

SYMPOSIUM | June 2024

Santiago de Compostela – Spain

Data Science in Fundamental Physics and its Bridge to Industry & Society

# Artificial Intelligence

Concept, Applications & Ethics



IGFAE

Instituto Galego de Física de Altas Enerxías



XUNTA  
DE GALICIA





# Bio

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- Statistician
- Data Science and AI Lecturer
- PhD Statistics



**Ricardo Galante**

**Principal Analytics & Artificial Intelligence Customer Advisor**

**SAS Institute**



# Agenda



Artificial Intelligence

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# Agenda

Artificial Intelligence →

01

General Definitions

02

Application Experiences

03

Responsible AI

04

SAS Viya for Learners

# Artificial intelligence

## General Definitions

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- **Artificial Intelligence** refers to the **science** that studies the development of machines, devices, and computers capable of performing complex tasks that historically only a human being could perform, such as reasoning, making decisions, or solving problems.

The Coursera logo, featuring the word "coursera" in a blue, lowercase, sans-serif font with a stylized infinity symbol as the letter 'c'.

- **Artificial Intelligence** is the **application** of advanced analytics such as machine learning and logic-based techniques to interpret events, support, and automate decisions.

The Gartner logo, featuring the word "Gartner" in a bold, blue, sans-serif font with a registered trademark symbol (®) at the end.

# Timeline



## The Beginning

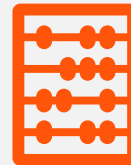
1950 - 1960

- AI was formally established as a field of study in 1956
- **Alan Turing** proposes the idea of "thinking machines"

- Programs such as **Logic Theorist** are designed to solve mathematical and logical problems.

1960 - 1970

## First Programs



## AI Winter

1980 - 1990

- Funding cuts
- Development of systems that mimic human expertise in specific domains.

- Resurgence of interest in artificial neural networks.
- AI begins to show its strength in games.



## Computational Improvements

2000 - 2010

- Deep Learning and Pervasive Applications
- Intense discussions about ethics

1990 - 2000

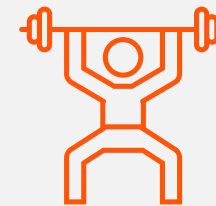
## Rebirth



- The exponential increase in the amount of data available
- Development of new algorithms

2010 - 2024

## Daily AI

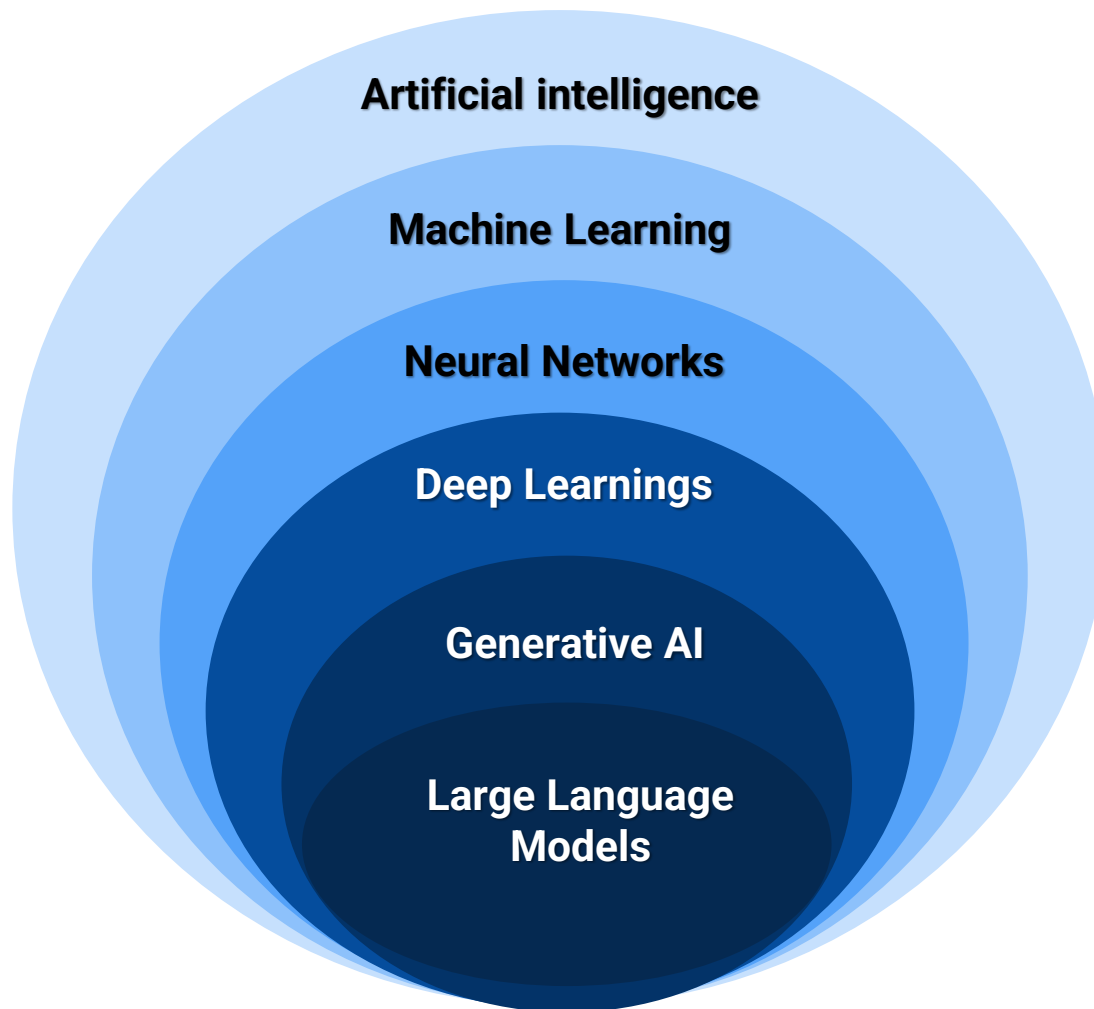




# Artificial intelligence

Joint Vision

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# Artificial intelligence

Why is artificial intelligence important?

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## Automates Process

- AI automates repetitive learning and discovery through data.
- Instead of automating manual tasks, AI performs frequent, high-volume, computerized tasks.

# Artificial intelligence

Why is artificial intelligence important?

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## Learning Algorithms

- AI adapts through progressive learning algorithms to let the data do the programming.
- AI finds structure and regularities in data so that algorithms can acquire skills.



# Artificial intelligence

Why is artificial intelligence important?

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## Analyzes Deeper Data

- AI analyzes more and deeper data using neural networks that have many hidden layers.
- All that has changed with incredible computer power and big data.



# Artificial intelligence

## Applications

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Banks

Retail

Telcos



# Artificial intelligence

## Applications

### Banks



- **Fraud Detection:** AI algorithms to identify suspicious transactions in real-time.
- **Credit Analysis:** AI to assess the creditworthiness of customers faster and with greater assertiveness.
- **Generative Marketing:** Generation of custom reports, financial forecasts, and content for customer engagement.



# Artificial intelligence

## Applications

### Retail



- **Personalized Recommendations:** Use of machine learning to personalize product recommendations based on customers' purchase and browsing history.
- **Inventory Management:** Automated: Forecasting algorithms to optimize inventory levels, reducing costs and improving efficiency.
- **Store Layout Optimization:** Use generative models to create synthetic customer trajectories within a store, analyzing their movement patterns and interaction points with different product displays to identify optimal layouts for maximizing customer engagement and sales

# Artificial intelligence

## Applications

### Telcos



- **AI-powered Customer Service:** Chatbots and virtual assistants for 24/7 customer service.
- **Network Optimization:** Use of AI to monitor and optimize network traffic, improving quality of service.
- **Service Personalization:** Telecom operators can leverage AI to create personalized service bundles and offerings based on individual customer preferences and usage patterns.



# Ethical Considerations

## Challenges

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### Transparency and Privacy

Companies must ensure that the use of AI is transparent and respectful of customers' privacy.

### Explainability of Models

Companies need to make it clear how AI systems make decisions.

### Biases and Discrimination

It is essential to identify and mitigate biases in AI models to avoid discriminatory practices..

### Regulation and Ethics

Companies should work together to establish ethical guidelines that guide the use of AI

# Regulatory Context of the European Union



## Artificial Intelligence Act

### COMMITTEE OF EUROPEAN ETHICS

In 2018, the EU created a document with the principles and requirements that AI must comply with in order to be trusted

### GUIDELINES FOR A ARTIFICIAL INTELLIGENCE RELIABLE



# Regulatory Context of the European Union



## Principles of the Artificial Intelligence Act - EU's AI ACT

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**1** Social and Environmental Well-Being

**2** Human-Centricity

**3** Privacy & Governance

**4** Justice and Diversity

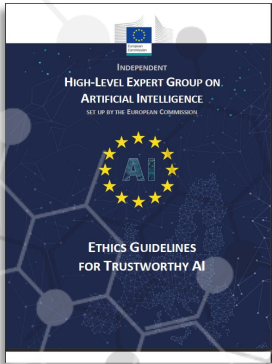
**5** Security and Robustness

**6** Responsibility

**7** Transparency

# Regulatory Context

## Artificial Intelligence Act - EU's AI ACT



March/2018

Beginning of 2019

European Commission  
Draft on Ethical AI  
(AI Act)

April/2021

Draft report of the  
IMCO Committee and  
the LIBE Committee

April/2022

2021 - 2022

Collection of opinions of the European Parliament (EIOPA, ECB, etc.)

Jun/2021

Final compromise text of  
the European Council  
released

Nov/2022

Electoral Law  
European Parliament

June/2023

Q3-Q4 2023: Final  
Discussions  
(Trilogues)

Dec.23  
Agreement. Trilogues  
completed

Drafted law

The law is  
Approved

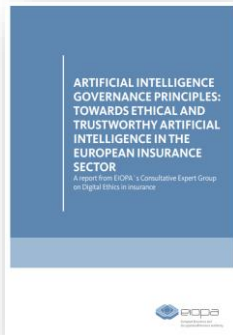
March 2024

By the end of the year, the law will come into force and its application will be gradual over 6, 12, 24 or 36 months for different provisions of the law.

**PORTUGUESE GOVERNMENT:**  
NATIONAL  
ARTIFICIAL  
INTELLIGENCE  
STRATEGY  
AI Portugal 2030



**GOBIERNO DE ESPAÑA:**  
ESTRATEGIA  
NACIONAL DE  
INTELIGENCIA  
ARTIFICIAL  
ENIA



**EIOPA: PRINCIPLES OF GOVERNANCE OF ARTIFICIAL INTELLIGENCE: TOWARDS ETHICAL AND TRUSTWORTHY ARTIFICIAL INTELLIGENCE IN THE EUROPEAN INSURANCE SECTOR**

# Regulatory Context



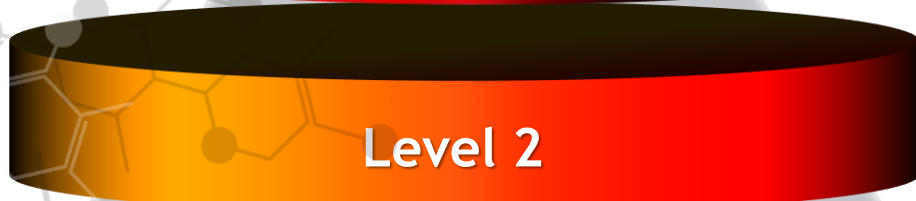
## Risk Levels - EU's AI ACT



Level 1

### **Unacceptable Risk: Prohibited AI Practices**

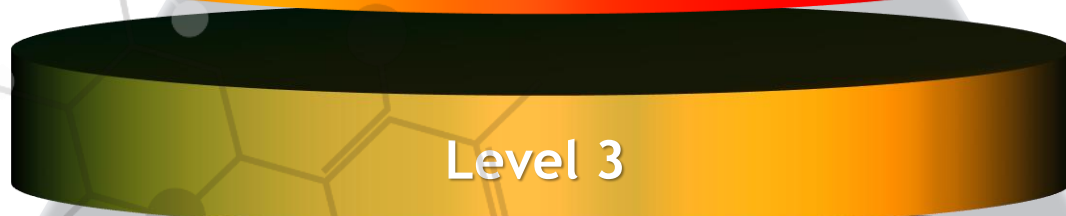
Constitute a clear threat to security, fundamental rights and democratic values: social qualification, certain uses of biometric identification.



Level 2

### **High Risk**

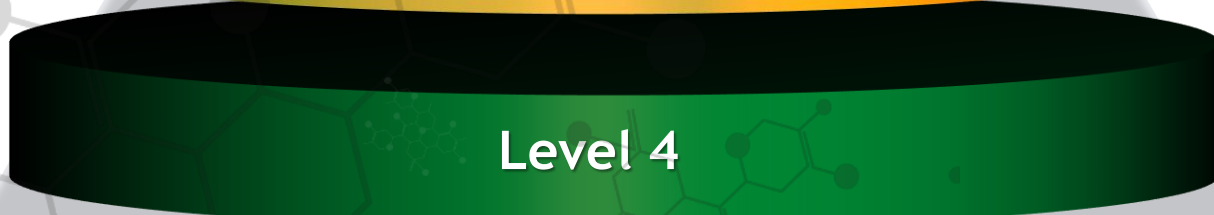
They can affect essential aspects such as safety, health and fundamental rights



Level 3

### **Low Risk**

Permitted but subject to information/transparency obligations. Systems such as chatbots, callbots, voicebots



Level 4

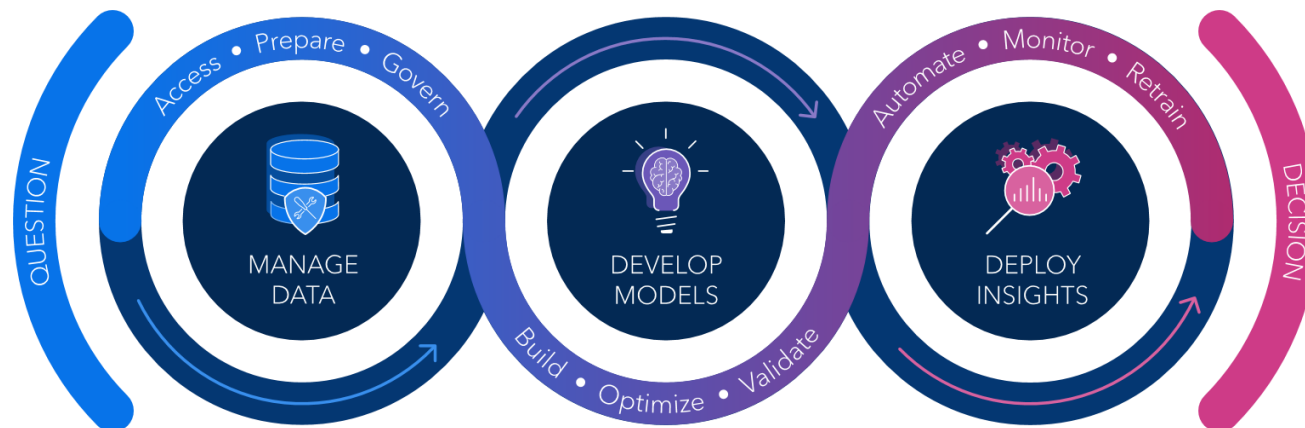
### **Minimal or No Risk**

Allowed without restriction such as video games, anti-spam filters

# SAS Viya for Learners

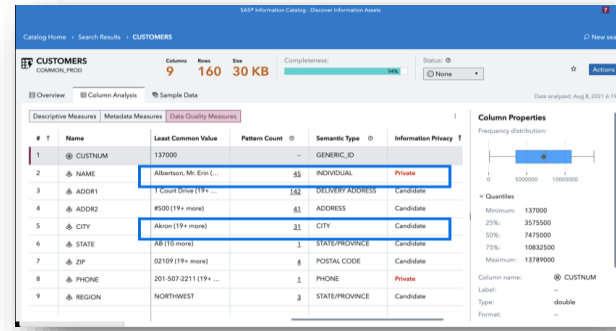
Academic Governance Framework for Responsible AI

- **SAS Viya for Learners** is a **free**, cloud-based suite of software designed for **teaching** and **learning data science** skills.
- **It** provides a **complete environment** for the **entire analytics life cycle**, from **data preparation** and **exploration** to **model building, deployment, and sharing results**.

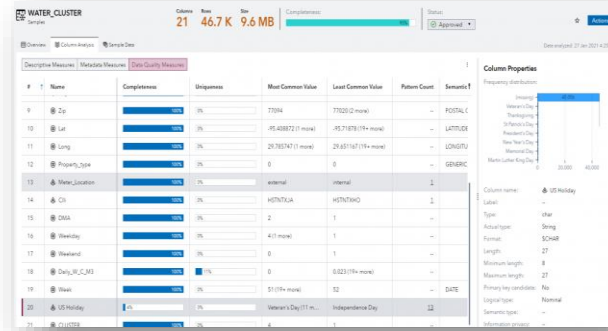




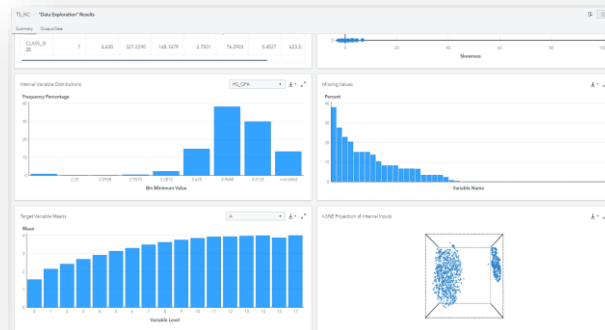
# Robust Data Governance



Automatic identification of private or sensitive information and cataloguing



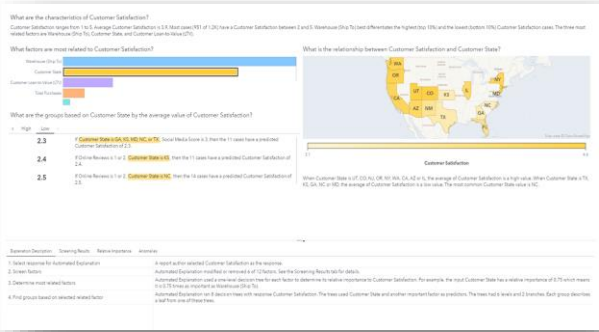
Data Quality Management, Anticipation, and Bias Mitigation



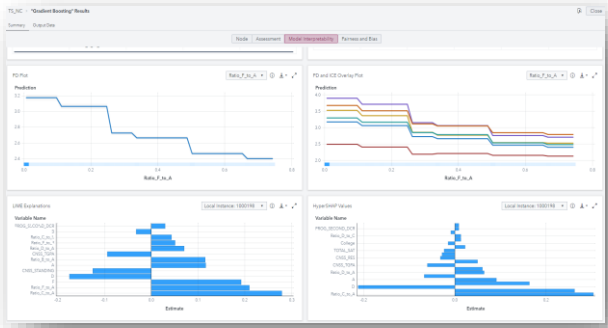
Visual and dynamic explorations to understand data and its internal relationships



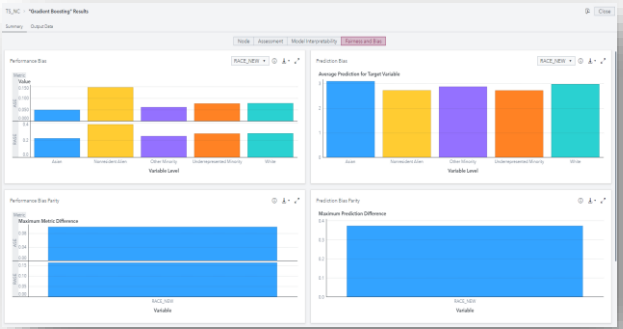
# Transparent Development



Visual explanations in natural language

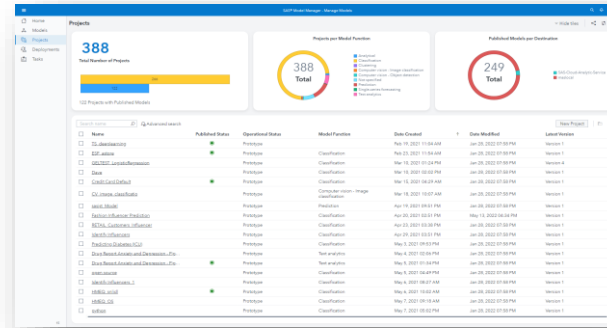
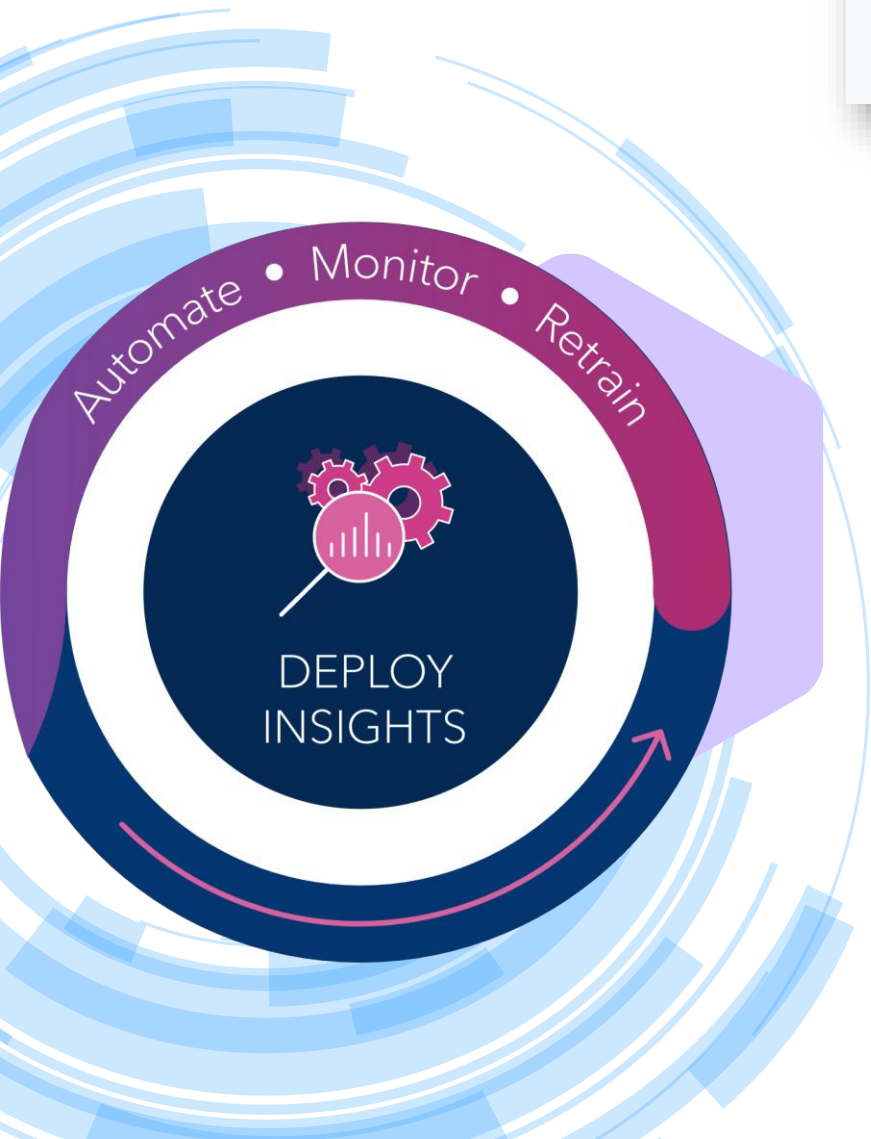


Interpretation of models using graphical methodologies

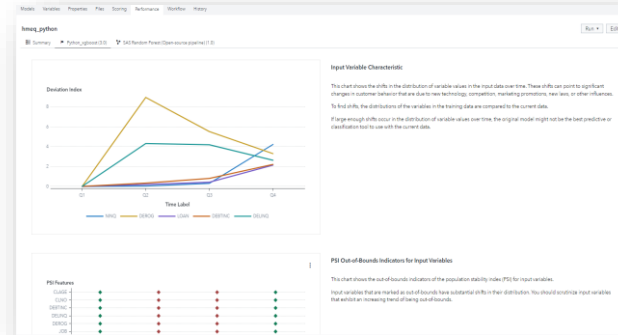


Visual indicators for bias detection and bias mitigation capabilities

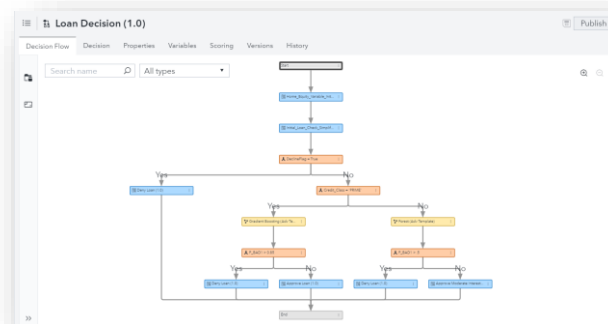
# Trust Deploying



Centralized repository to govern SAS and Open Source models



Automatic monitoring for accurate, stable and unbiased models



Orchestration and automation of non-compliance decisions and alerts

# Takeaways

## Important Points

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- AI is transforming industry, enabling personalization at scale, intelligent automation, and extremely assertive predictive analytics
- The EU's AI ACT sets out guidelines for the ethical and responsible use of AI.
- SAS Viya for Learners ([free and cloud-based suite of software designed for teaching and learning artificial intelligence](#)) provides a unified platform for the entire AI lifecycle, making it easier to implement responsible AI practices.
- By making responsible AI practices accessible, SAS Viya for Learners empowers [students](#), [teachers](#) and [researchers](#) to prioritize fairness, transparency, and accountability in their AI initiatives.



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# Thank you

LinkedIn



SAS Viya 4 Learners

