LECTURER: TAI LE QUY

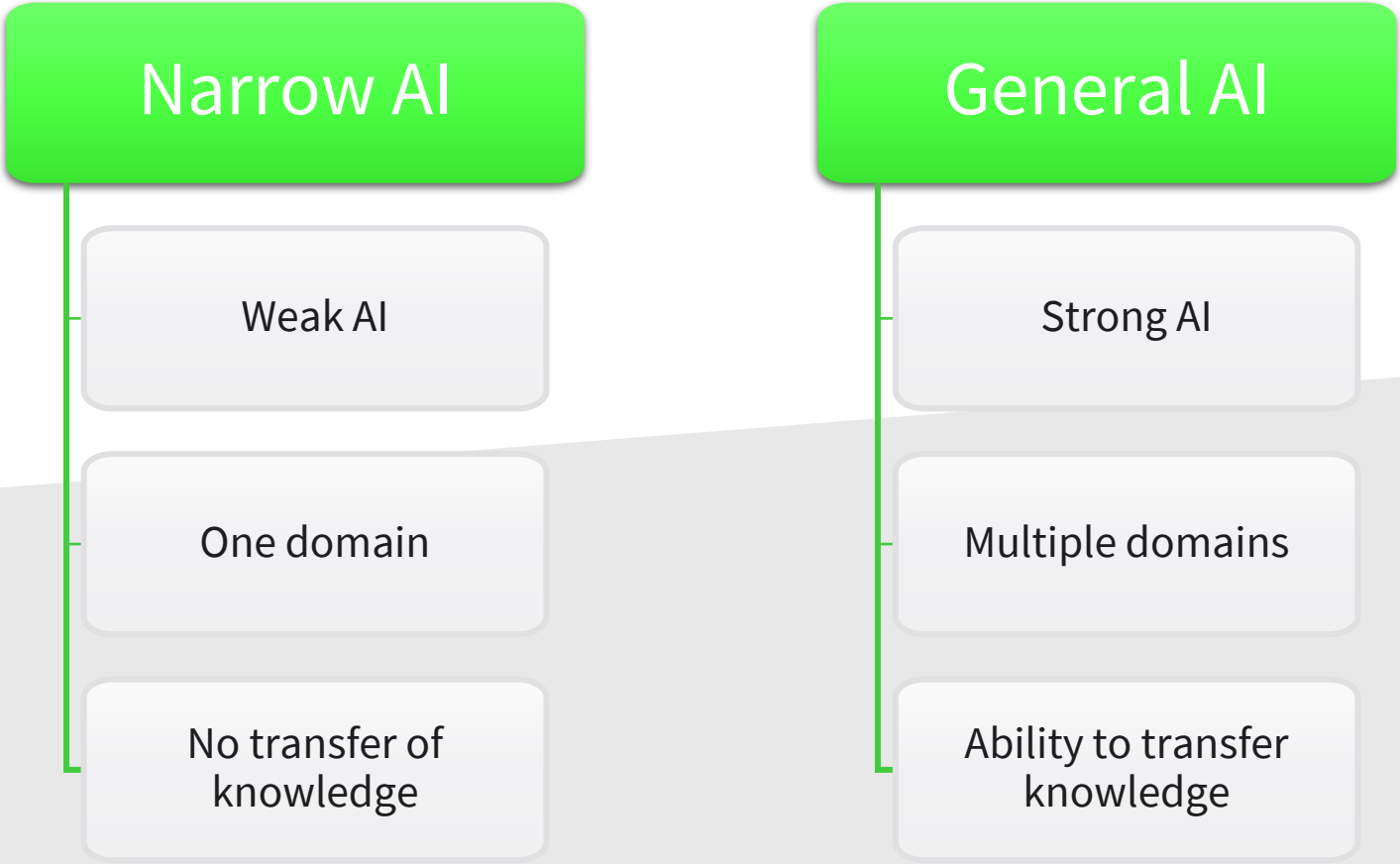# ARTIFICIAL INTELLIGENCE

TOPIC OUTLINE

MODERN AI SYSTEMS

— Differentiate between narrow and general artificial intelligence.

— Identify the most important applications in AI.

— Describe AI in corporate activities.

— Evaluate AI systems.

1. What is the difference between narrow and general AI?

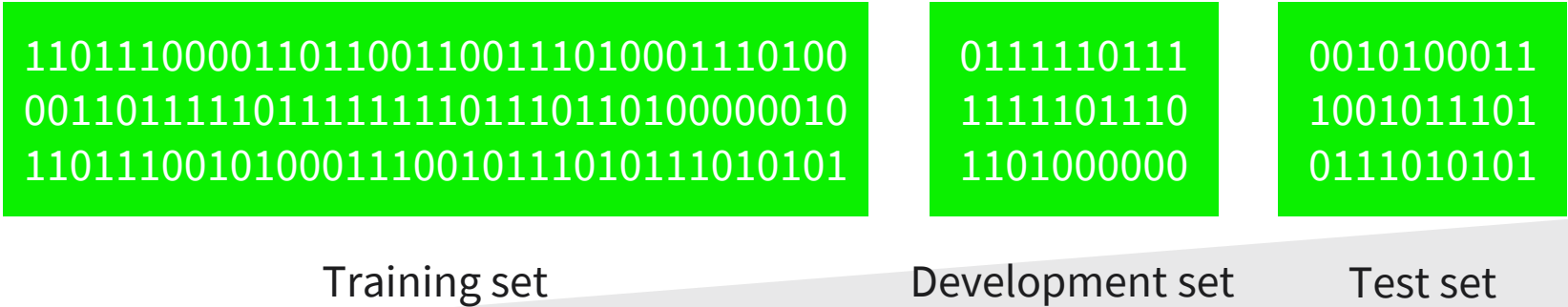2. In which areas can AI be used?

3. How can AI systems be evaluated?

NARROW VS GENERAL AI

Narrow AI

- Weak AI
- One domain
- No transfer of knowledge

General AI

- Strong AI
- Multiple domains
- Ability to transfer knowledge

APPLICATION AREAS OF AI

Financial Services

High Tech & Telecom-munication

Business, Legal, and Professional Services

AI Application Areas

Automotive & Assembly

Consumer Goods & Retail

Healthcare & Pharma

EVALUATION OF AI SYSTEMS

11011100001101100110011101000111010001101111101111111101110110100000010110111001010001110010111010111010101

Training set

0111110111
1111101110
1101000000

Development set

0010100011
1001011101
0111010101

Test set

THE CONFUSION MATRIX

		Predicted result	
		True	**False**
Actual result	**True**	True positive	False negative
	False	False positive	True negative

PRECISION

$$\frac{TP}{TP + FP}$$

RECALL

$$\frac{TP}{TP + FN}$$

EVALUATION METRICS

ACCURACY

$$\frac{TP + TN}{TP + TN + FP + FN}$$

F-SCORE

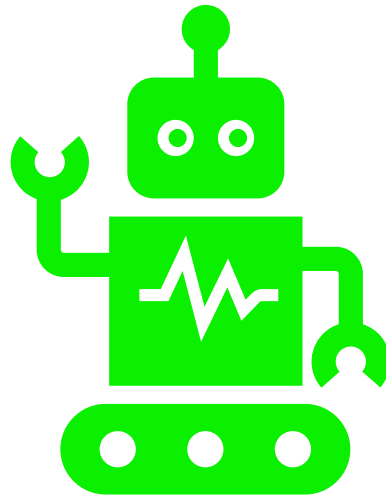$$2 \cdot \frac{precision \cdot recall}{precision + recall}$$

— Differentiate between narrow and general artificial intelligence.

— Identify the most important applications in AI.

— Describe AI in corporate activities.

— Evaluate AI systems.

TRANSFER TASK

1. Describe at least five characteristics that a humanoid robot equipped with an AGI would have to possess.

2. Reflect on how AI could contribute to reducing the workload of the HR department of a company.

3. Imagine you want to compare two computer vision algorithms for the detection of cancer. From the evaluation you get the following confusion matrices:

Algorithm 1	Predicted result	
	Cancer	No cancer
Cancer	25	20
No cancer	10	65

(Actual result)

Algorithm 2	Predicted result	
	Cancer	No cancer
Cancer	25	10
No cancer	20	65

(Actual result)

Compute precision, recall, accuracy, and F-score.
Which of the two algorithms would you choose and why?

Please present your results.

The results will be discussed in plenary.

1. Characteristics of the robot:

- Learn from past experiences and generalize the knowledge
- Make plans for the future based on past experience
- Adapt to circumstances if the environment shifts
- Ability to reason in unknown situations
- Reading emotions and thought processes

2. Use of AI in the human resources department

- Automatically extract relevant information from CVs
- Trawl the internet for potential candiates for positions which are hard to fill
- Suggest suitable training programs for employees
- Automatically reply to employees' questions by using, for instance, chatbots
- Guide new employees through the onboarding process

3. Comparison of the algorithms:

Algorithm 1:
- Precision: 0.7143
- Recall: 0.5556
- Accuracy: 0.75
- F-Score: 0.625

Algorithm 2:
- Precision: 0.5556
- Recall: 0.7143
- Accuracy: 0.75
- F-Score: 0.625

3. Comparison of the algorithms:

When comparing both algorithms it is important to consider which risk is considered as more dangerous:
(1) the risk of diagnosing cancer if there is none (FP), or
(2) the risk of not diagnosing cancer even though there is cancer (FN).

If (1) is considered to be more important, the decision should be made based on precision.

1. What sort of AI do current AI systems integrate?

2. What are the typical areas of application of AI?

3. Which data sets are required to develop AI systems?