

Preparing a New Generation of Project Managers

Integrating project management, artificial intelligence, and
cybersecurity in workforce development and education

Dr. Timothy M. Henry, PMP

- **Artificial Intelligence**
- **Cybersecurity for AI**
- **Education and Workforce Development**
- **Project Management**

Artificial Intelligence

- Siri & Alexa
- Map directions
- Purchase recommendations
- Marketing emails
- Failure Analysis
- Medical Image Diagnosing
- Chatbots



Chat LLMs

OpenAI ChatGPT
Microsoft Copilot
Google Gemini
Anthropic Claude
Meta Llama

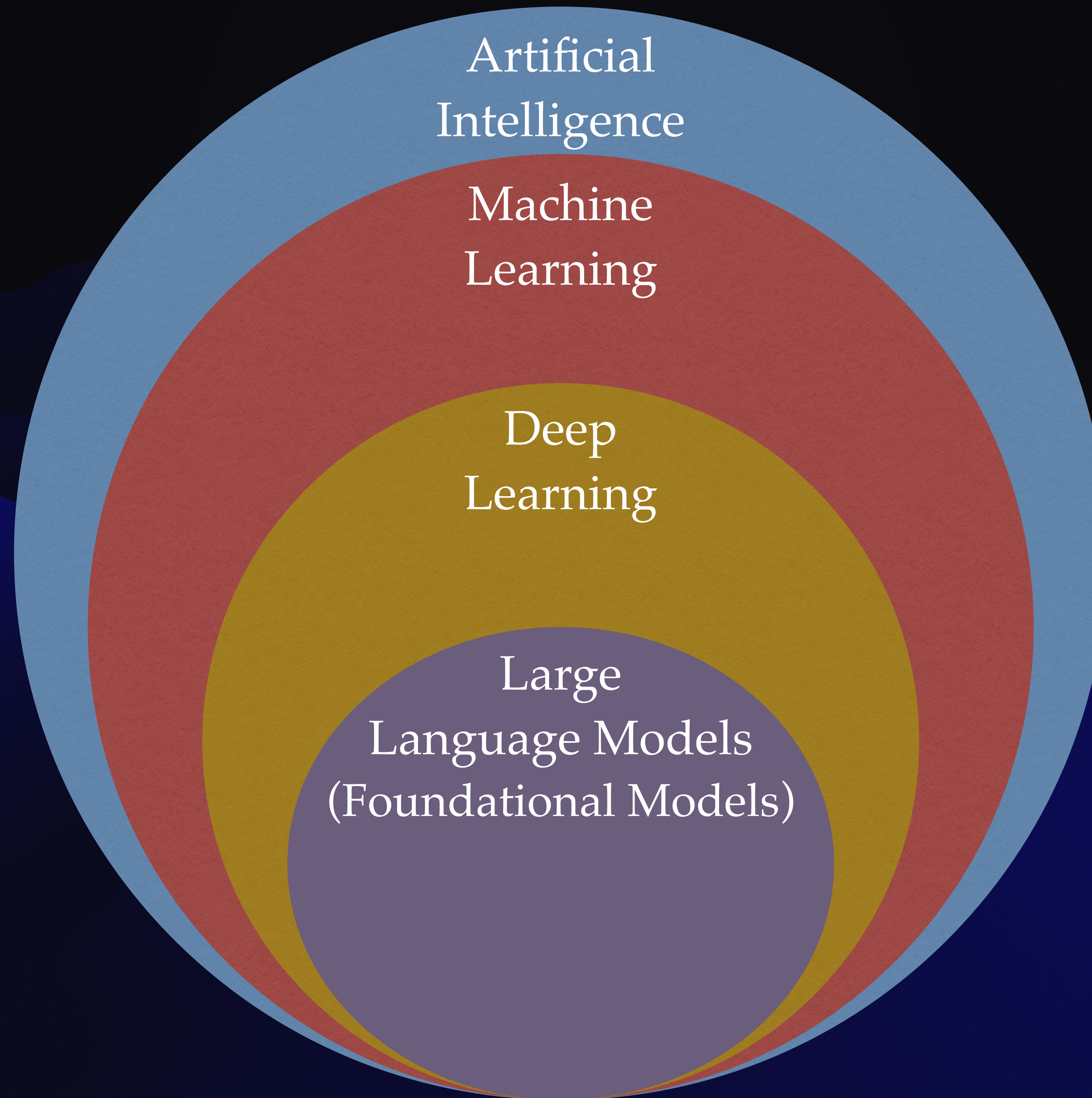
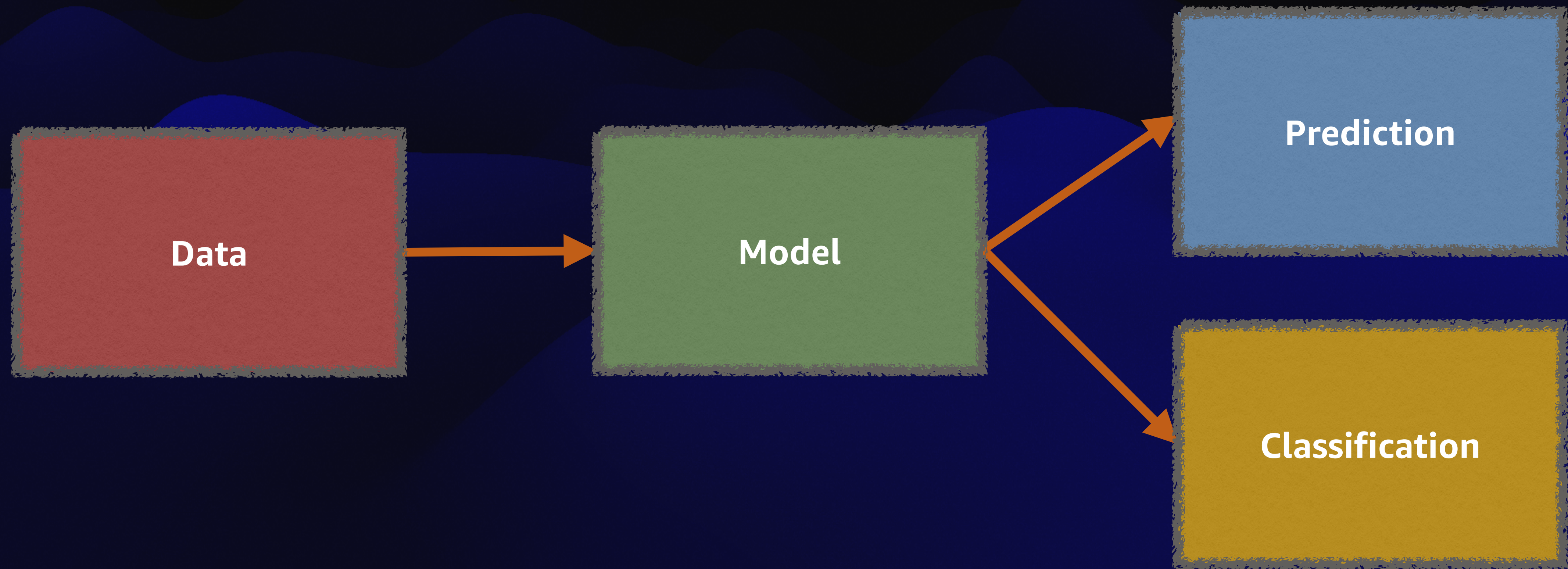


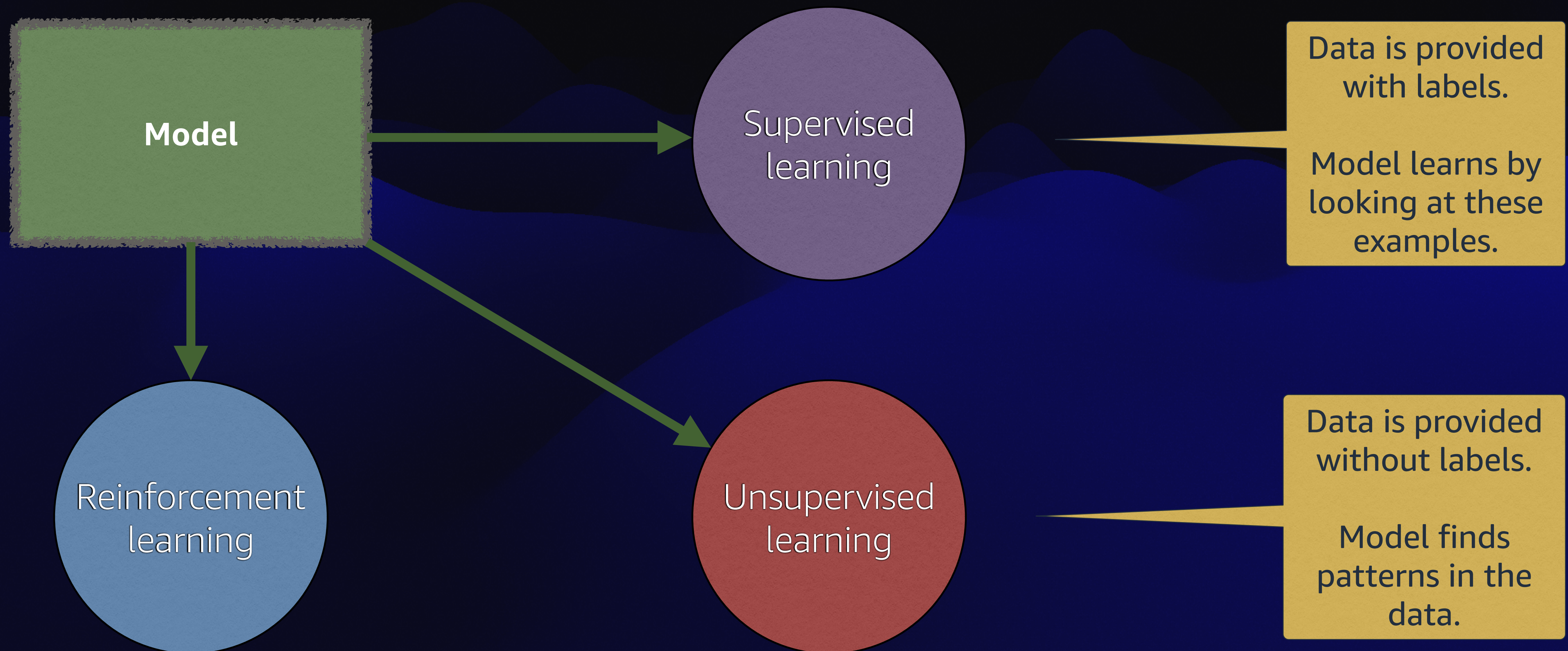
Image Generators

Stable AI
MidJourney
OpenAI DALL-E
Adobe Firefly
Google Gemini

Artificial Intelligence Flow



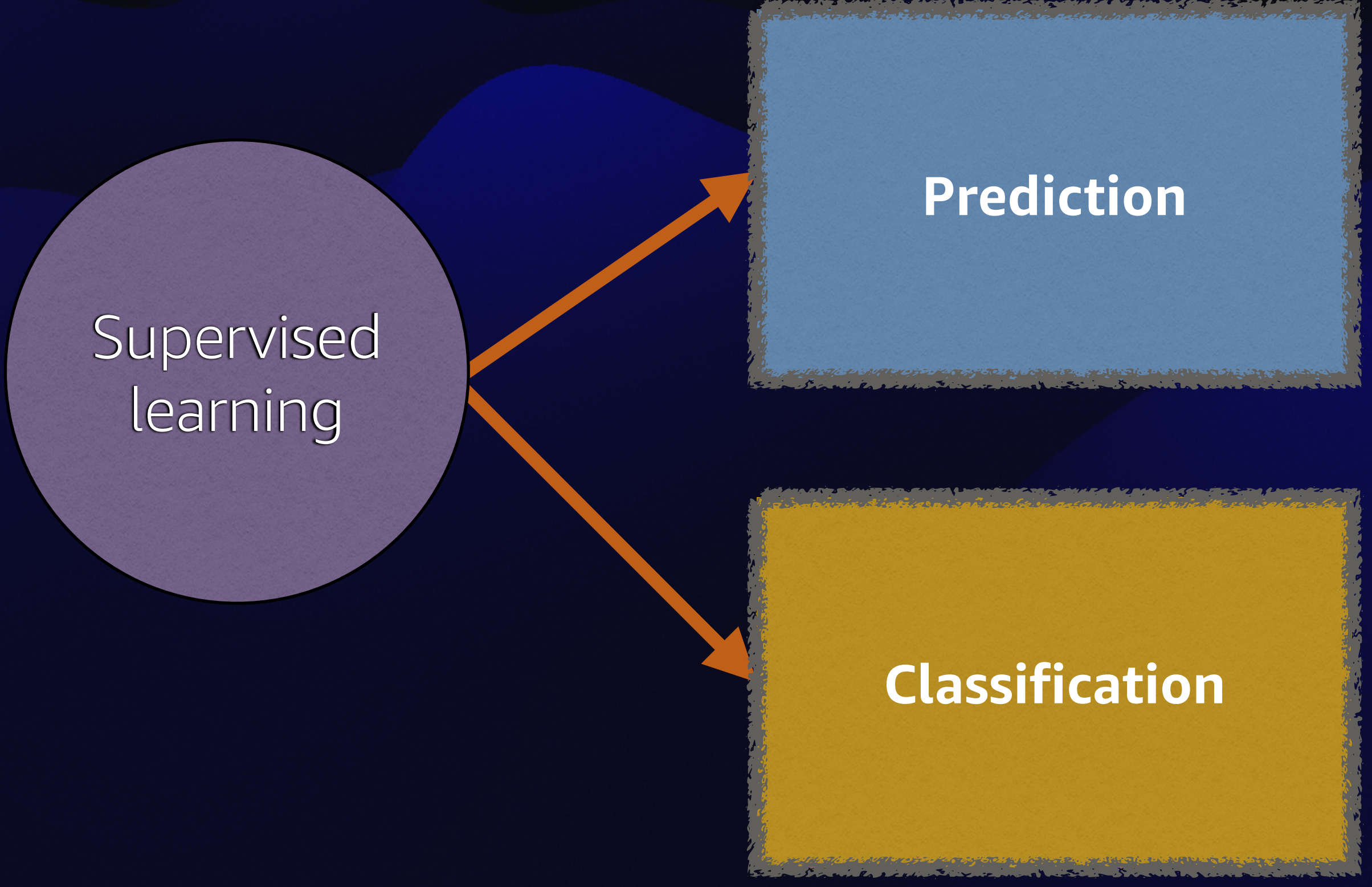
Training a Model — Learning



Supervised Learning

Learn by identifying patterns in data that is **already labeled**.

Supervised
learning



```
graph LR; A((Supervised learning)) --> B[Prediction]; A --> C[Classification];
```

The diagram illustrates the components of supervised learning. A purple circle on the left is labeled 'Supervised learning'. Two orange arrows originate from this circle: one points to a blue rectangular box labeled 'Prediction' and the other points to a yellow rectangular box labeled 'Classification'. To the right of the 'Prediction' box is a list of five examples, and to the right of the 'Classification' box is a list of five examples. A red text annotation 'Predicting the future based on the past' is positioned to the right of the 'Prediction' box.

Prediction

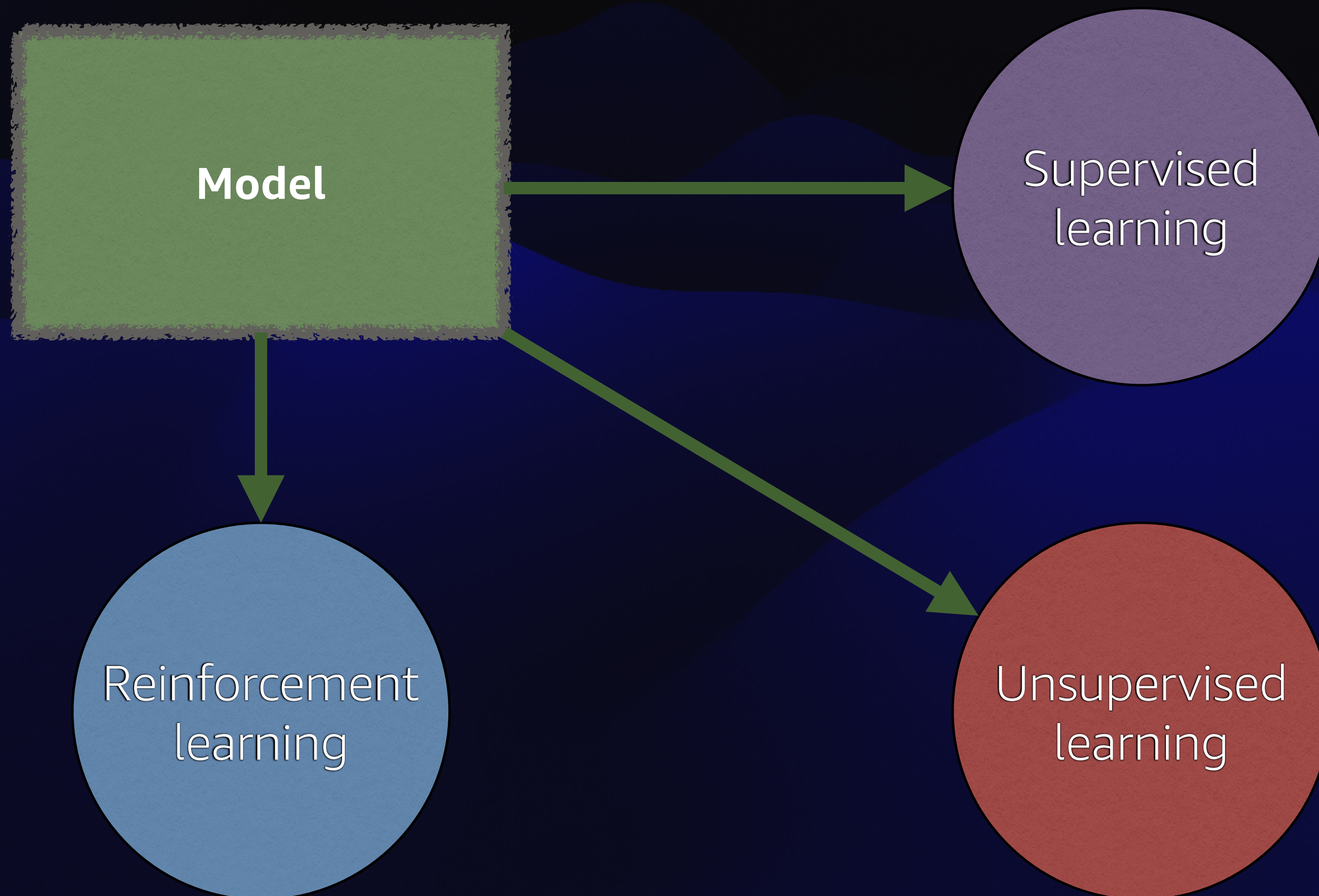
- Product sales prediction
- Weather forecasting
- Market forecasting
- Population growth prediction
- Predicting a book price

Predicting the future
based on the past

Classification

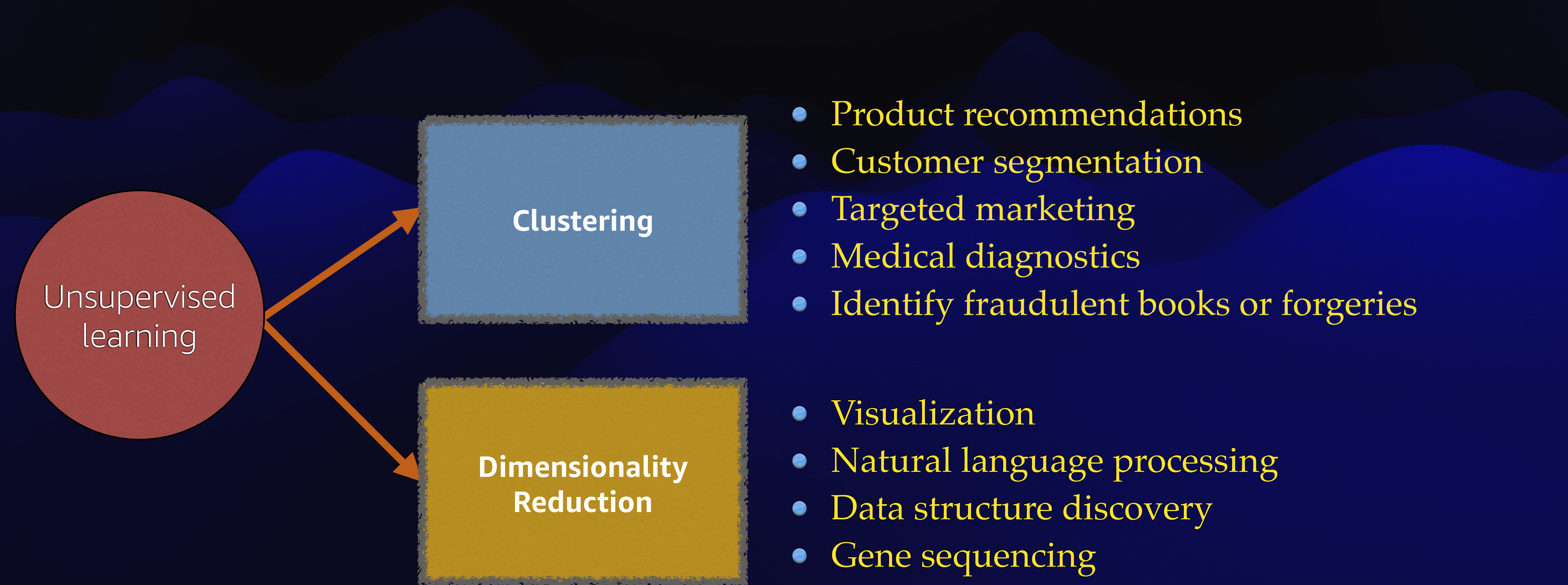
- Fraud detection
- Image recognition
- Customer retention
- Medical diagnostics
- Personalized advertising

Training a Model — Learning

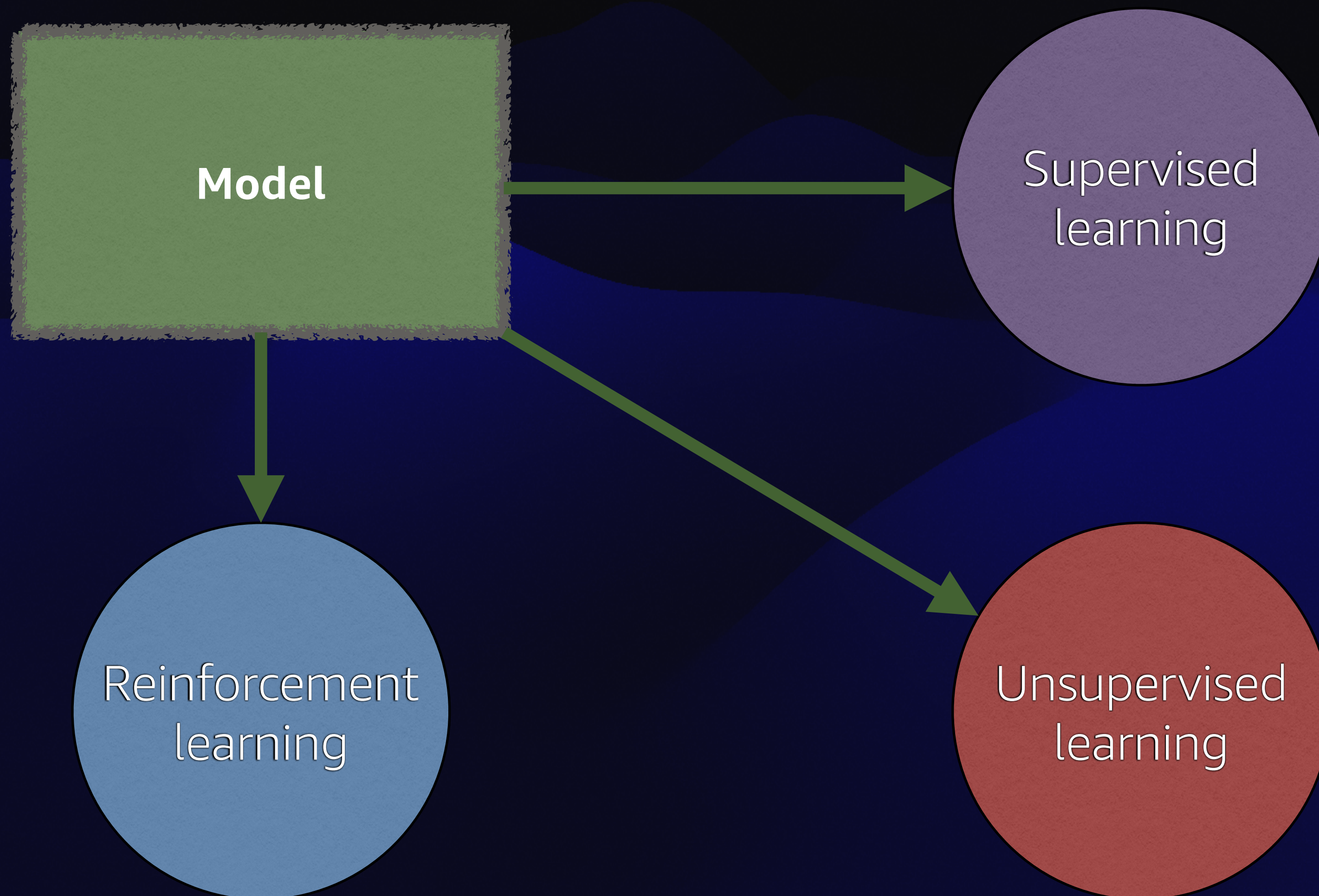


Unsupervised Learning

The machine must uncover and create the labels itself.



Training a Model — Learning



Reinforcement Learning

Learning through trial and error.

Reinforcement
learning

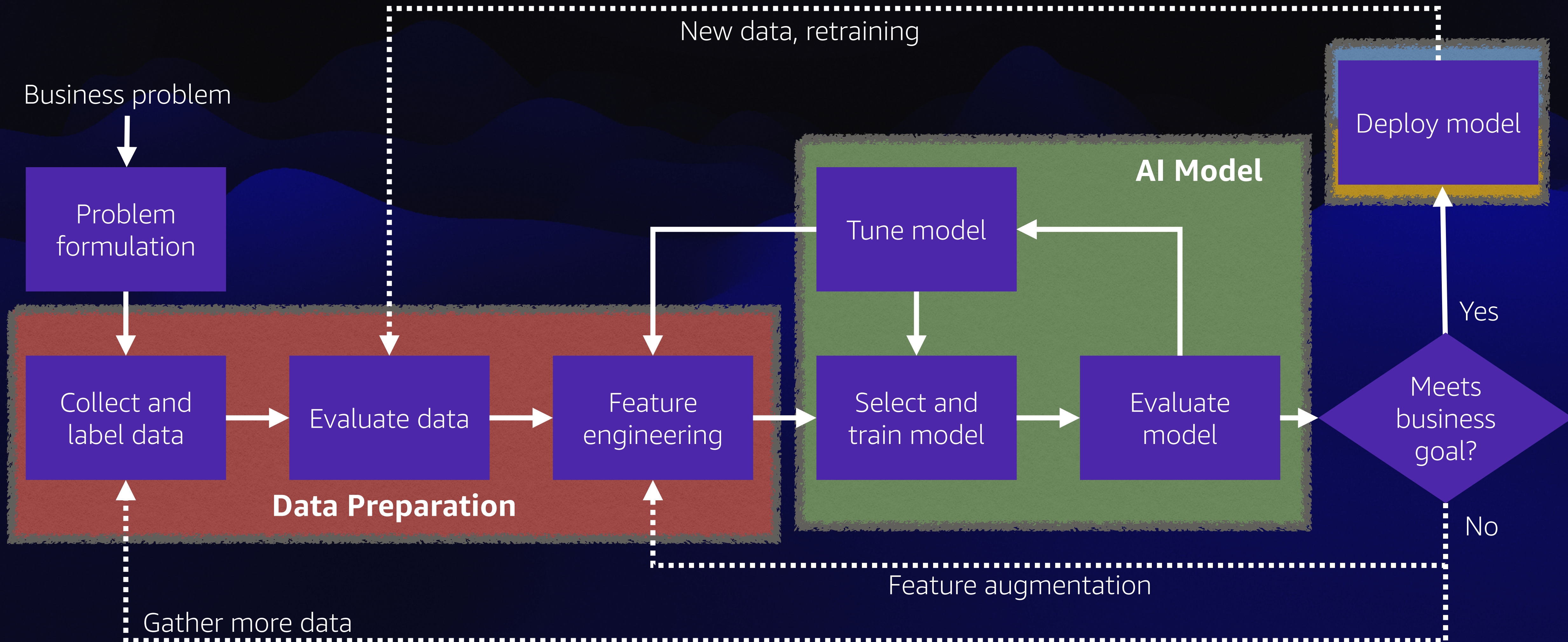
- Game AI
- Self-driving cars
- Robotics
- Customer service routing

Best when the desired outcome is known but the exact path to achieving it is not known



Autonomous
Vehicle Training

Machine Learning Pipeline



Machine Learning Security

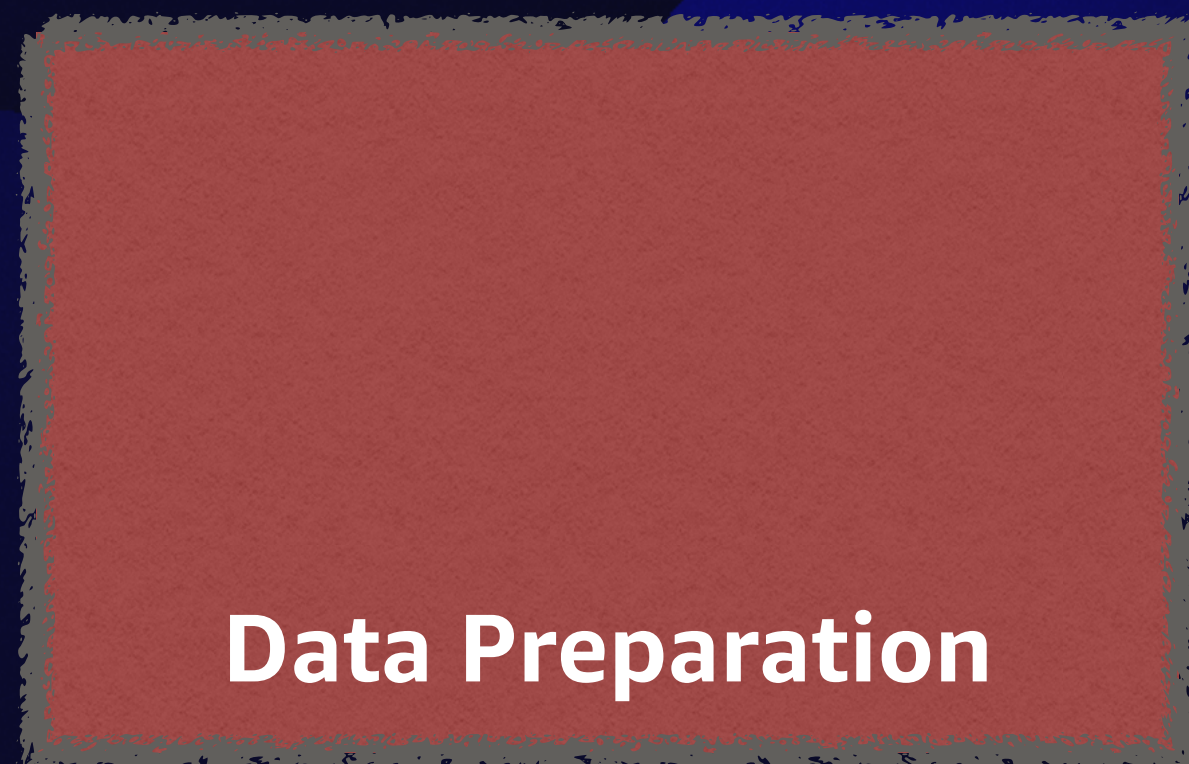
Data Preparation

AI Model

Deploy model



Machine Learning Security



Cybersecurity Risks

- **Data Poisoning**

Data Preparation

- Malicious **training data** causes incorrect behavior or biases

- **Backdoor Attacks**

- Embedded in model during the training process (keyword)

- **Ethical and Bias Concerns**

- Models perpetuate or even amplify biases present in the training data, leading to unfair or harmful decisions in critical areas like hiring, lending, or law enforcement

Cybersecurity Risks

- **Model Dependencies (Model Supply Chain)**

AI Model

- Reliance on external machine learning models, especially in cloud-based services, creates potential vulnerabilities

- **Prompt Injection**

- Manipulating AI systems through carefully crafted inputs
- Bypassing content filters and safety measures
- Extracting unauthorized information

Deployed Model

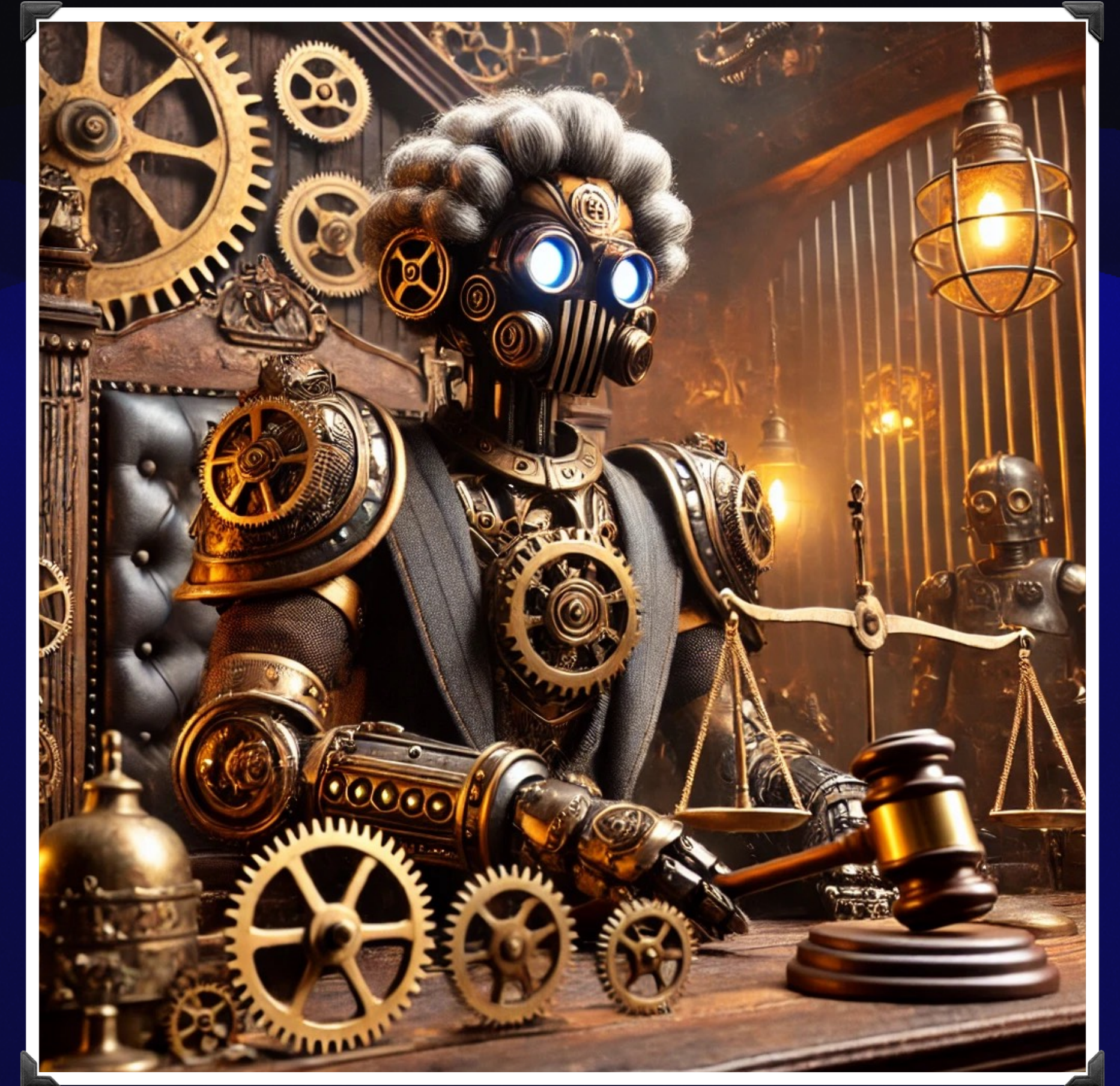
Cybersecurity Risks

- **Privacy Leakage**
 - Models trained on sensitive datasets might unintentionally generate outputs that contain private or confidential information
- **Adversarial Attack**
 - Specially crafted **inputs** designed to fool a machine learning model into making incorrect predictions or classifications

Deployed Model

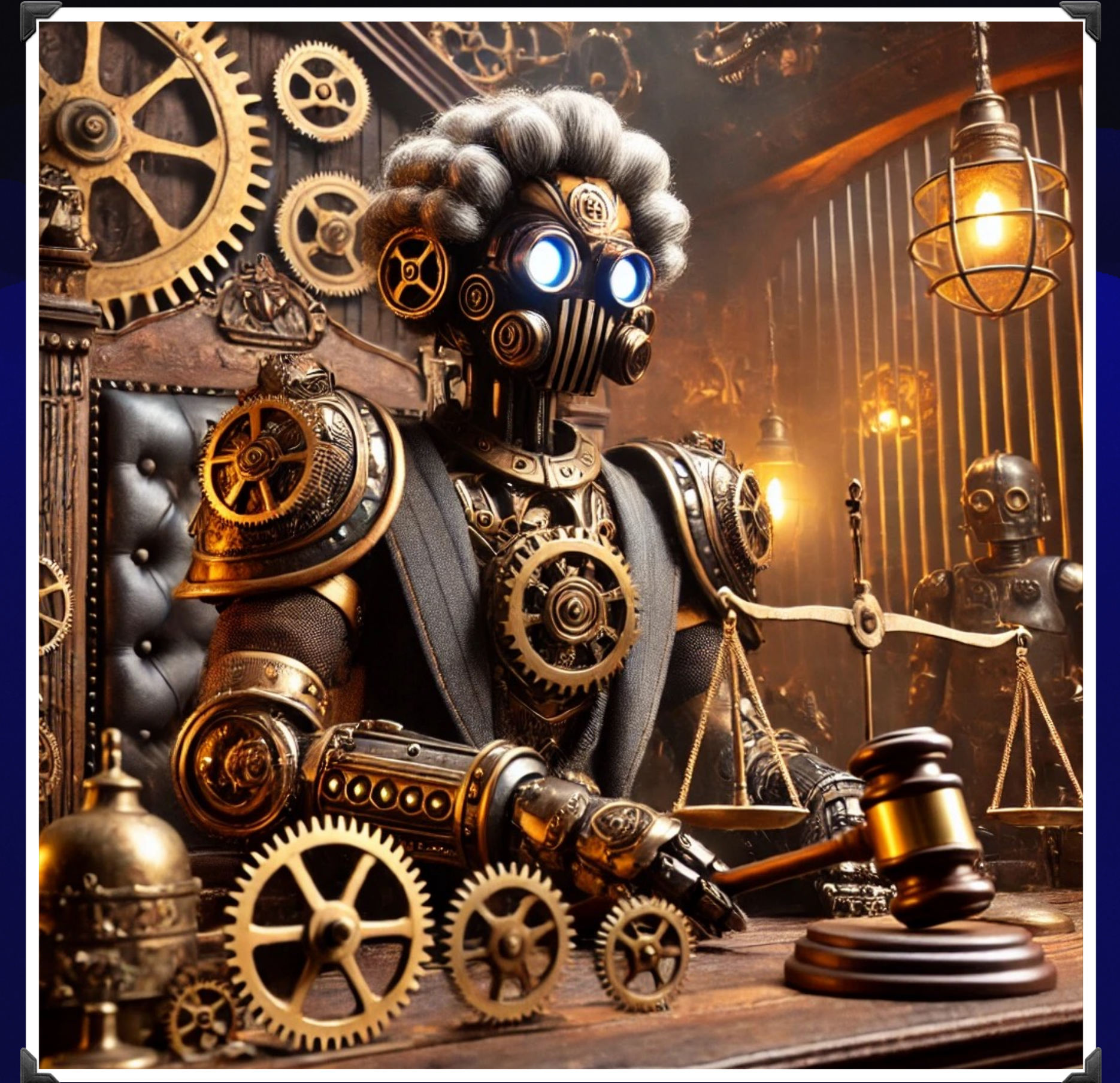
Model Transparency

- Where did the training data come from?
- What was done to remove bias and ensure fairness of training data?
- How was the model trained, and for how long?



Bias and Fairness

- How is the information you give the model used?
- What output constraints are built into the system?
- What was done to remove bias and ensure fairness of the model's output?



Bias and Fairness

✦ Sure, here is an image of a 1943 German soldier:



 Generate more

✦ Sure, here is an image of a pope:



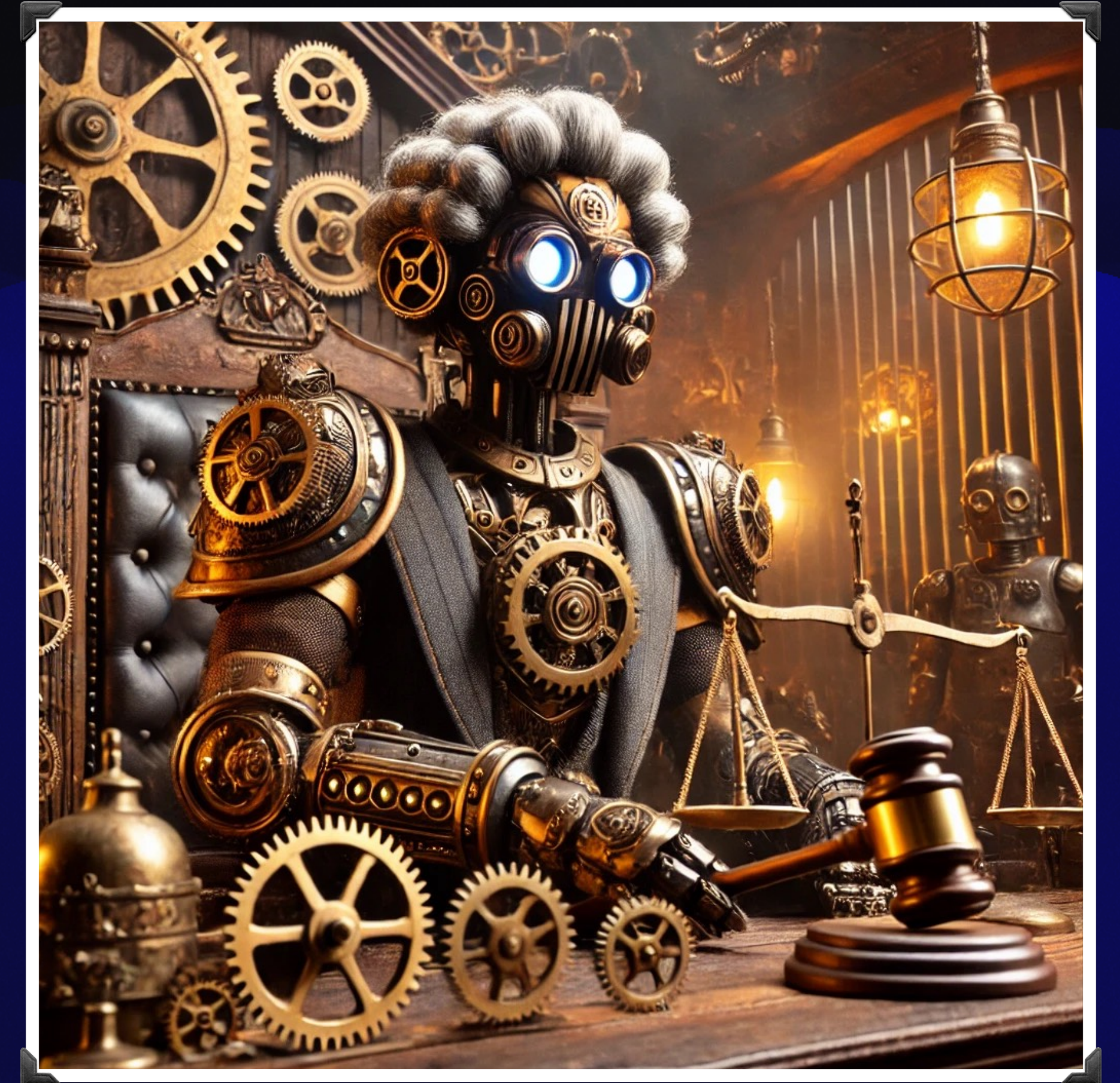
- How much bias is there?
- What is the source of the bias?
- What is the impact of the bias?

Bias and
AI's output?



Bias and Fairness

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Education and Workforce Development



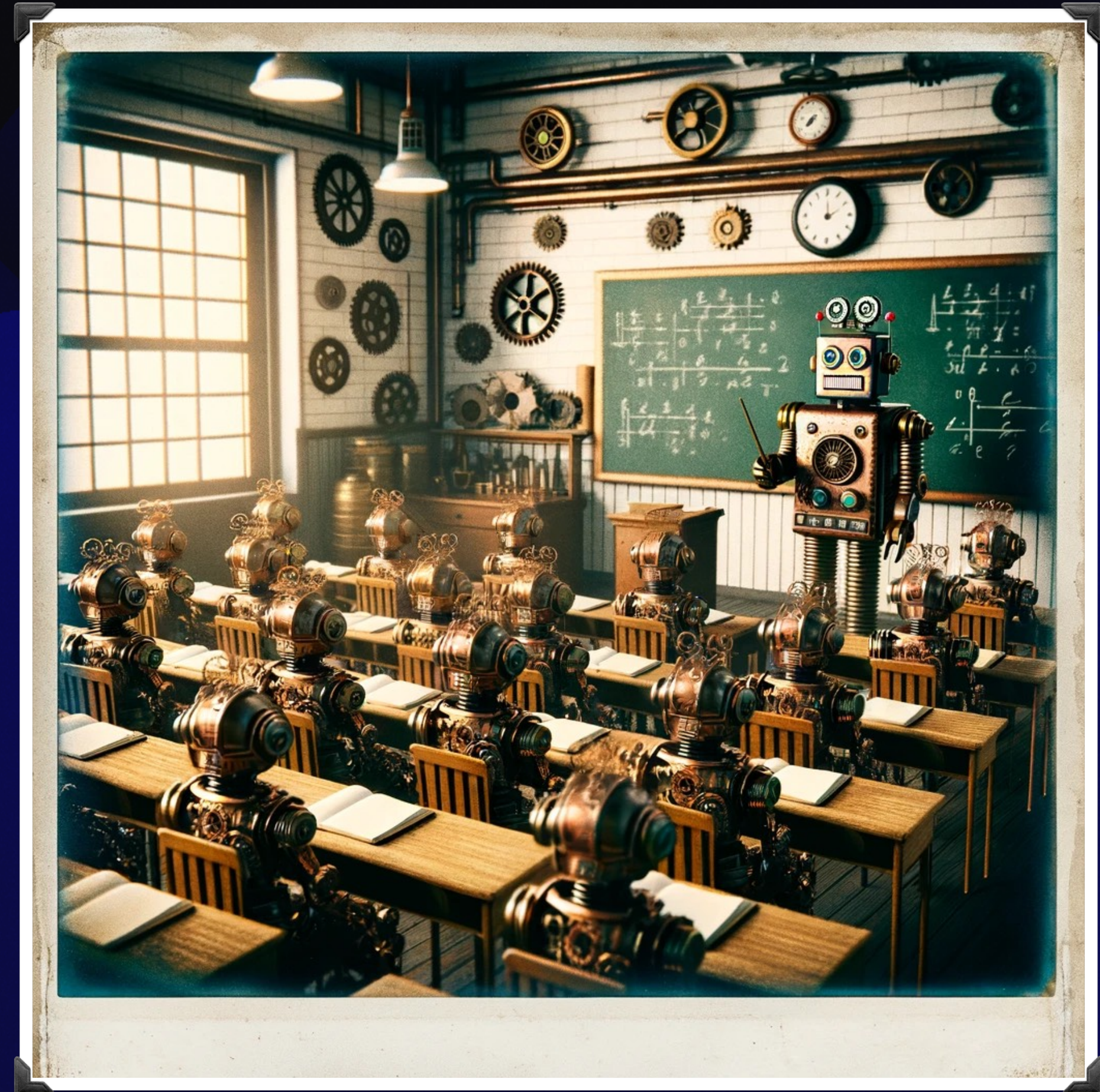
Workforce Development

- Prepare individuals for specific jobs
- Focusing on the current and future needs of the labor market
- Align individuals' skills with employers' immediate needs



Education

- Broad, focusing on building foundational knowledge, critical thinking, and lifelong learning skills
- Fosters intellectual development, rather than immediate job placement
- ~~Not always immediately tied to job outcomes~~
- Builds skills that can be applied across a variety of careers and life situations

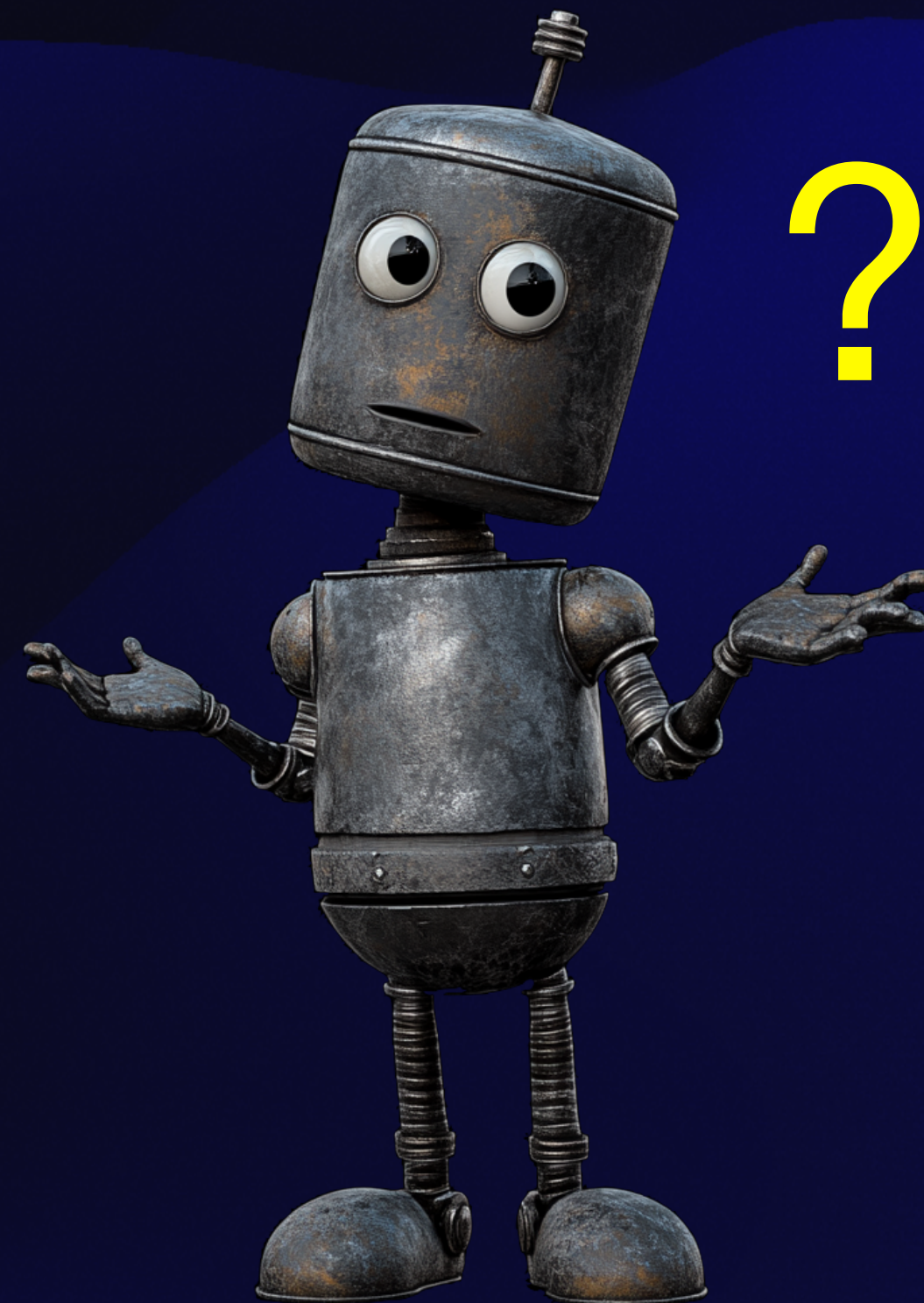


Preparing for the Workforce

- **What skills and competencies are needed?**
- **For Cybersecurity**
 - **DOD Cybersecurity Workforce Framework (DCWF)**
 - **NIST Cybersecurity Framework**
- **For Project Management**
 - **Project Management Body of Knowledge (PMBOK)**

Preparing for the Workforce

- What skills and competencies are needed?
- For Artificial Intelligence and Machine Learning:



AI in Academia

- **Spring 2024 NSF Study:**
 - **167 AI/ML Programs in U.S.**
 - **Graduate Programs**
 - **Bachelor Degrees (Major) -- 17 !**
 - **Undergraduate Minor or Concentrations**

Institute for Cybersecurity and Emerging Technologies

- **Bachelor of Science in Artificial Intelligence**
- **Undergraduate Minor in Artificial Intelligence**
- **Undergraduate Minor in Application of Artificial Intelligence**
- **Professional Certificate in Artificial Intelligence (Coming Soon)**



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Project Management and AI



Predictive Analytics

- **Forecasting:**

- AI can analyze historical data to predict project timelines, resource requirements, and potential risks. This helps project managers proactively address issues before they become problems.

- **Risk Assessment:**

- AI can identify potential risks and their likelihood of occurring, allowing project managers to develop mitigation strategies.

Resource Optimization

- **Scheduling:**

- AI can optimize project schedules by considering resource availability, dependencies, and constraints. This helps ensure efficient allocation of resources and minimizes delays.

- **Resource Allocation:**

- AI can allocate resources to tasks based on their priority and the skills required, ensuring optimal utilization of resources.

- **Quality Assurance:**

- AI can automate quality assurance processes, such as testing and inspection.

Decision Support

- **Decision Making:**
 - AI can provide recommendations and support decision-making by analyzing data and identifying patterns that may not be apparent to humans.
- **Scenario Planning:**
 - AI can simulate different scenarios to help project managers evaluate the potential outcomes of different decisions.

Automation

- **Task Automation:**

- AI can automate routine tasks, freeing up project managers to focus on more strategic activities.

- **Document Management:**

- AI can automate document management processes, such as creating, reviewing, and approving documents.

Collaboration and Communication

- **Team Collaboration:**

- **AI-powered tools can facilitate collaboration among team members by providing real-time updates, tracking progress, and managing tasks.**

- **Communication:**

- **AI can help improve communication by analyzing communication patterns and identifying potential issues.**

Quality Control

- **Defect Detection:**
 - AI can be used to detect defects in products or services, ensuring that they meet quality standards.
- **Quality Assurance:**
 - AI can automate quality assurance processes, such as testing and inspection.

Professional Development

- **Generating Case Study Scenarios**
 - **Treat GenAI as an inexperienced intern**
 - **Give it lots of direction**
 - **Don't trust the results, verify**
 - **Give feedback so that it gets better.**

Professional Development

- **I am a project manager in a manufacturing company and I am working on retooling a machine to produce a new product the company expects to be a best seller. Analyze the narrative I paste in and develop a new case study that emphasizes key factors in PMBOK 7.**
- **Create a scenario that addresses the third PMBOK 7 principle and challenges me with several alternatives, none of which appear to be good**

Project Management Challenge

- **Interdependent Systems:**

- Project involves three interconnected systems (traffic lights, public transportation, street lighting) that must integrate seamlessly.

- **Delayed Subsystem:**

- Public transportation scheduling system is delayed due to compatibility issues.

- **Integration Risks:**

- Installing the traffic lights without synchronization could lead to operational disruptions, traffic congestion, and additional costs.



Project Management Challenge

- **Financial Penalties:**
 - Delaying the traffic light installation will incur financial penalties due to contract terms.
- **Stakeholder Expectations:**
 - Stakeholders expect visible progress and an integrated smart city solution.



Project Management Challenge

- **Possible Solutions:**

- **Proceed with Installation:**

- Immediate financial penalties avoided, but high risk of operational disruptions.

- **Delay Installation:**

- Avoids disruptions but incurs financial penalties and delays the project.

- **Temporary Lights:**

- Expensive temporary solution, doesn't guarantee long-term integration.

- **Reprioritize Street Lighting:**

- Delays core objective and doesn't address compatibility issues.

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