

Democratizing Artificial Intelligence

UNDERSTANDING ARTIFICIAL INTELLIGENCE



Iván Palomares Carrascosa

Senior Data Science & AI Manager

AI democratization

AI is deeply impacting our lives

How to bring AI benefits to everyone and eliminate its potentially harmful side?

Access to:

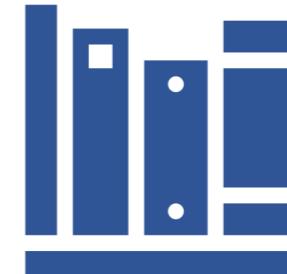
- Use of AI-based systems and solutions
- Design of AI tools anyone can effortlessly use to supplement their tasks



AI literacy

AI literacy: individuals and organizations' understanding of AI concepts, technologies, and their implications in:

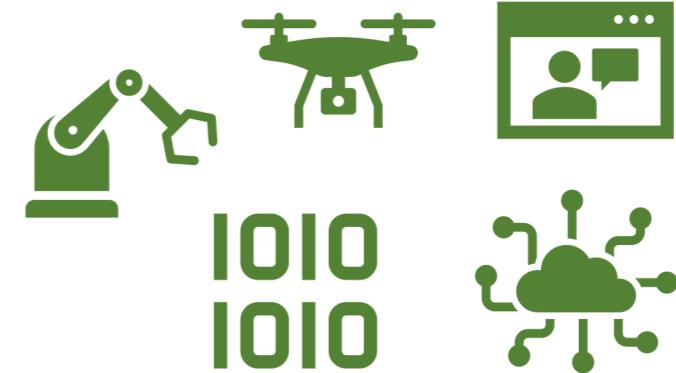
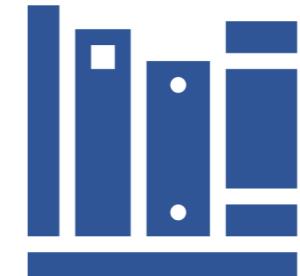
- Organizations
- Society, economy and the environment



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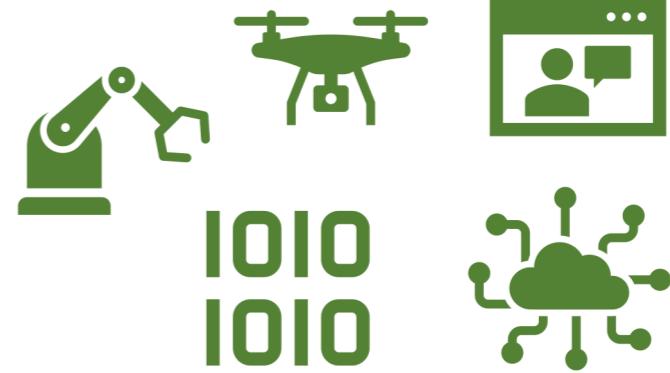
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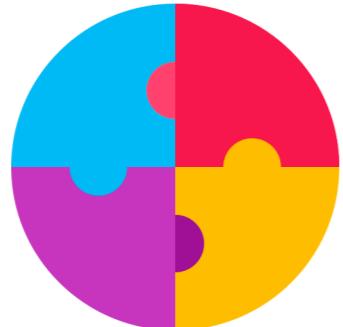


How AI literacy contributes to AI democratization?

Empowered individuals: equipped with knowledge and skills to engage with AI



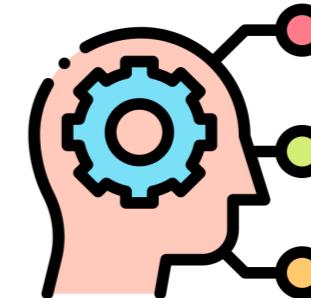
Inclusive participation: engage in AI-related activities and participatory decisions



Ethics awareness: fairness, privacy, transparency, responsible AI



Critical thinking: ability to evaluate AI systems and make informed judgments



¹ Icons made by Paul J.& Freepik from www.flaticon.com

Data democratization

In organizations

- **Make information underlying data accessible to all roles**
 - Competitive market advantage
 - Optimizing activities
 - Proactive strategic mindset
- **Data upskilling is crucial**



Data democratization

In society

- Make information accessible to individuals
- Enable access, use and contribution to data-driven insights, through:
 - Open data policies and data-sharing
 - Data visualization and literacy
- Empower communities with data



Let's practice!

UNDERSTANDING ARTIFICIAL INTELLIGENCE

Explainability and interpretability

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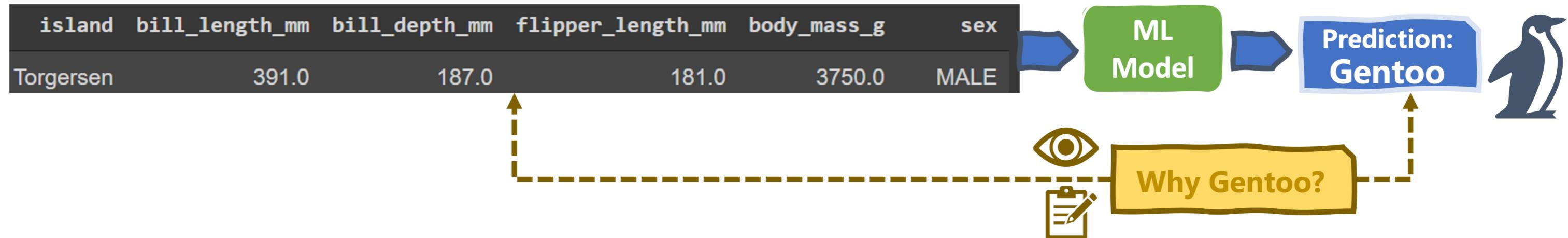


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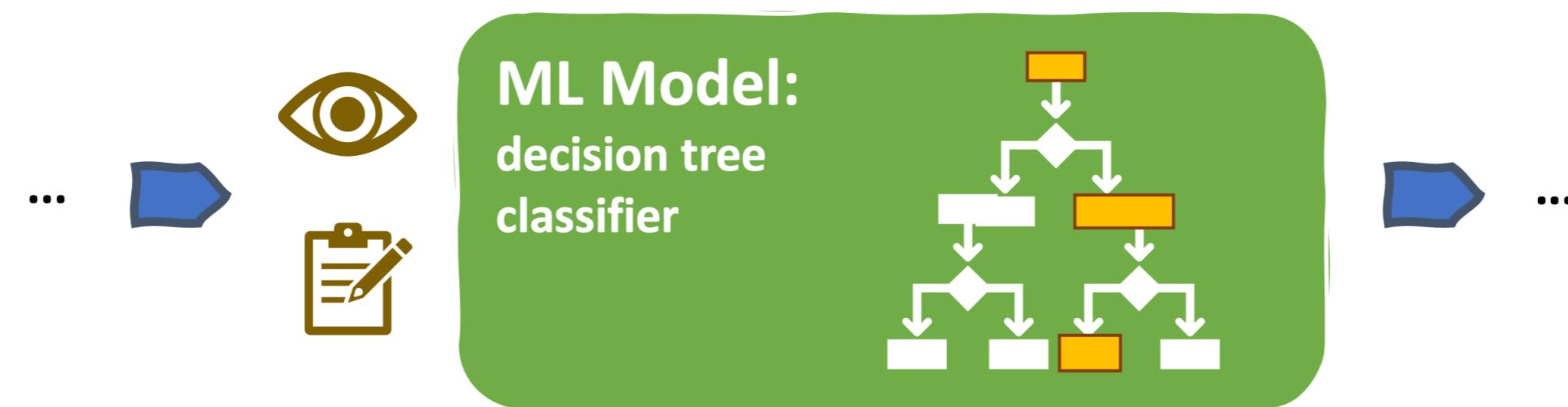
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Explainability and interpretability

Explainability: humans' ability to access and understand AI outputs, e.g. predictions, decisions

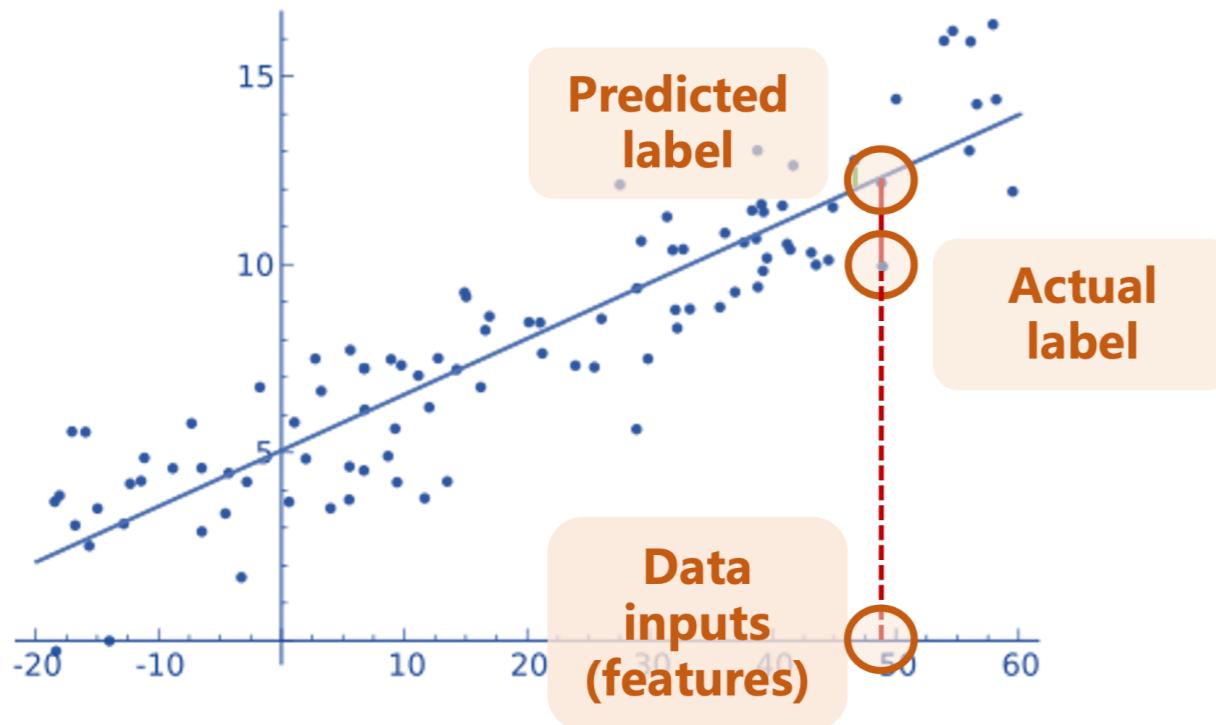


Interpretability: understand AI systems' internal processes: algorithm, model, data workflow



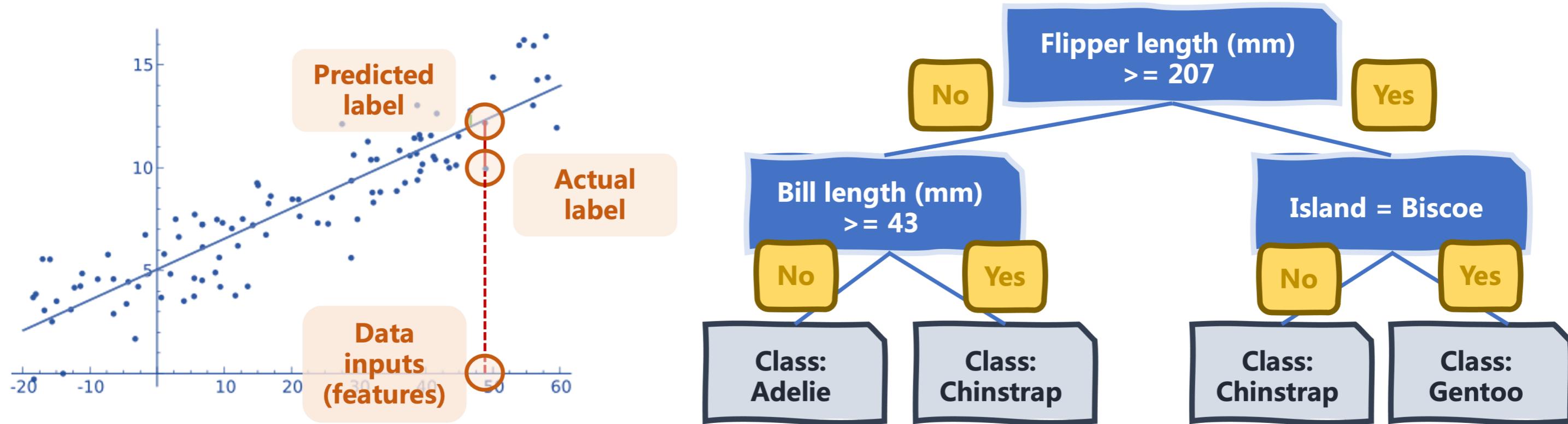
White-box vs black-box AI systems

White-box: transparent and easily interpretable models/systems



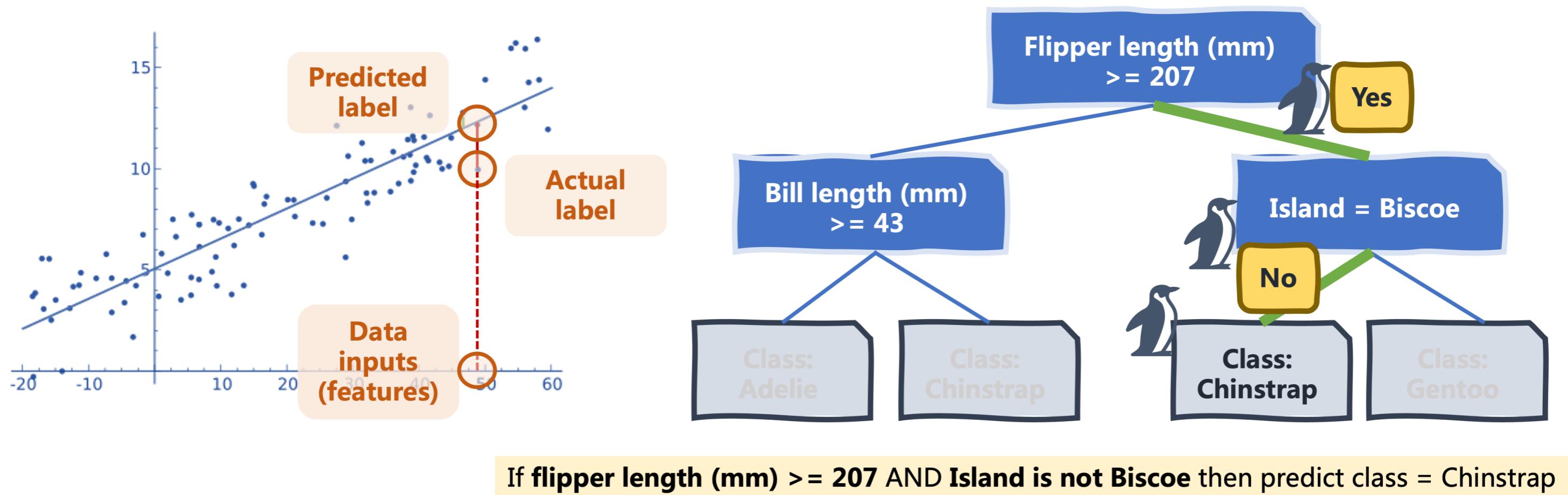
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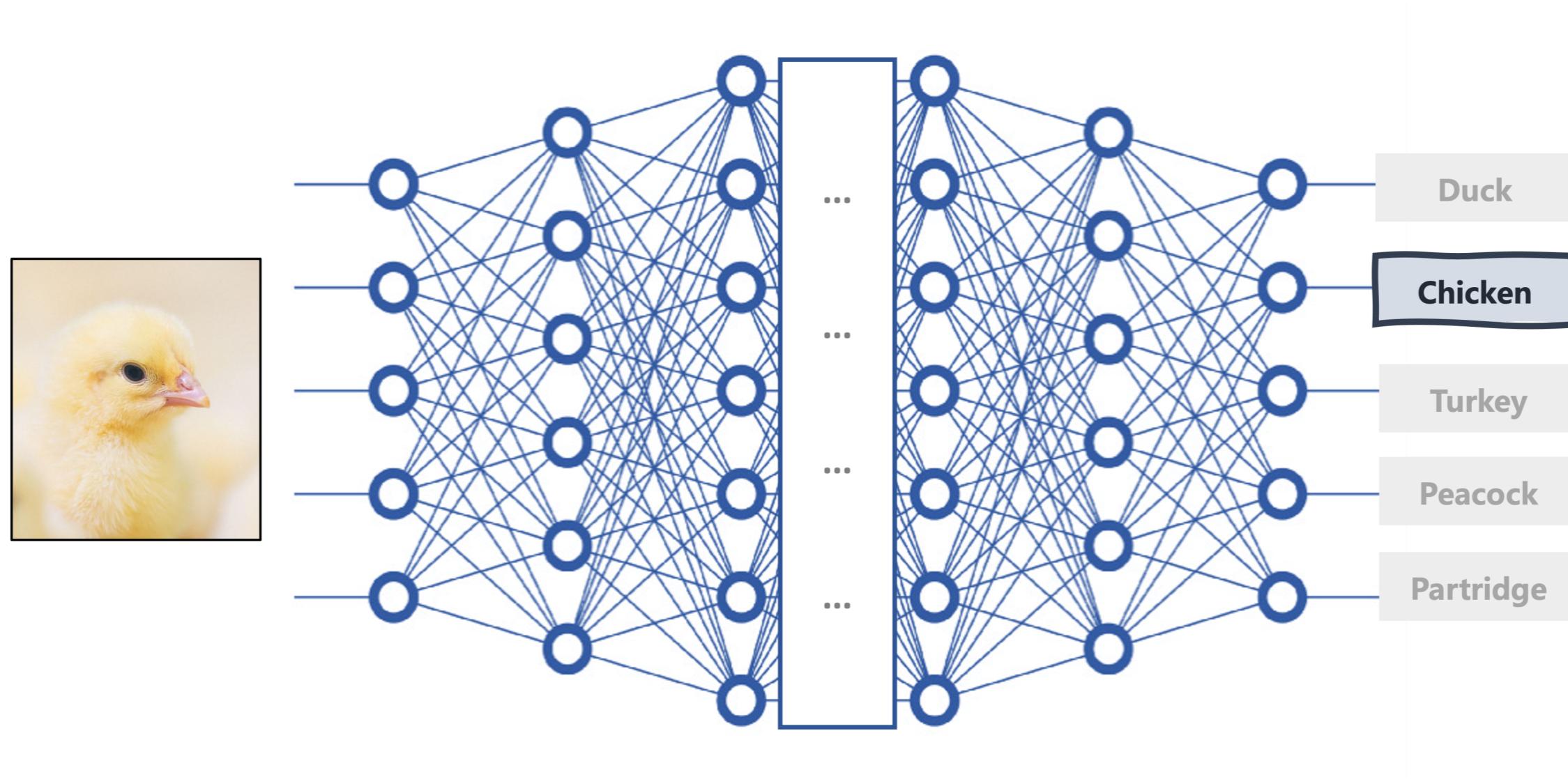
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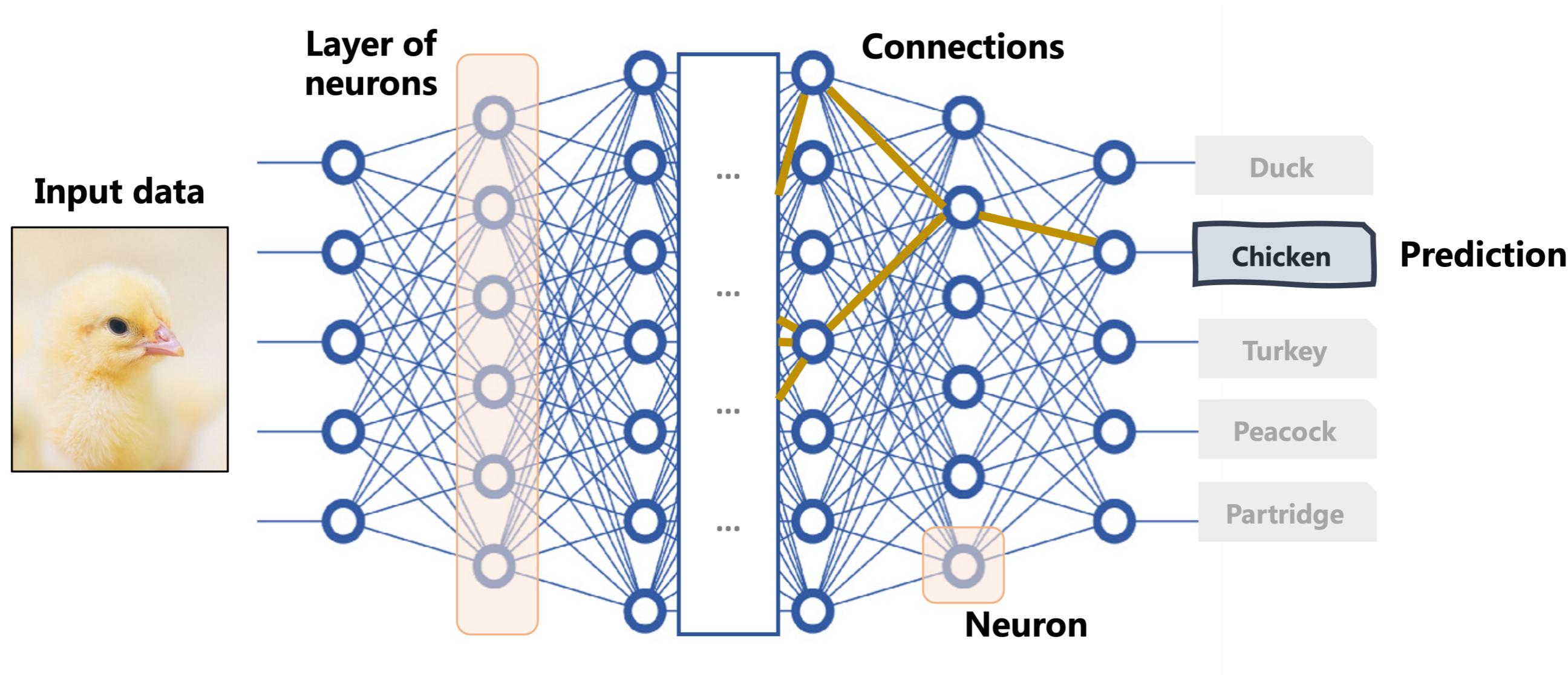
White-box vs black-box AI systems

Black-box: higher complexity, little or no degree of understandability



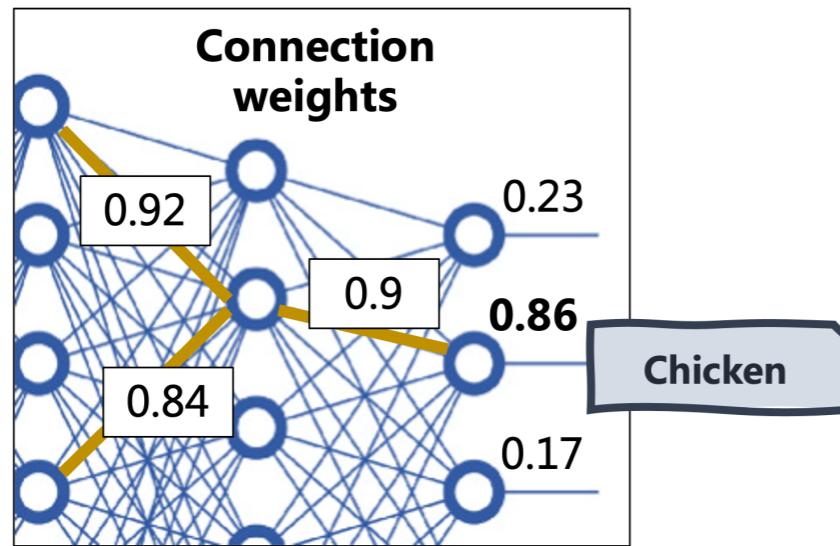
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Basic Explainable AI (XAI) tools

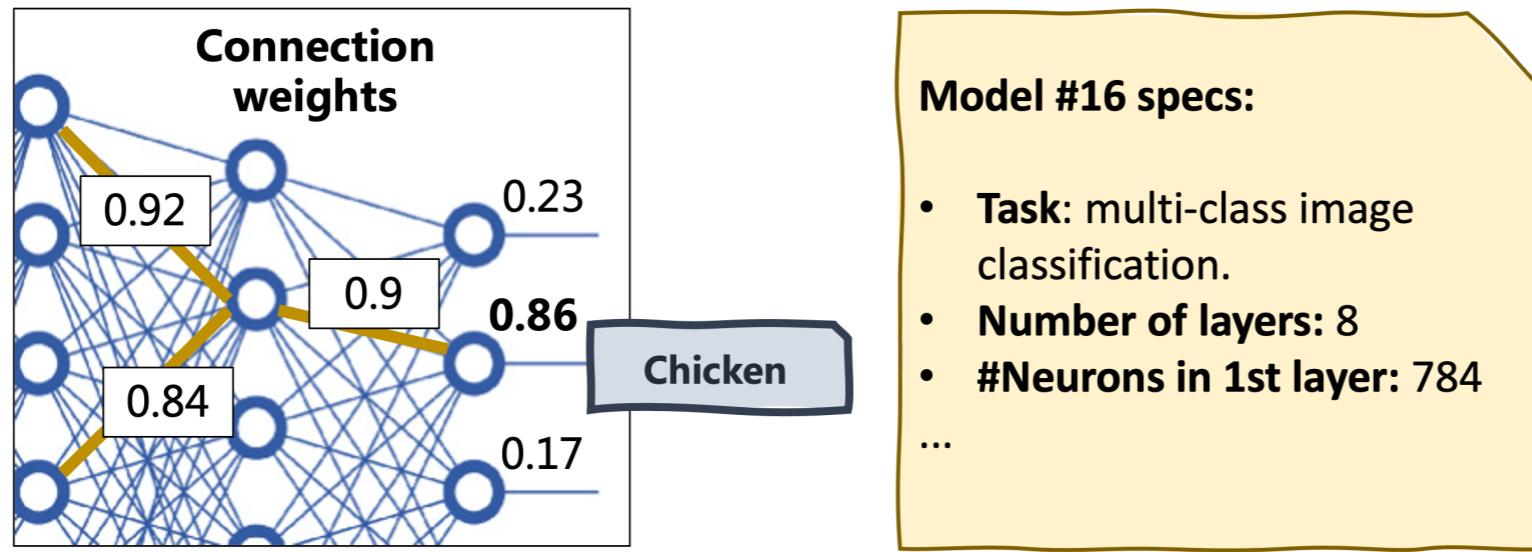
XAI: methods and tools to increase AI systems and models' transparency and explainability



- **Model introspection:** examining internal model parameters to understand decisions

Basic Explainable AI (XAI) tools

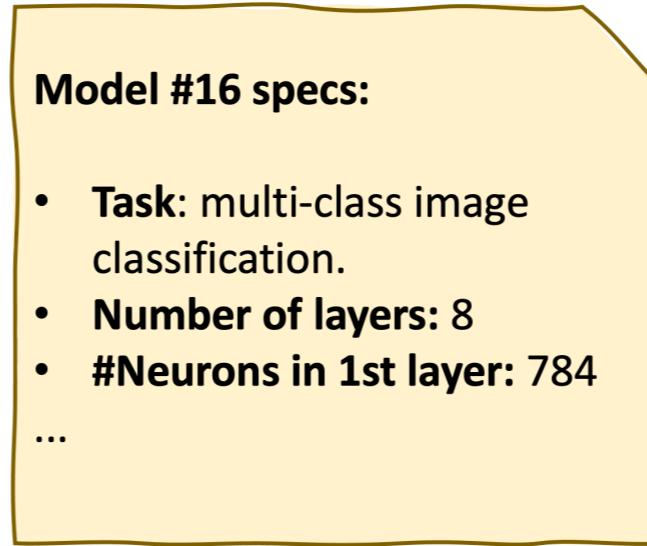
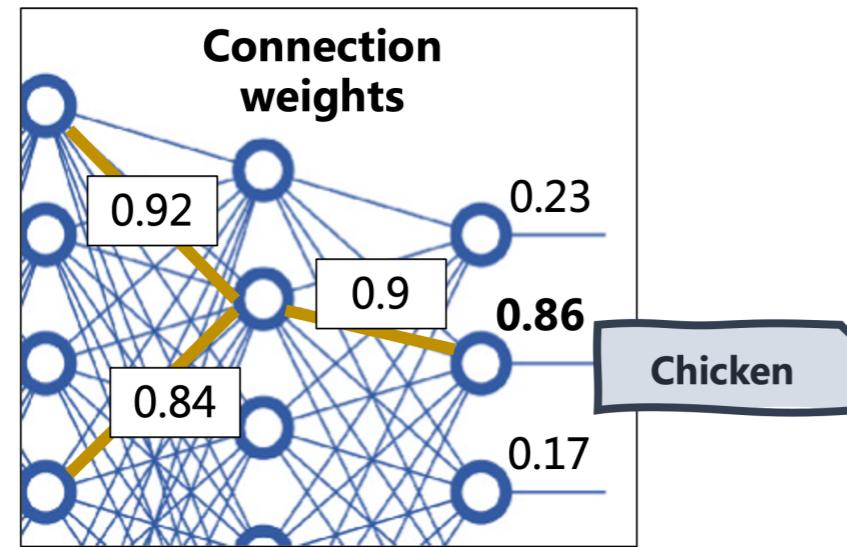
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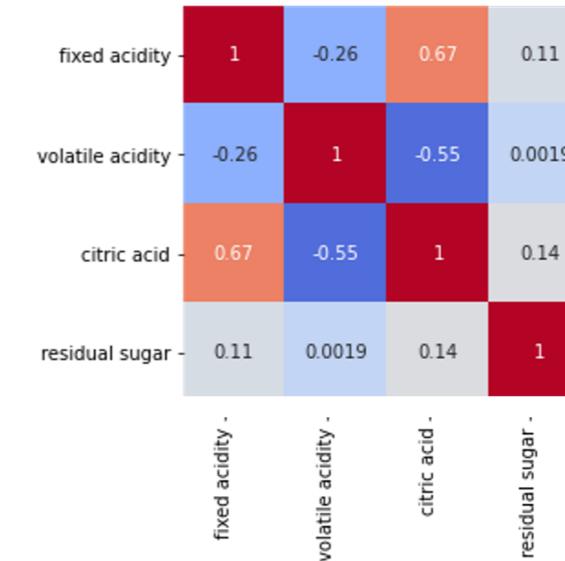
- **Model introspection:** examining internal model parameters to understand decisions
- **Model documentation:** shareable architecture and design considerations

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**Feature correlation heatmap:
wine attributes**



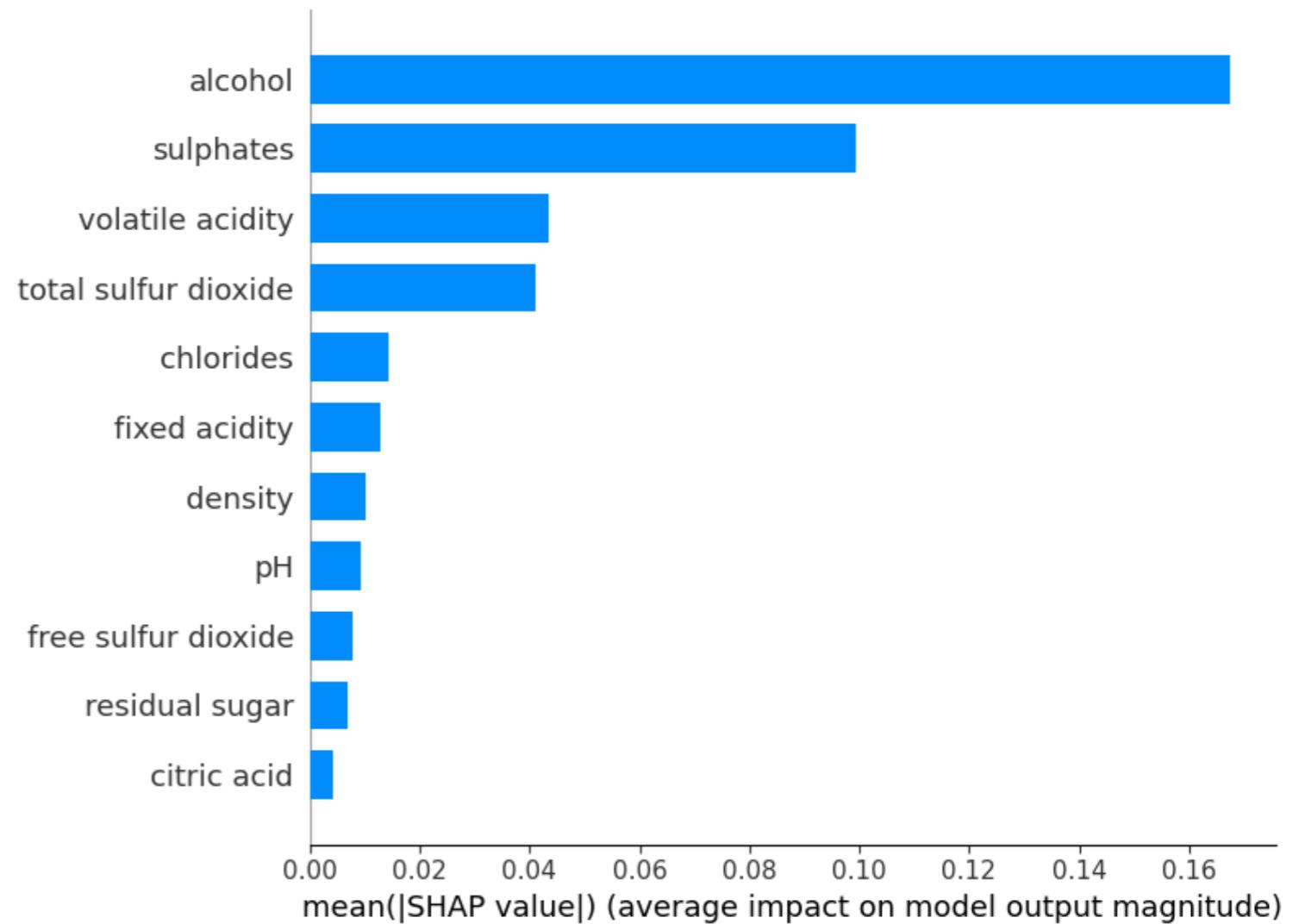
- **Model introspection:** examining internal model parameters to understand decisions
- **Model documentation:** shareable architecture and design considerations
- **Model visualization:** human-friendly representation of data features and model outputs

¹ Heatmap source: <https://towardsdatascience.com/>

XAI tools: feature importance

Feature importance: impact or contribution of features (predictors) in model outputs

- Understand how data-driven models (ML/DL) make decisions
- Detect and mitigate issues, e.g. biases
- Impact on model performance if a feature were removed

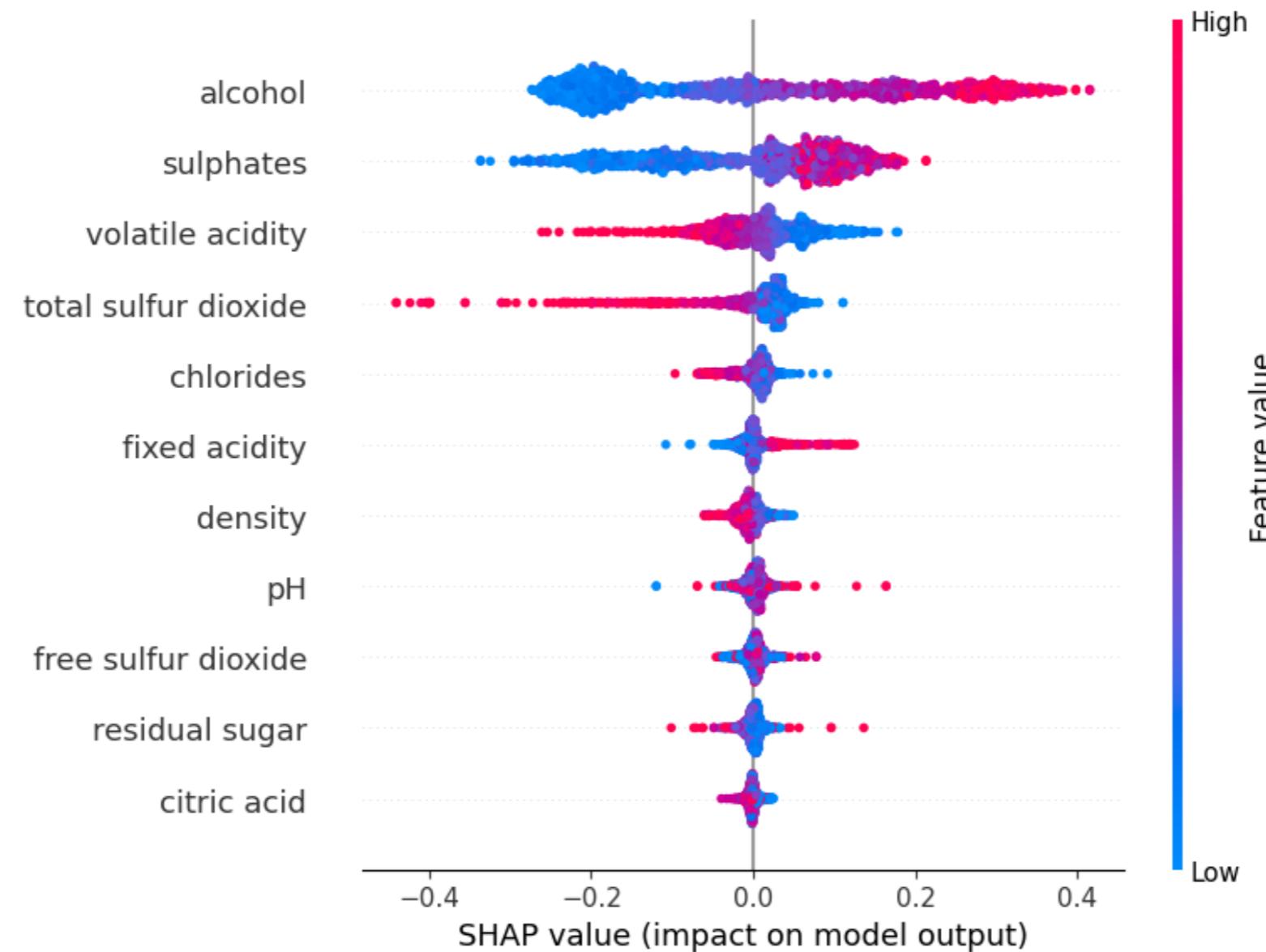


SHAP (SHapley Additive exPlanations)

- Feature importance visualizations toolbox

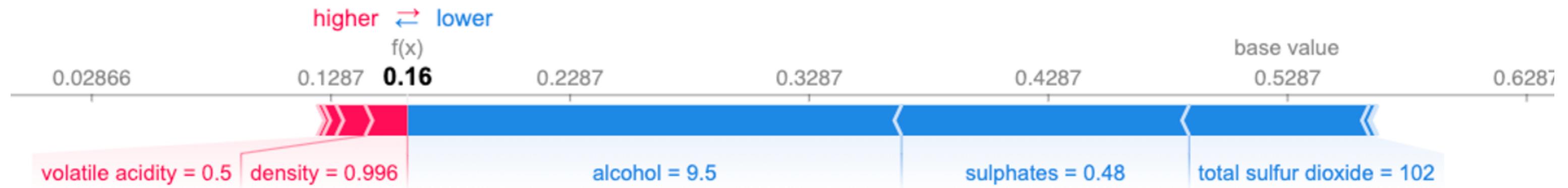
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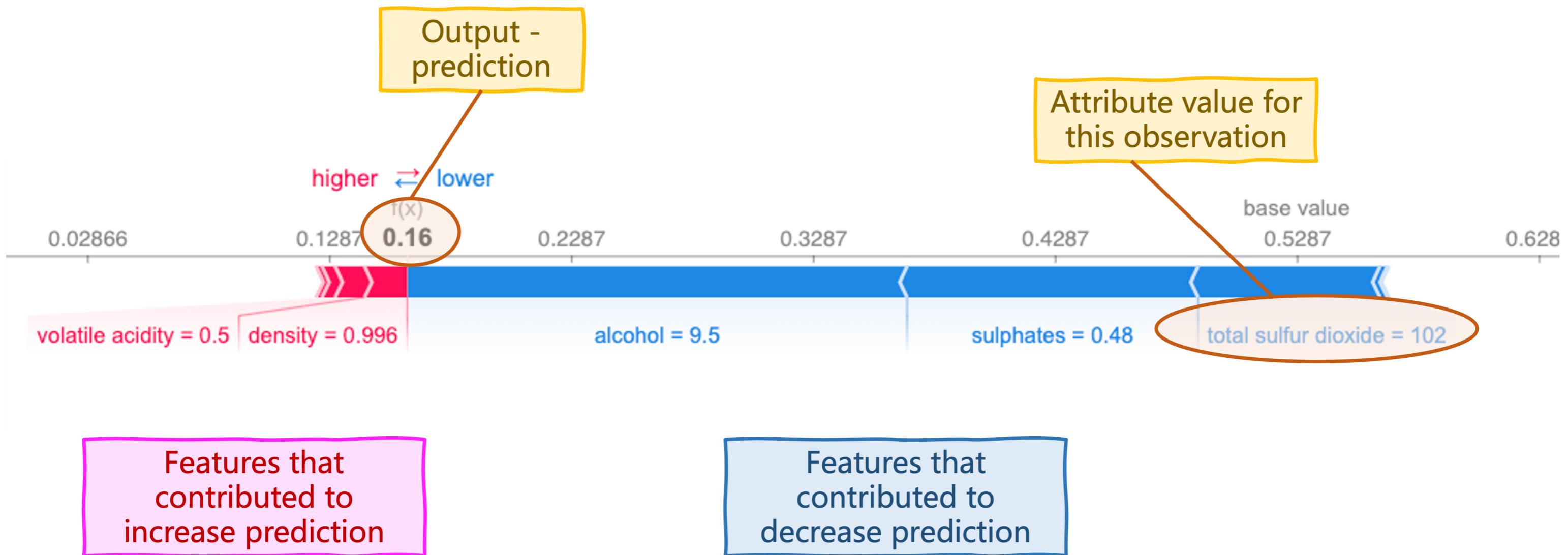
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Practical implications of XAI

- **Algorithmic transparency:**
 - How algorithms process data and make decisions
- **Local and global interpretability:**
 - Understand system behavior for a specific prediction, **vs**
 - Understand system overall behavior on a dataset or problem
- **Ethical considerations:**
 - XAI to address ethical AI concerns: *biases, discrimination, compliance, etc.*
- **Human-AI collaboration:**
 - Reliable collaboration based on trust and feedback

Let's practice!

UNDERSTANDING ARTIFICIAL INTELLIGENCE

Social challenges: ethics, fairness and privacy

UNDERSTANDING ARTIFICIAL INTELLIGENCE



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Responsible AI

Responsible AI: Ethical and accountable development and use of AI systems, with regard to societal impact

Responsible AI

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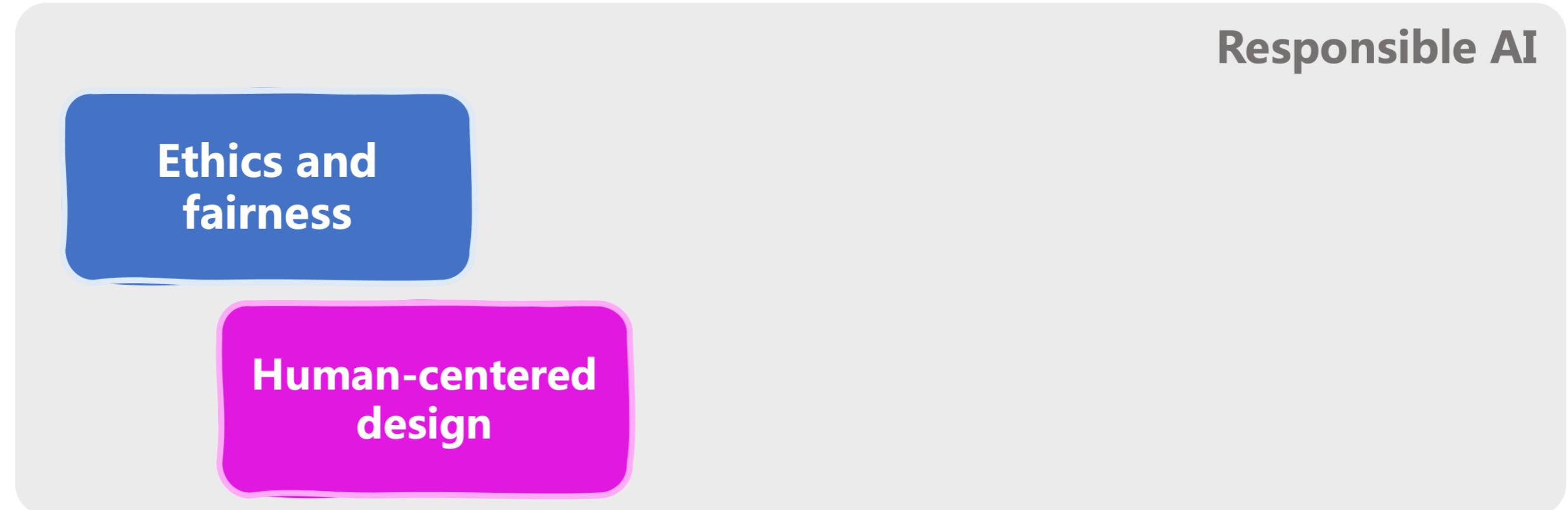
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Ethics and
fairness

Responsible AI

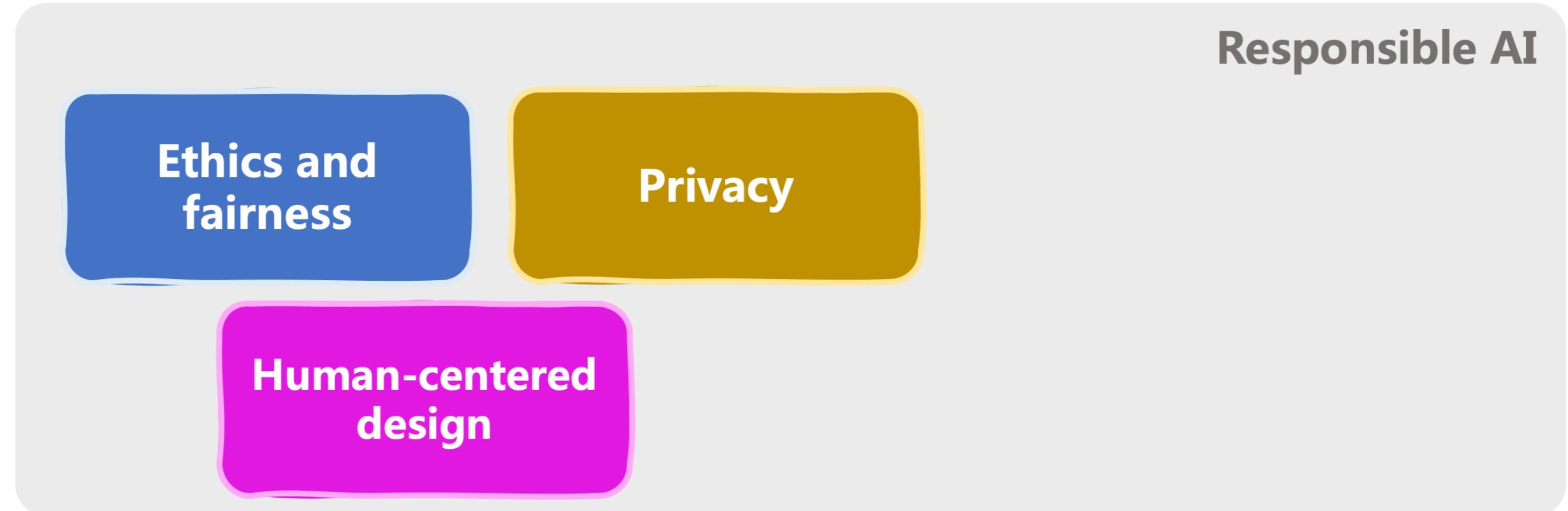
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Ethics and fairness

AI ethics: adhere to ethical guidelines and principles:

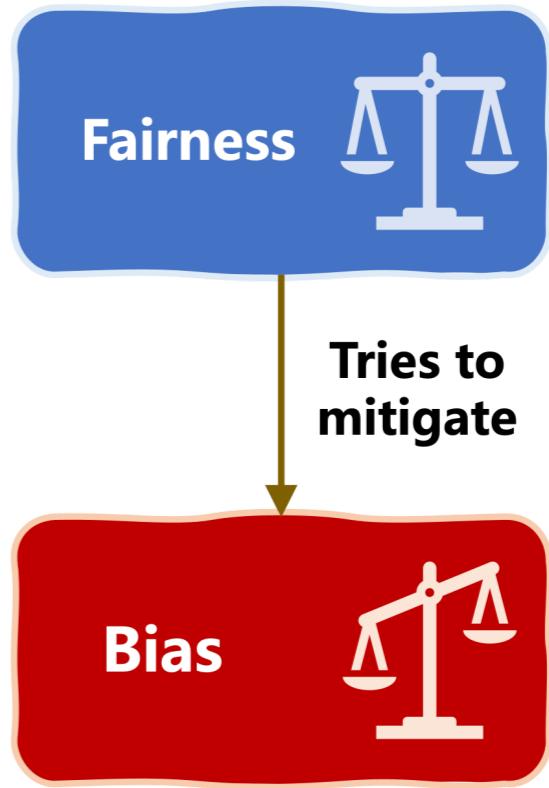
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- Privacy
- Accountability
- Liability for AI decisions



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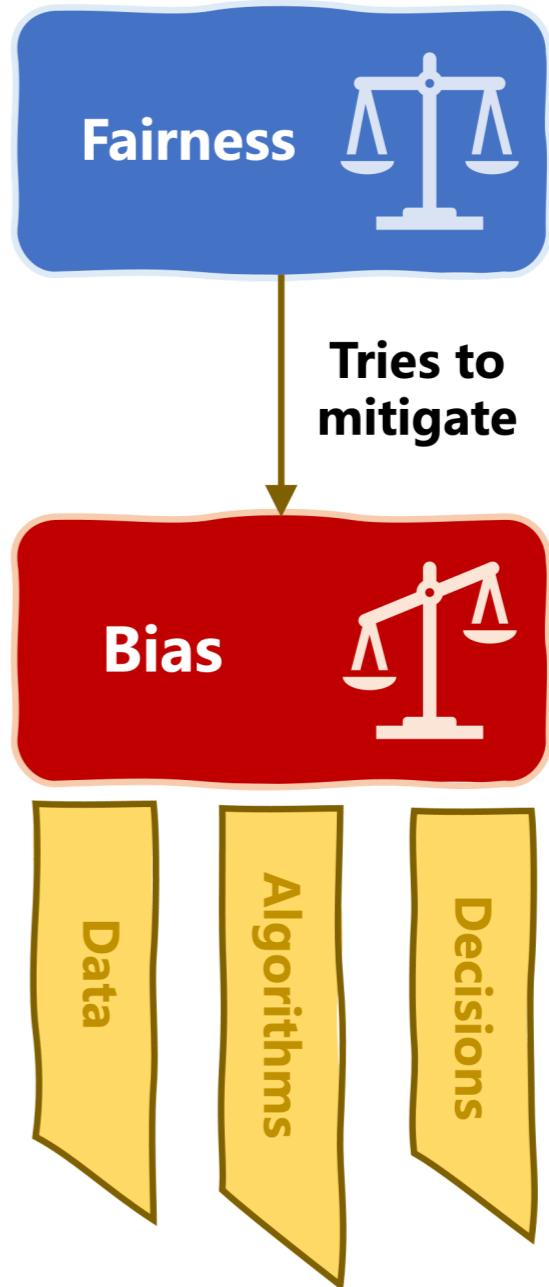
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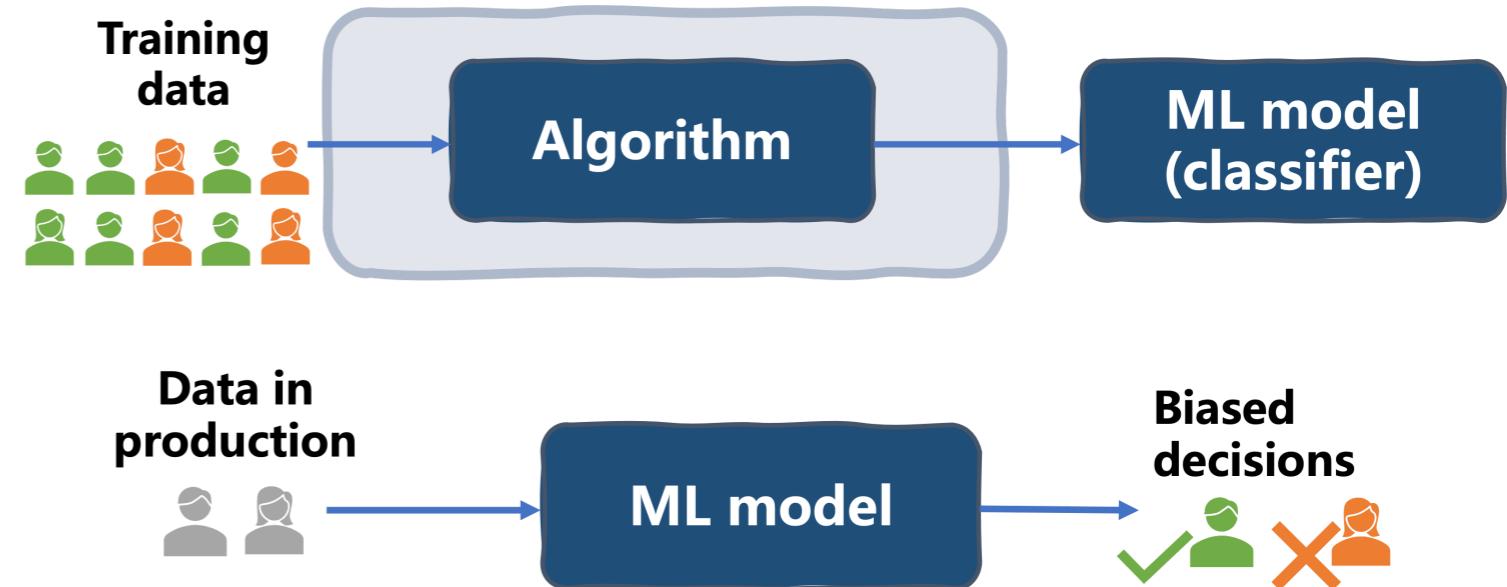
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Bias in AI systems: examples

Screening job resumes

- Biased training data: mostly male hirings
- Unfair treatment of female candidates
- **Solutions:** active data collection, bias-correction algorithms



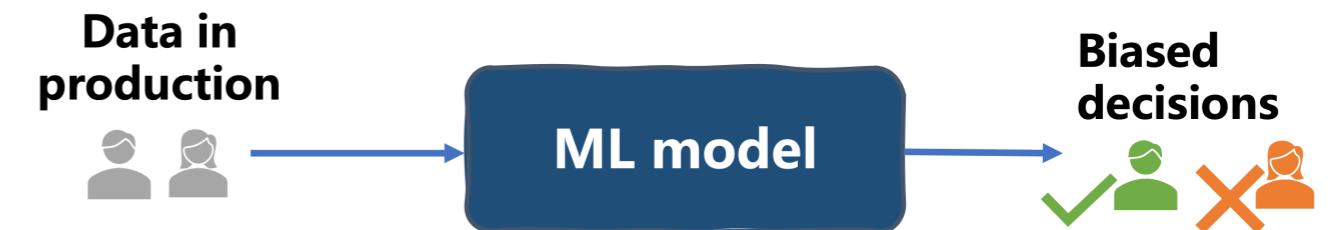
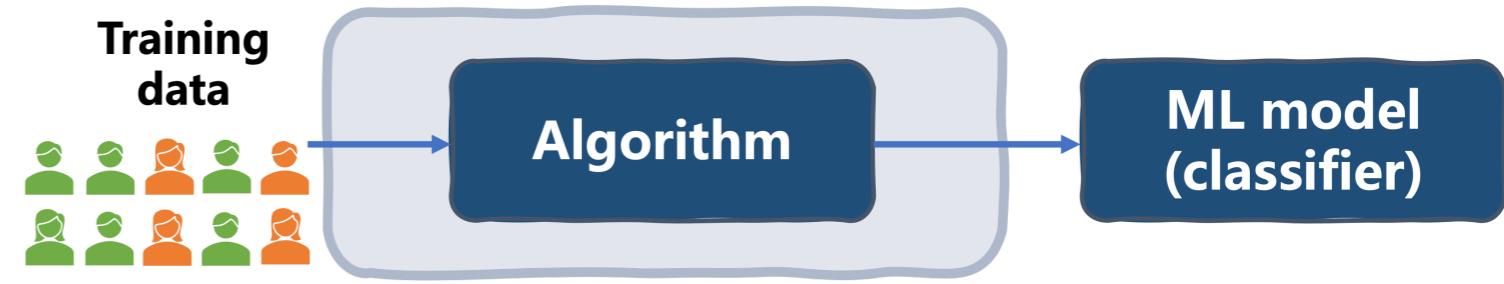
E-commerce recommendations



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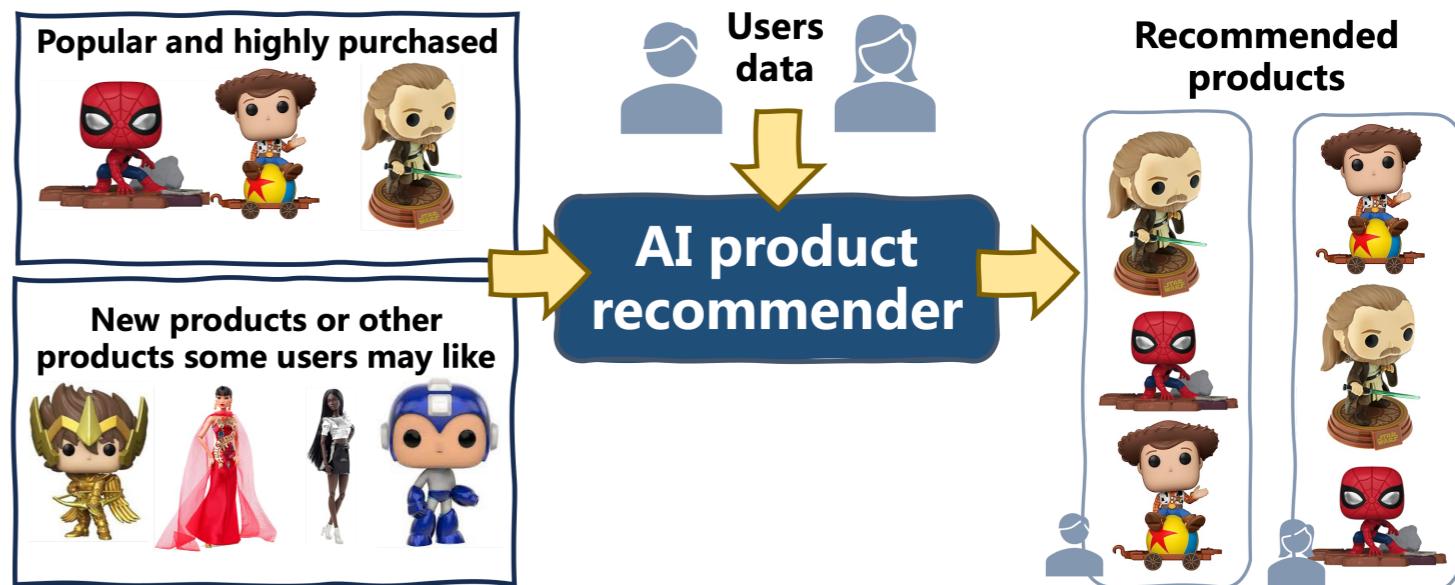
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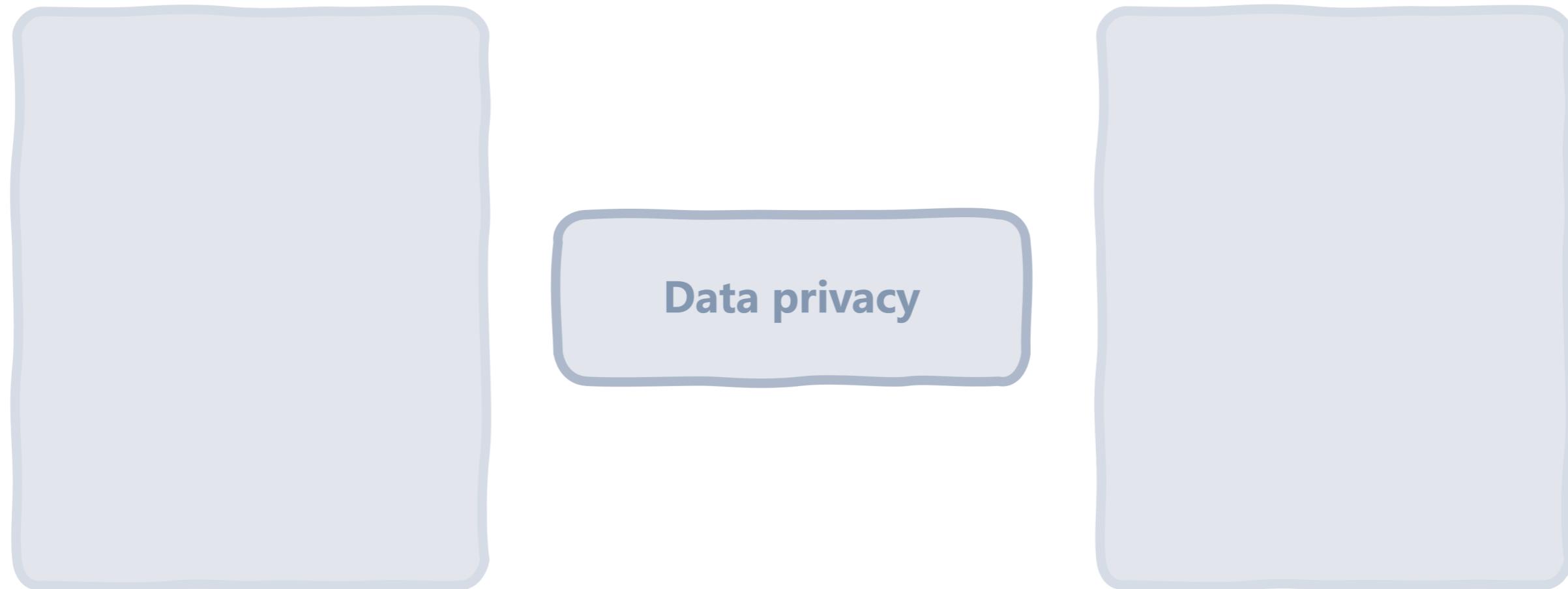
E-commerce recommendations

- Popular products are overly promoted
- New or different products are disregarded
- **Solutions:** techniques and metrics for diverse and fair recommendations



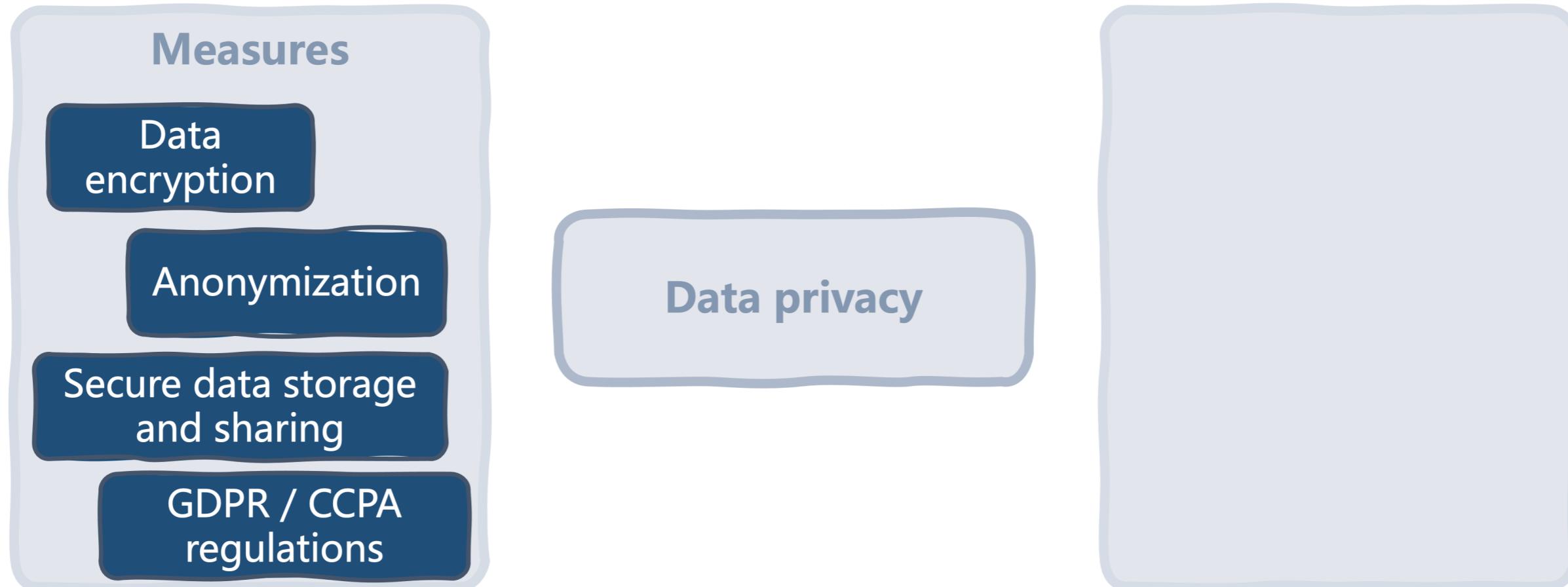
Data privacy in AI systems

Data privacy: safeguarding sensitive or personal information from unauthorized access and misuse



Data privacy in AI systems

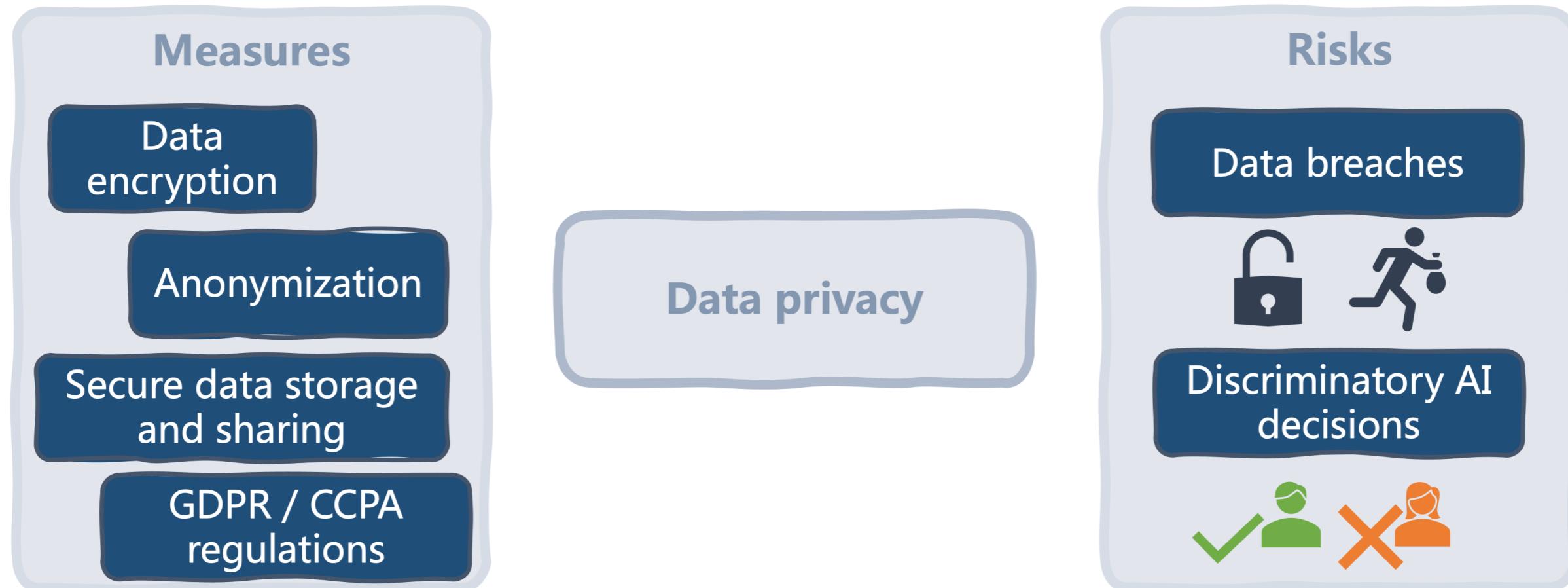
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¹ GDPR: General Data Protection Regulation. CCPA: California Consumer Privacy Act.

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UNDERSTANDING ARTIFICIAL INTELLIGENCE

Social challenges: the future of AI

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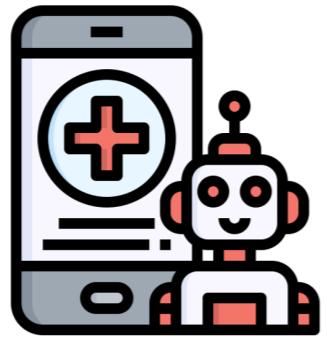
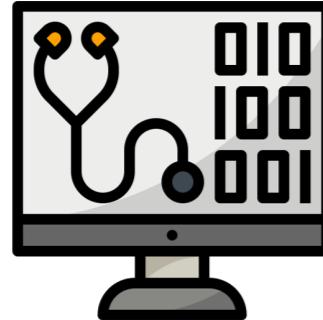


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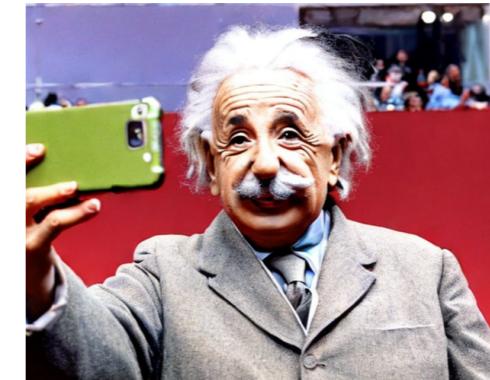
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How AI may shape our present (and future) society?

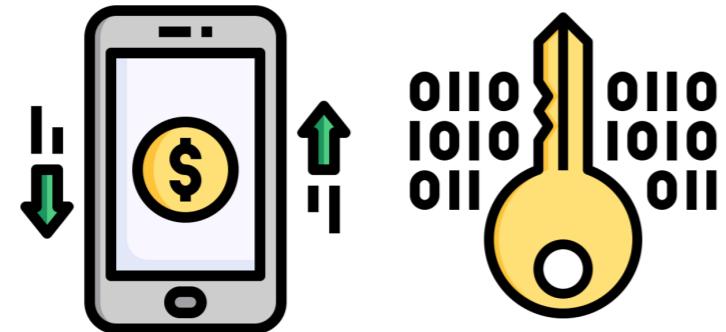
Healthcare: advanced diagnosis, personalized treatments, surgical robots, etc.



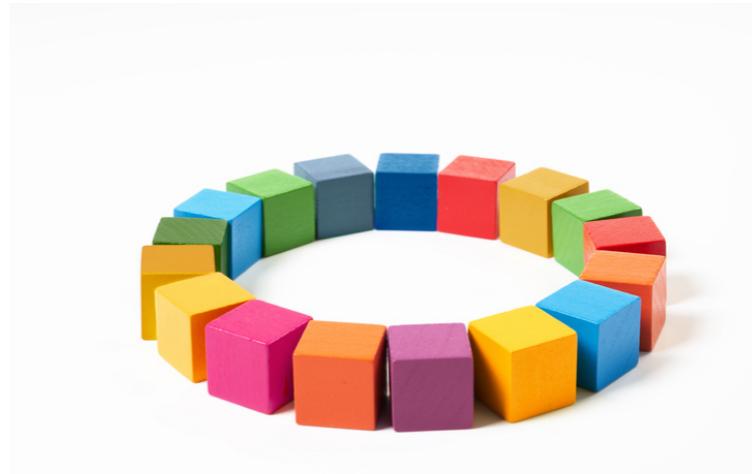
Governments and Law: Generative AI; new regulations about responsible use



Finance and cybersecurity: risk management, fraud detection



Sustainable Development Goals (SDGs)



¹ Icon made by mynamepong, surang (flaticon.com). Image generated in <https://stablediffusionweb.com/>

AI and sustainability



¹ Source: United Nations (<https://sdgs.un.org/goals>)

AI and sustainability



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AI and the future of workforce

Challenges:

Job displacement, rapidly evolving skillsets

- **Example:** Large Language Models (e.g. *ChatGPT*), prompt engineering skills

Opportunities:

New jobs, e.g. AI ethicist, AI educator

Industry transformation

The screenshot shows a mobile-style chat interface. At the top, a dark header bar reads "Prompt Engineering Simplified" with a menu icon (three horizontal lines) on the left and a plus sign (+) on the right. Below the header, a user message from a man's profile picture asks, "Hi ChatGPT, can you explain me what is \"Prompt Engineering\" in simple terms?". A small edit icon (pencil) is located to the right of this message. The AI response, preceded by its own profile picture (a green square with a white AI icon), is: "Certainly! \"Prompt engineering\" refers to the process of crafting or designing effective prompts or instructions when working with language models like me, ChatGPT. It involves carefully formulating a specific question, statement, or description to guide the model's output in a desired direction." The background of the interface is light gray.

AI and the future of education

Challenges:

- **Skills gap:** educational institutions need to keep up to date with relevant AI training
- **Digital divide:** ensure universal access to AI-powered education



Opportunities:

- **Personalized learning**
- **Automation of time-consuming administrative tasks**

AI and the future of the environment

Challenges:

- Ecological degradation: energy consumption, electronic waste, carbon footprint

Opportunities:

- Understand climate change
- Optimize use of natural resources
- Optimize renewable energy use



Let's practice!

UNDERSTANDING ARTIFICIAL INTELLIGENCE

One journey ends, another begins

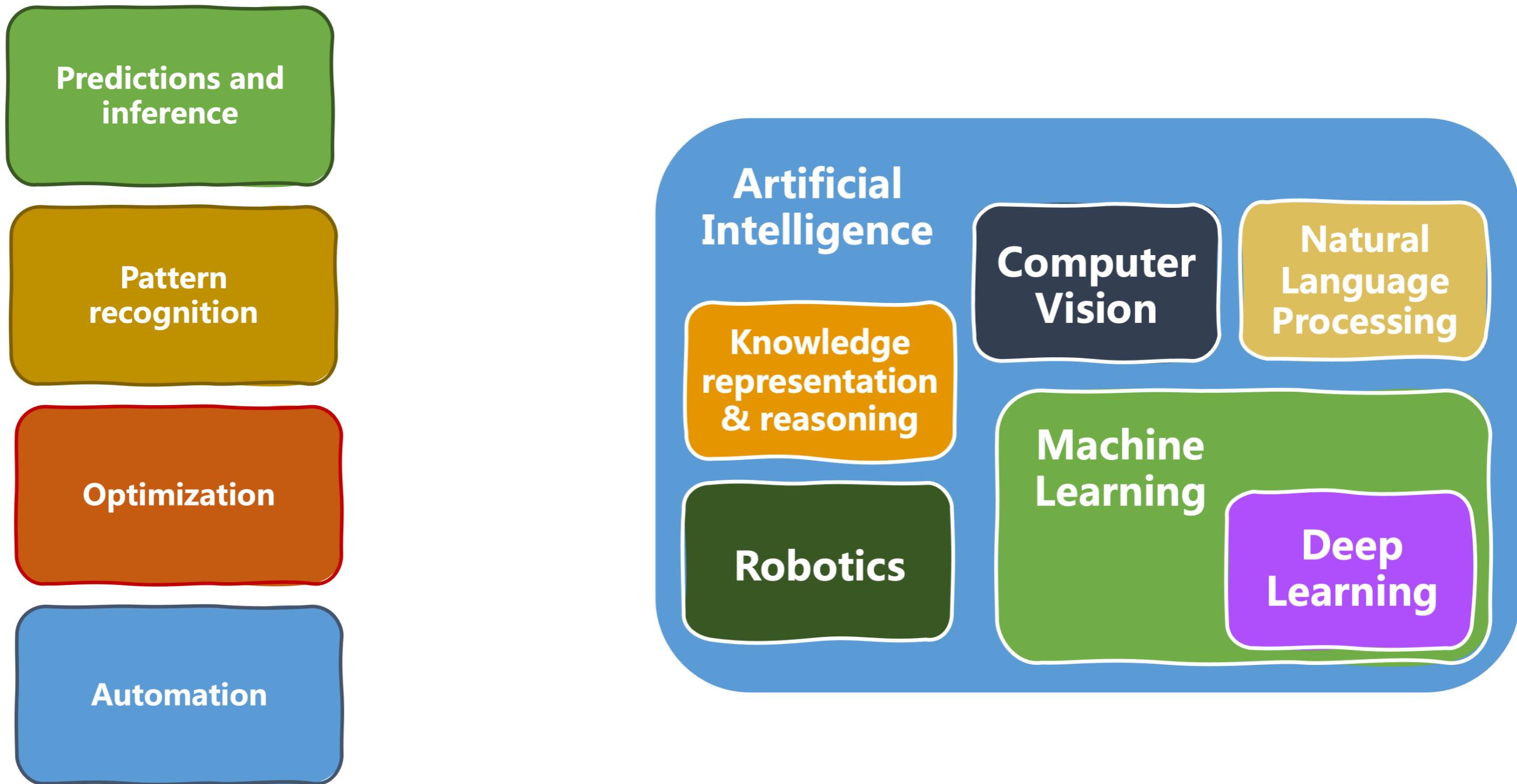
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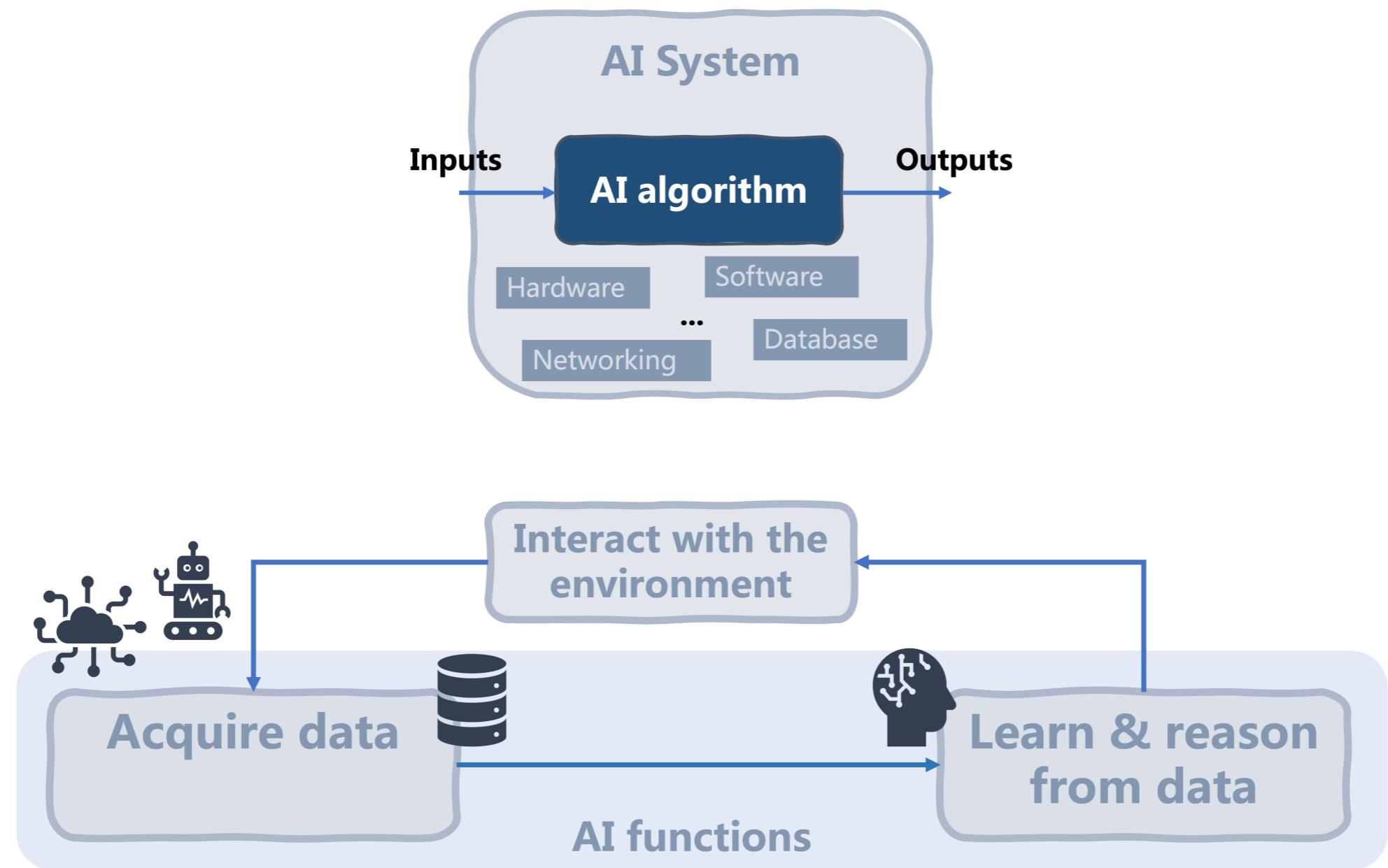
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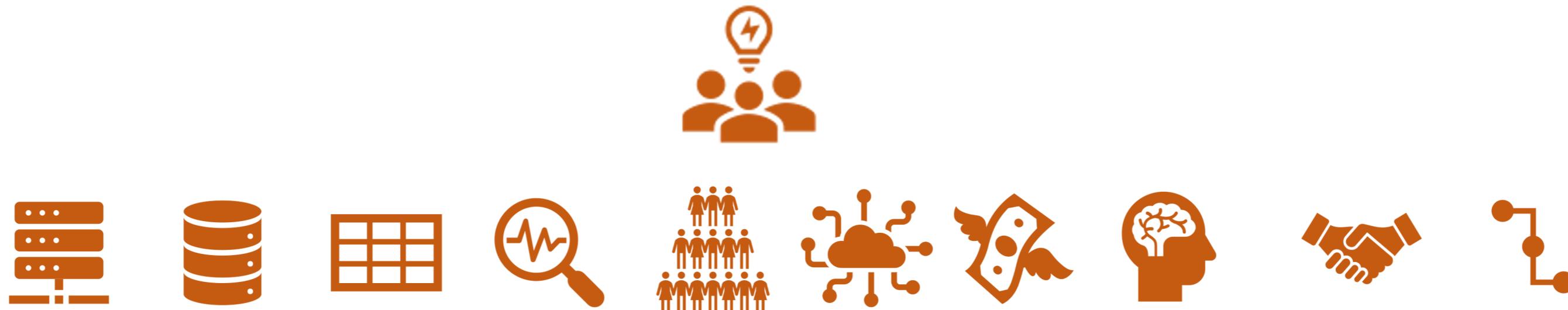
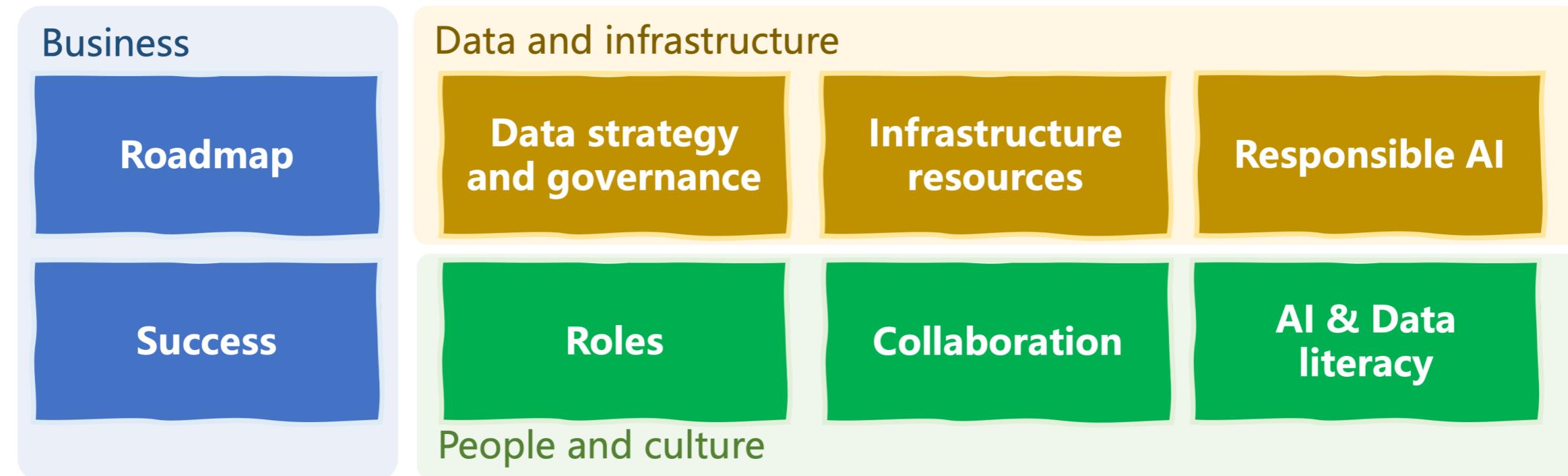
Chapter 1: What is Artificial Intelligence



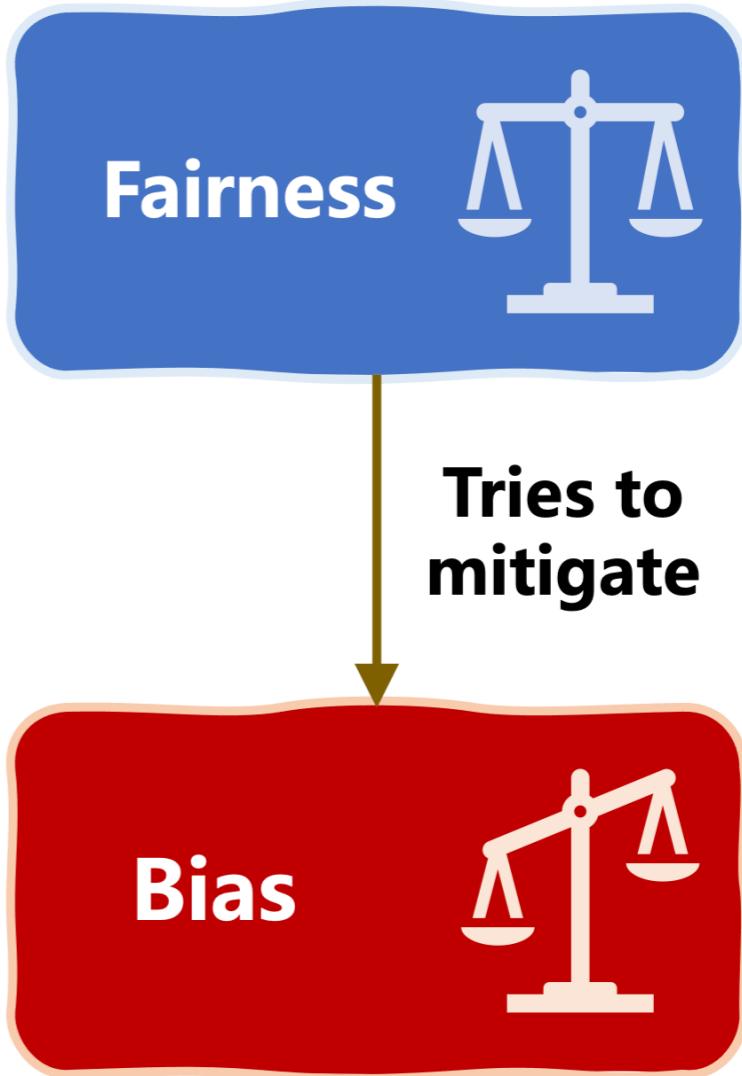
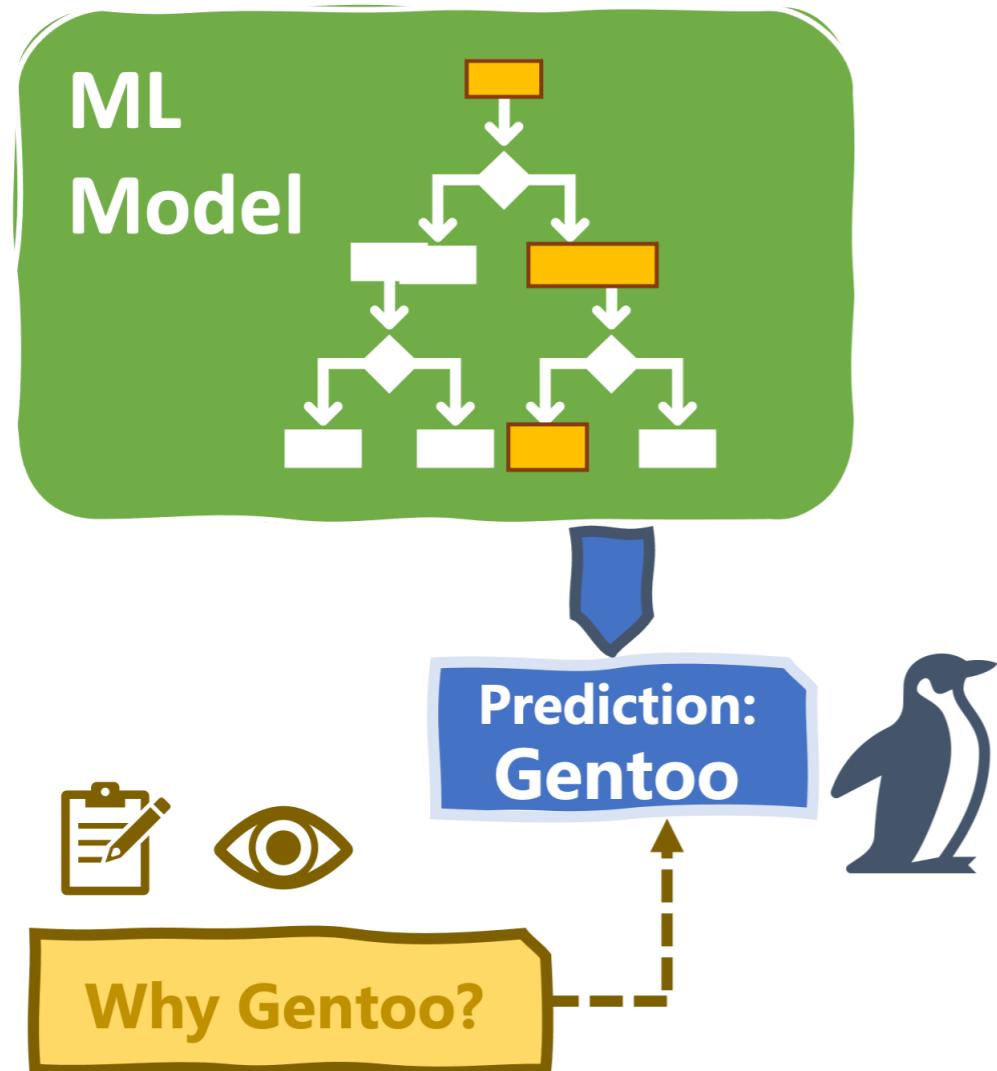
Chapter 2: Tasks AI can solve



Chapter 3: Harnessing AI in organizations



Chapter 4: The human side of AI



What to learn next?

- **AI Essentials Skill Track**
 - An exciting 6-course pathway to consolidate your AI literacy.
- **Implementing AI Solutions in Business**
 - From use cases to proofs-of-concept, explore AI system deployment in business.
- **Artificial Intelligence (AI) Concepts in Python**
 - A gentle and practical introduction to implementing AI and ML systems.



¹ Image by upklyak (www.freepik.com)

Congratulations!

UNDERSTANDING ARTIFICIAL INTELLIGENCE