



Collaborative



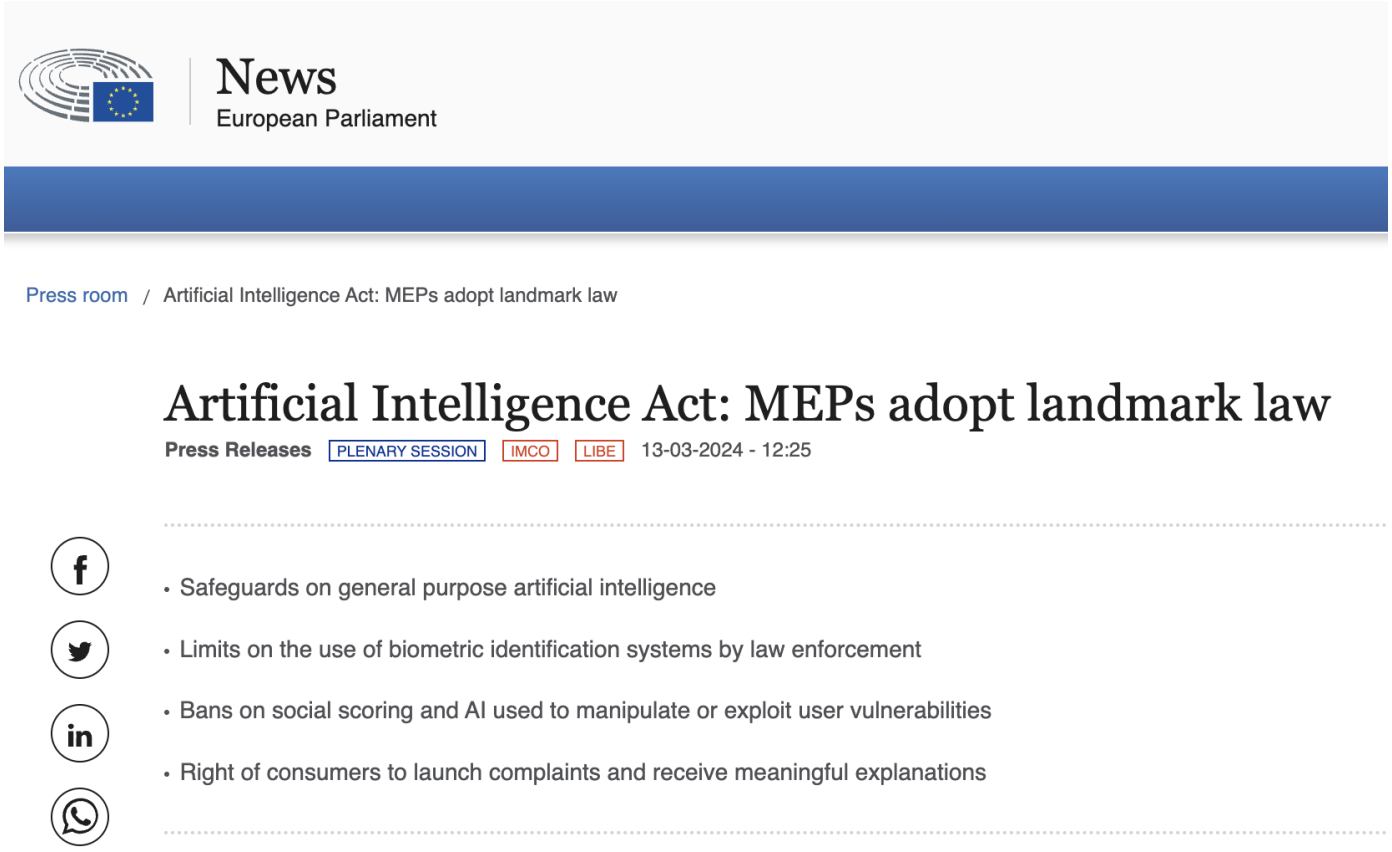
Sequential



Bringing it all together

© AXVECO 2024. All rights reserved

12 July 2024 – EU AI Act formally published



News
European Parliament

Press room / Artificial Intelligence Act: MEPs adopt landmark law

Artificial Intelligence Act: MEPs adopt landmark law

Press Releases PLENARY SESSION IMCO LIBE 13-03-2024 - 12:25

- Safeguards on general purpose artificial intelligence
- Limits on the use of biometric identification systems by law enforcement
- Bans on social scoring and AI used to manipulate or exploit user vulnerabilities
- Right of consumers to launch complaints and receive meaningful explanations

The AI Act Explorer website:
https://artificialintelligenceact.eu/ai-act-explorer/

© AXVECO 2024. All rights reserved

A risk-based approach to AI proposed by EU

High Risk

Most regulated AI systems, as these have the potential to cause significant harm if they fail or are misused, e.g. if used in law enforcement or recruiting.

Minimal Risk

All other AI systems, e.g. a spam filter, which can be deployed without additional restrictions.

Unacceptable Risk

Highest level of risk prohibited in the EU. Includes AI systems using e.g. subliminal manipulation or general social scoring.

Limited Risk

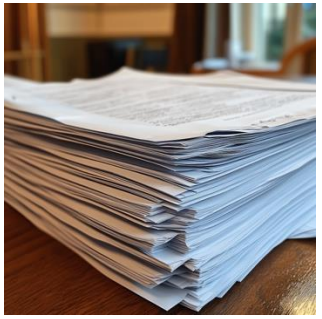
Includes AI systems with a risk of manipulation or deceit, e.g. chatbots or emotion recognition systems. Humans must be informed about their interaction with the AI.

© AXVECO 2024. All rights reserved

Coming soon from our Smart Agent Factory…

"EU AI Act Buddy"

- Answer questions about the EU AI Act
- Describe how to assess the status of an AI solution
- Guide to doing a rsik assessment
- Reporting requirements
- Help you to adhere to the provisions of the Act



If printed in a readable format, the Act is:

- 420 pages
- 180 intention statements
- 200 pages of requirements

AXVECO

© AXVECO 2024. All rights reserved

2018

Executive agenda

1. Open the door to Data Driven Working and AI!

2. Provide a process to stimulate and manage data / AI innovation
   - Identify use cases in training / department workshops
   - Pitch use cases to management to select the bast cases
   - Structured process to realise solutions

3. Ensure domain managers / supervisors are “AI Enabled Professionals”
   - Otherwise they don’t know what they don’t know…
   - Nobody identifies use cases!

4. Establish AI capability in your organisation
   - Build the skills for the type of AI that is relevant to your business

© AXVECO 2024. All rights reserved

Trends to watch

- Autonomous Smart Agents serve humans and optimise workflows
- Language becomes the new interface to the machine
- Smart products replace dumb products
- Products are designed for input, not just output
- Immersive, 3D experience, Web3 & Metaverse
- Large scale language models present a risk to humanity

© AXVECO 2024. All rights reserved

AI Enabled Professional

- Wat is er nodig van een professioneel persoon om succesvol te zijn in het tijdperk van data en AI? Welke capaciteiten zijn essentieel om te overleven in het tijdperk van AI?
- Dit programma rust je uit om data en AI te gebruiken om succesvol te zijn op individueel, team- of organisatieniveau.
- Je leert de top 10 toepassingen van AI te implementeren die nodig zijn om te overleven in het tijdperk van AI.
- En je kan het AI Brevet certificatie halen van de nederlandse AI Coalitie

Je leert:

- Waarom is AI zo belangrijk geworden? Wat maakt het anders?
- Wat is AI en waar kan het worden toegepast?
- Hoe je de top 10 toepassingen van AI kunt toepassen.
- Ethische, juridische en maatschappelijke implicaties van AI.
- Het programma is ontworpen door data- en AI-experts die samen meer dan 14.000 studenten hebben opgeleid. We geven je de mogelijkheden en tools die je nodig hebt om succesvol te zijn met AI.

© AXVECO 2024. All rights reserved

Questions?

Alex Dowdalls

Partner

+31 653 204 932

adowdalls@axveco.com | www.axveco.com