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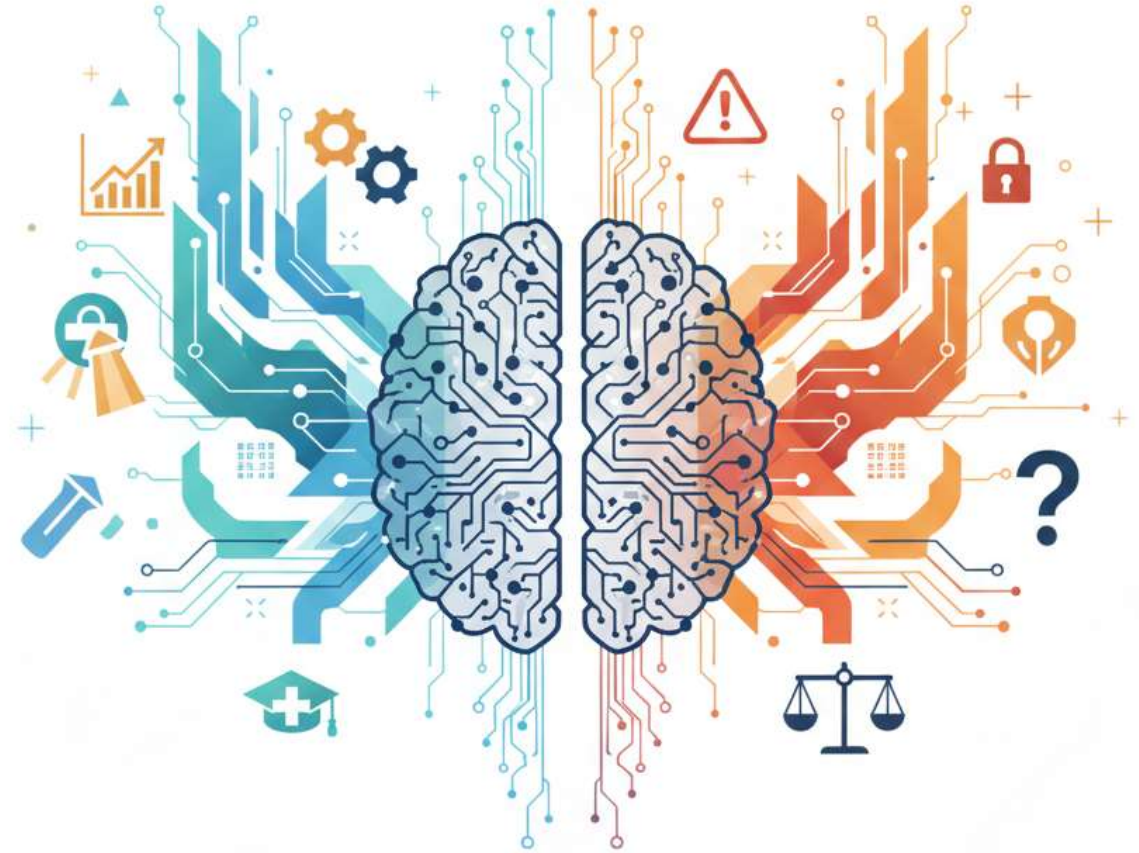
1st year

Introduction to Artificial Intelligence

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Advantages and Risks of Artificial Intelligence



In Chapter 1 we explored what AI is, how it works, and where it is applied.

Now we turn to the question:

Why is AI beneficial, and what dangers may arise from its use?



Advantages of AI

Advantage 1: Increased Efficiency & Productivity

AI systems optimize and automate processes that are slow, costly, or error-prone when done by humans.

Examples & Impact:

- Smart factories optimizing production flows
- Data preprocessing and pattern detection in research
- Automated customer service responses

Technical basis:

Machine learning, deep learning, robotic process automation



✓ **AI does work faster and more consistently** than humans in many contexts.

Advantage 2: Enhanced Decision-Making

AI helps make sense of large, complex datasets and supports decisions using predictive analytics.

Examples:

- Predicting disease progression in healthcare
- Credit risk scoring in finance
- Forecasting infrastructure maintenance needs



✓ AI can surface insights humans would miss due to scale or complexity.

Advantage 3: Reducing Human Risk

AI can be used for tasks that are unsafe for humans.

Examples:

- Robots in hazardous environments (e.g., nuclear sites)
- AI-assisted surgical tools
- Search and rescue in disaster zones

✓ Protects human lives in dangerous contexts.



Advantage 4: 24/7 Operation

AI systems do not require rest.

Examples:

- Chatbots and virtual assistants serving users at all hours
- Real-time monitoring systems
- Autonomous vehicles on shift

✓ Continuous operation boosts productivity and responsiveness.



Advantage 5: Innovation and New Solutions

AI fosters new technologies and solutions:

Examples:

- Autonomous driving
- Smart energy grids reducing emissions
- Personalized education platforms

✓ AI also contributes to solving complex global challenges like climate modelling and food supply optimization.



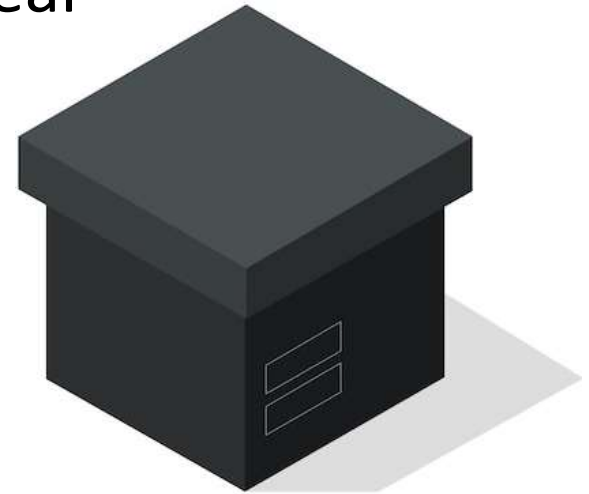
Risks of AI

Risk 1: Lack of Transparency (“Black Box”)

Many AI models, especially deep neural networks, lack clear explainability.

Consequences:

- Users don't know *how decisions are made*
- Hard to challenge or audit outcomes



✓ This lack of clarity can reduce trust and make accountability difficult.

Risk 2: Bias and Discrimination

AI systems can unintentionally reproduce or amplify biases present in training data.

Examples:

- Discriminatory hiring algorithms
- Unequal performance in facial recognition

✓ Regulation helps promote fairness.



Risk 3: Safety and Performance Failures

AI errors or poor design in critical systems (transport, infrastructure, healthcare) can have serious consequences.

Examples:

- Autonomous vehicle malfunctions
- Incorrect risk predictions in safety systems



✓ Regulations require **risk checks, human control, and technical standards.**

Risk 4: Fundamental Rights Violation

Certain AI applications may infringe on basic human rights:

Examples:

- Privacy violations through mass surveillance
- Unjust social scoring systems



✓ The EU AI Act bans systems threatening rights like freedom and non-discrimination.

Risk 5: Accountability and Responsibility

AI can be used irresponsibly if there are no clear rules on oversight or penalties.

Issue:

Who is responsible when AI causes harm?



- ✓ Good governance clearly defines the roles of developers and users.

AI can augment human capabilities and address complex problems but only if we engineer and regulate it responsibly.

This balance between innovation and caution is the core challenge of modern AI.