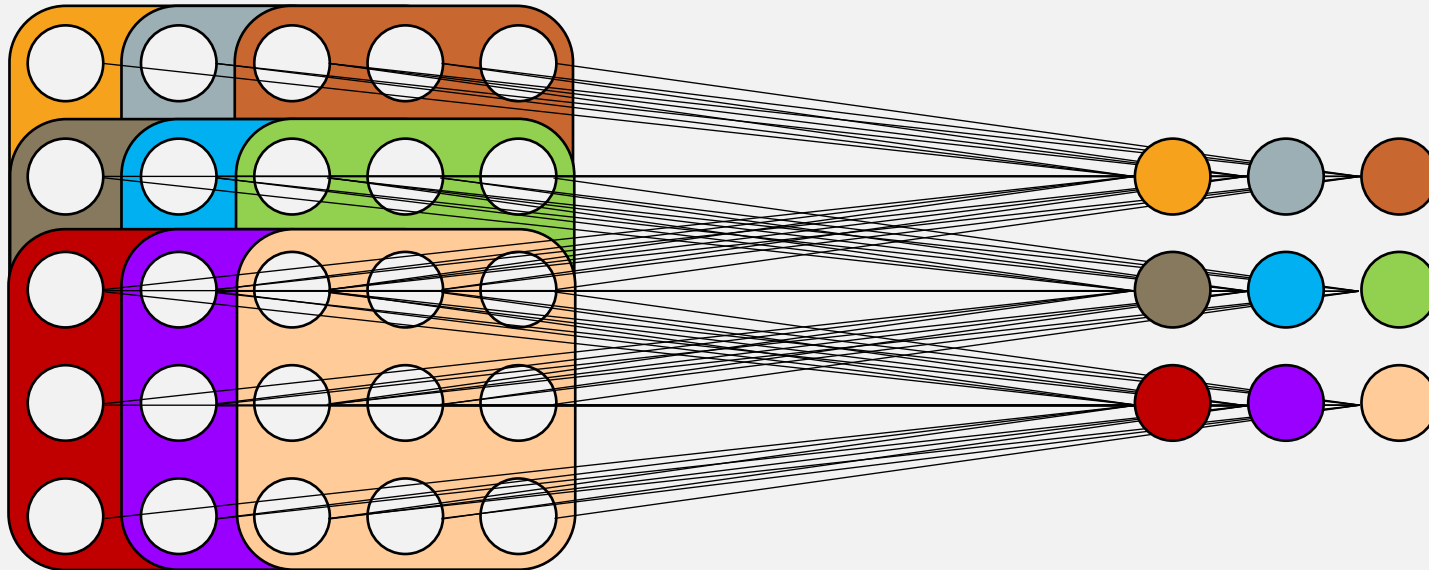


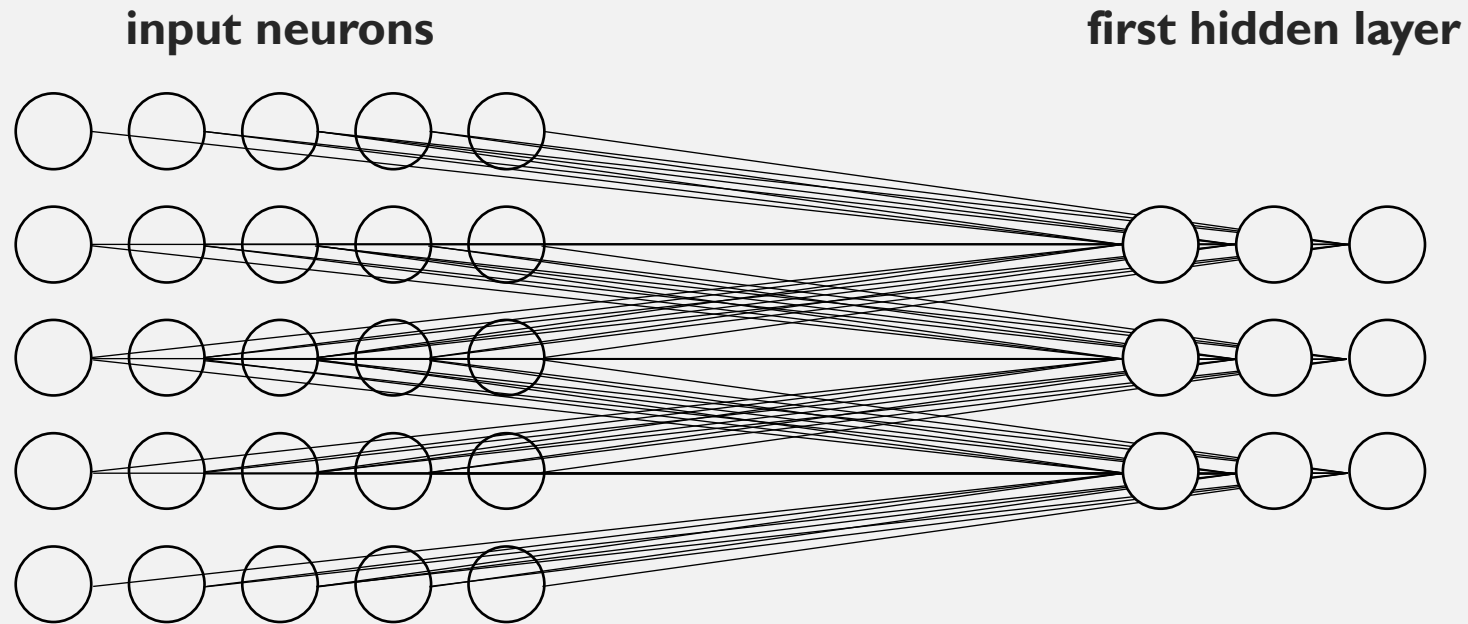
PERSPECTIVES IN ARTIFICIAL INTELLIGENCE

Lecture 12
MALI, 2024

CONVOLUTIONAL NEURAL NETWORKS

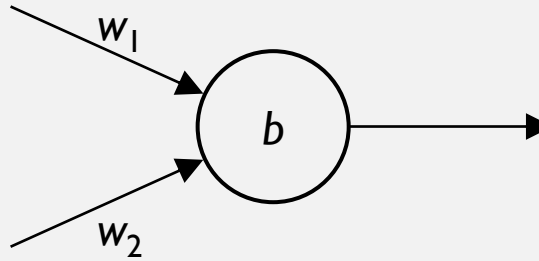


CONVOLUTIONAL NEURAL NETWORKS

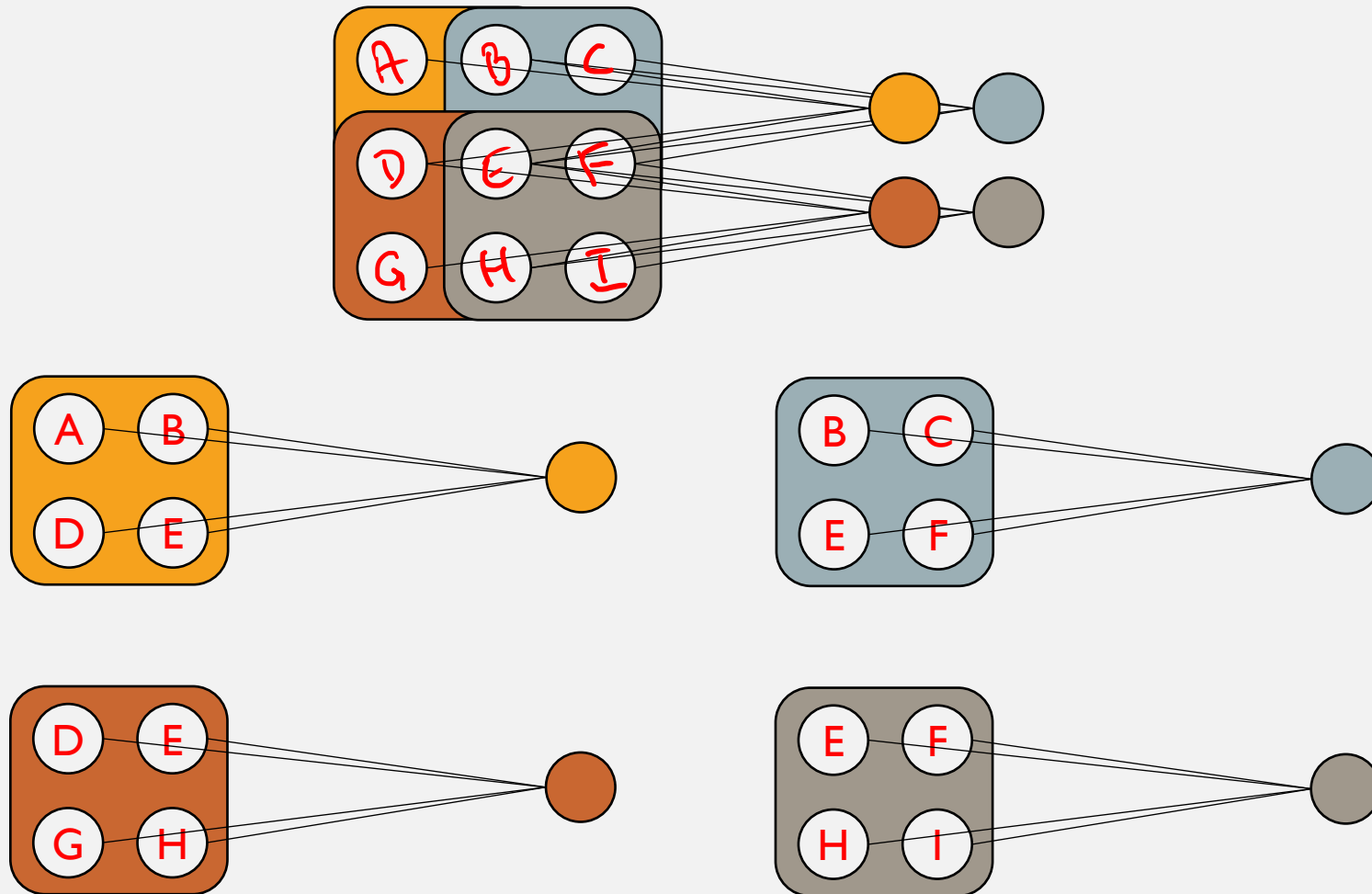


CONVOLUTIONAL NEURAL NETWORKS

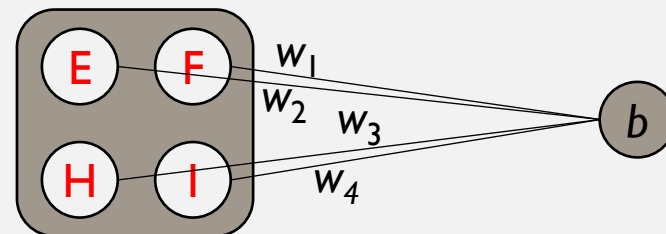
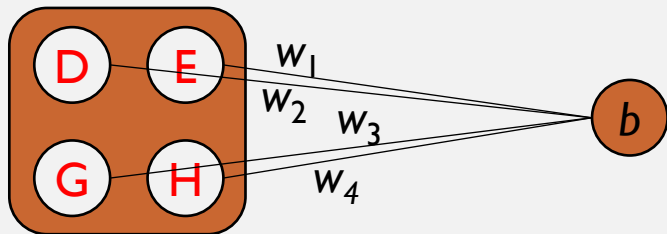
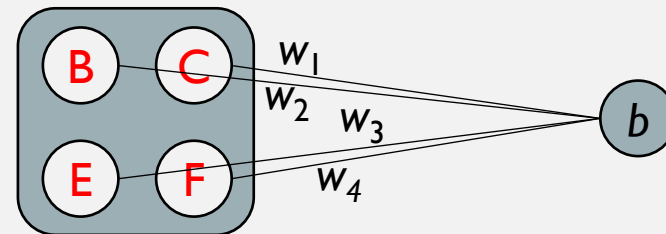
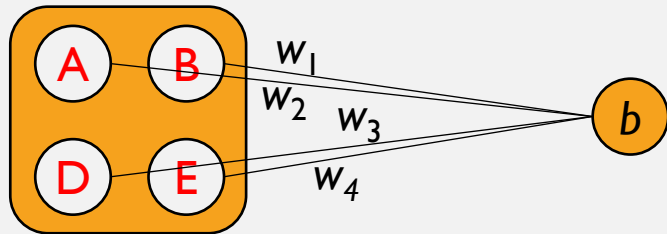
Remember this?



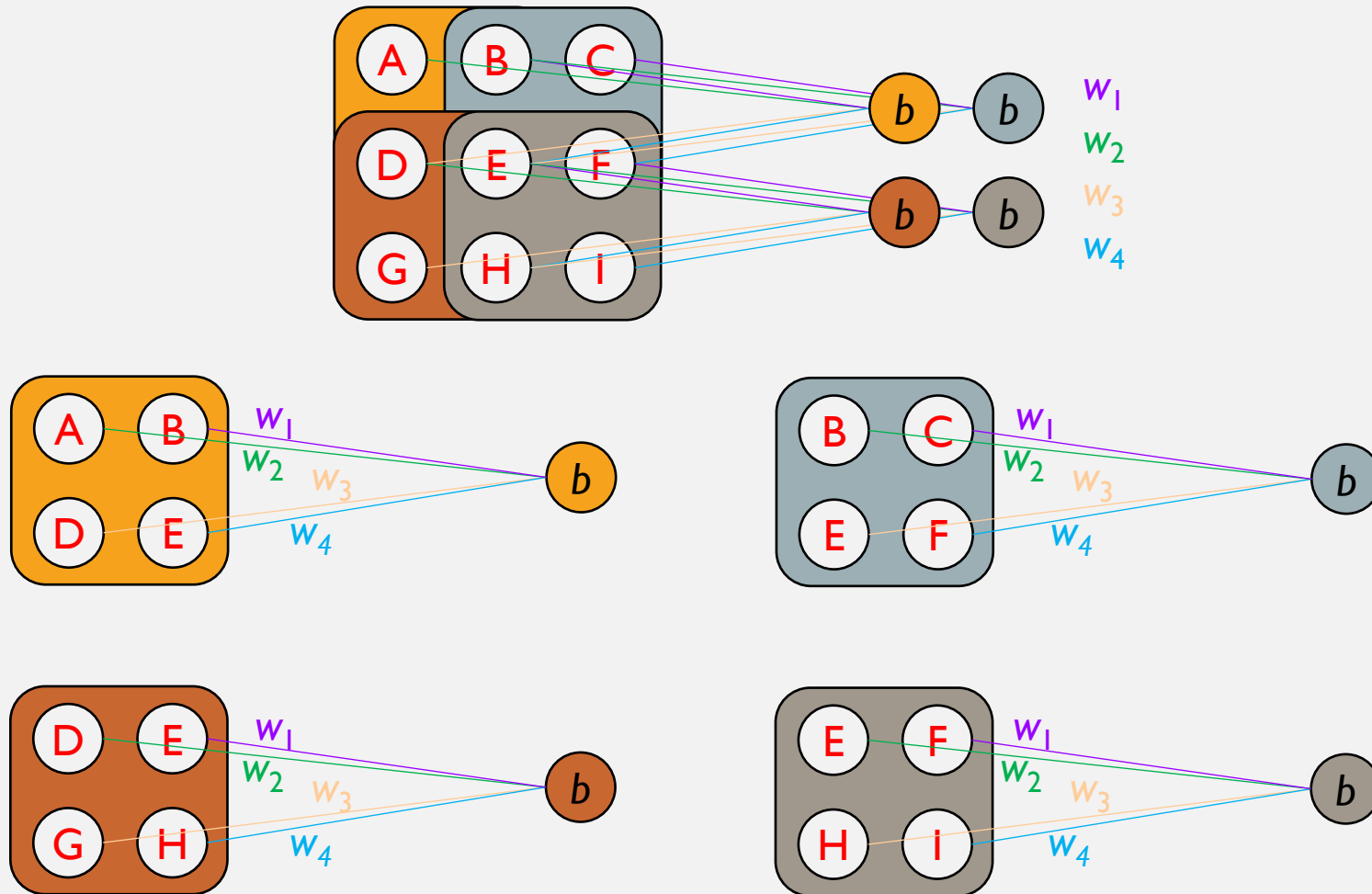
CONVOLUTIONAL NEURAL NETWORKS



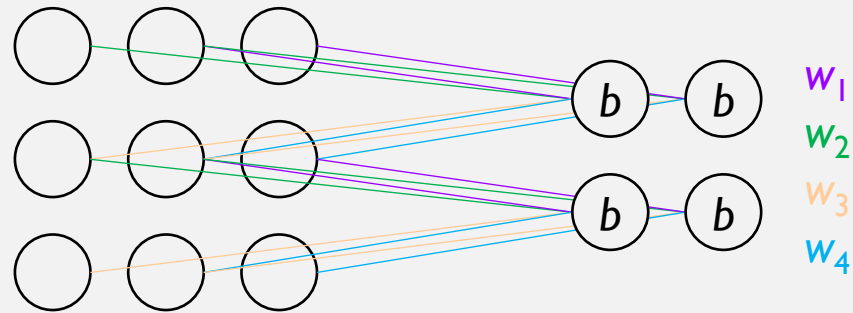
CONVOLUTIONAL NEURAL NETWORKS



CONVOLUTIONAL NEURAL NETWORKS

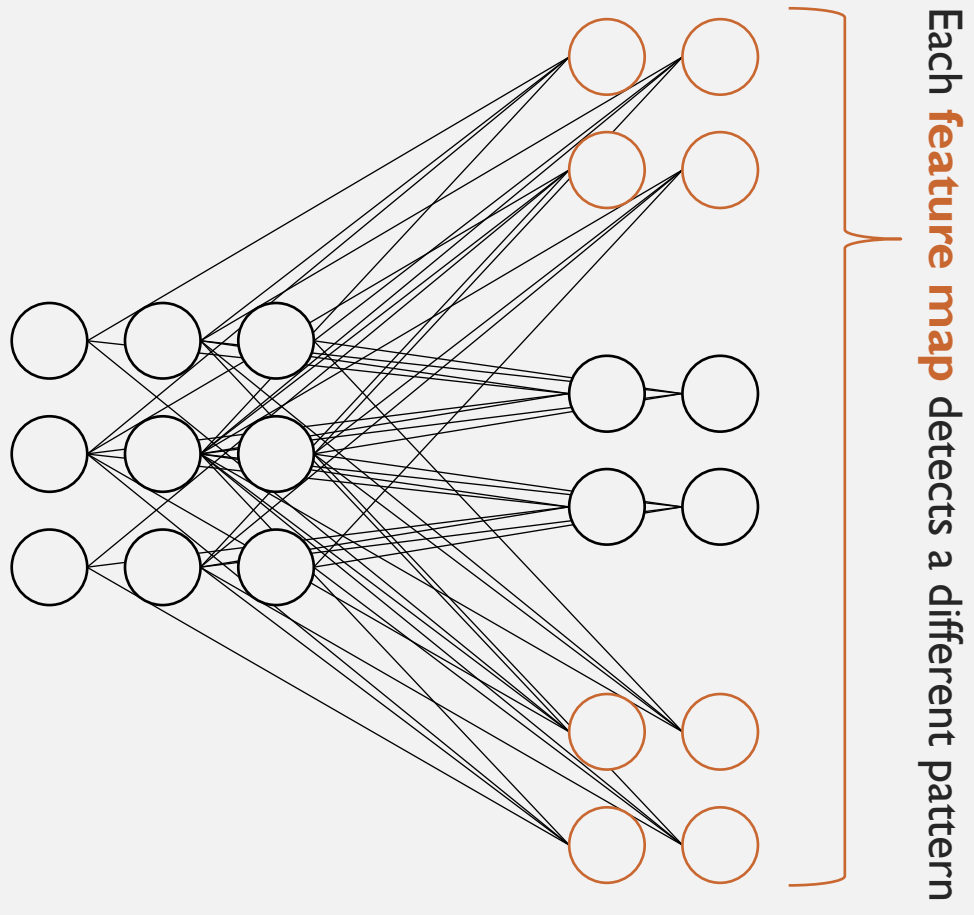


CONVOLUTIONAL NEURAL NETWORKS

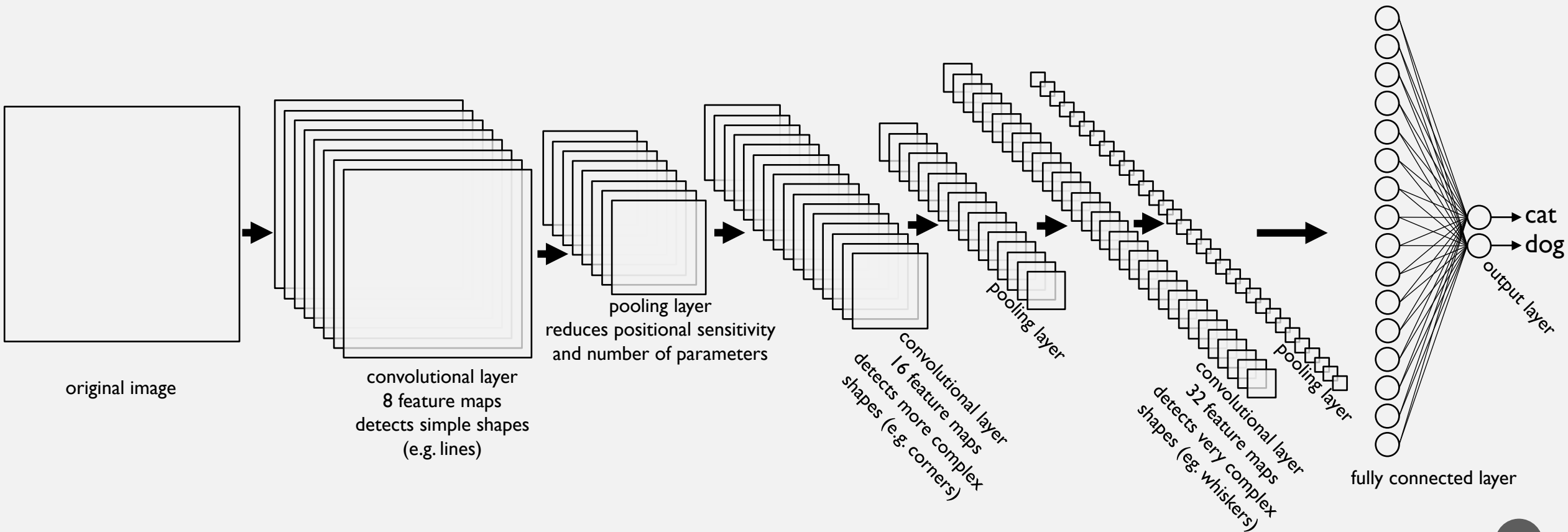


Each neuron in the hidden layer detects the same pattern, but at different positions in the image.

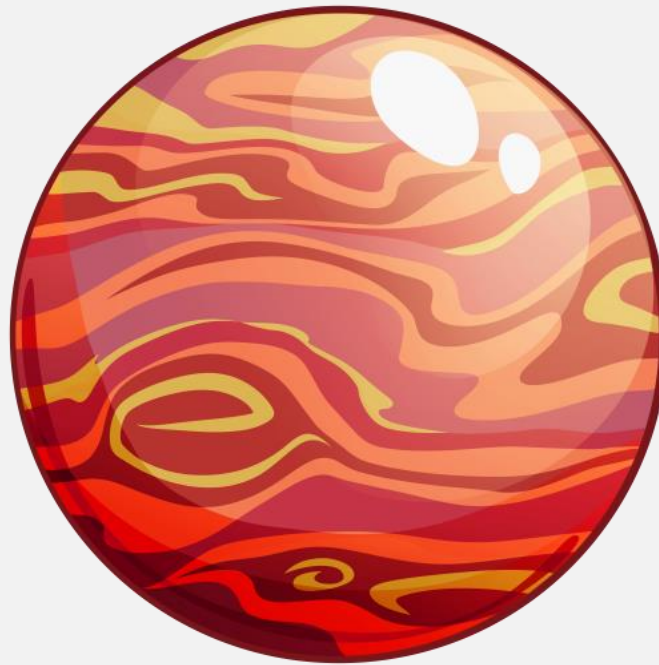
CONVOLUTIONAL NEURAL NETWORKS



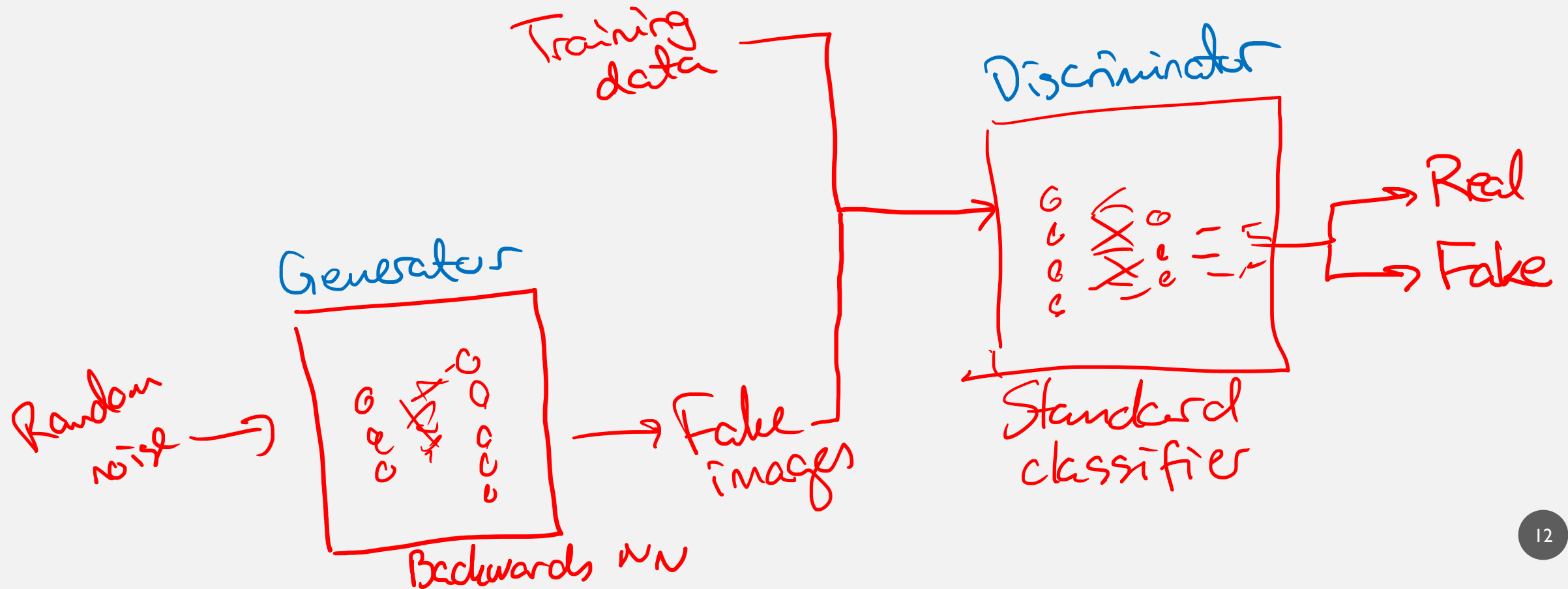
CONVOLUTIONAL NEURAL NETWORKS



CONVOLUTIONAL NEURAL NETWORKS



GENERATIVE ADVERSARIAL NETWORKS



GENERATIVE ADVERSARIAL NETWORKS

- The **discriminator** becomes better and better at classifying real vs. fake
- The **generator** becomes better and better at generating images that look real

GENERATIVE ADVERSARIAL NETWORKS



GENERATIVE ADVERSARIAL NETWORKS



RECURRENT NEURAL NETWORKS

She saw a bat



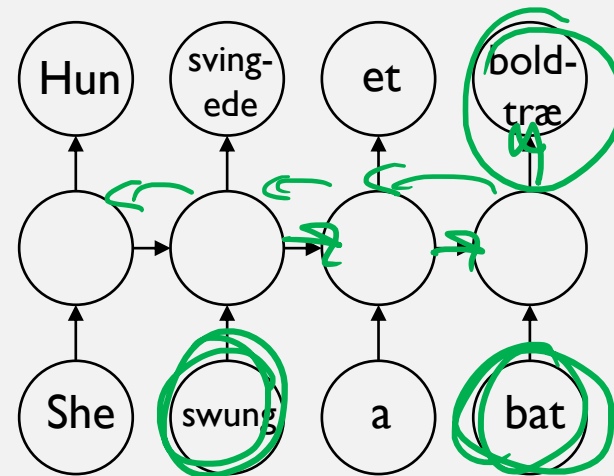
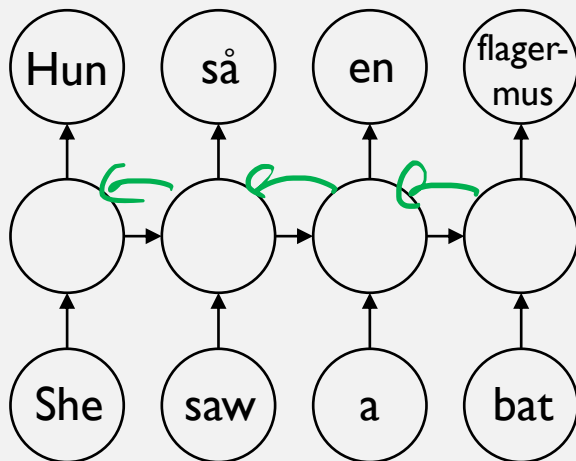
Hun så en flagermus

She swung a bat



Hun svingede et boldtræ

RECURRENT NEURAL NETWORKS



RECURRENT NEURAL NETWORKS



translate.google.com

RECURRENT NEURAL NETWORKS

The screenshot displays a language learning application interface with two panels. Each panel has a header with language selection options: 'Registrer sprog', 'Dansk', 'Engelsk', and 'Tysk' (top panel) or 'Engelsk', 'Dansk', and 'Engelsk' (bottom panel). The top panel shows the 'Engelsk' tab selected, with a list of English sentences: 'he is a nurse', 'she is a doctor', 'he is beautiful', and 'she is strong'. Below this list are icons for voice input and output, and a progress indicator '59 / 5.000'. The bottom panel shows the 'Estisk' tab selected, with a list of Estisk sentences: 'ta on õde', 'ta on arst', 'ta on ilus', and 'ta on tugev'. Below this list are similar icons and a progress indicator '43 / 5.000'. The right side of each panel shows the translated text in the target language, with a star icon for favorites and icons for copy, share, and feedback.

Top Panel (English to Estisk):

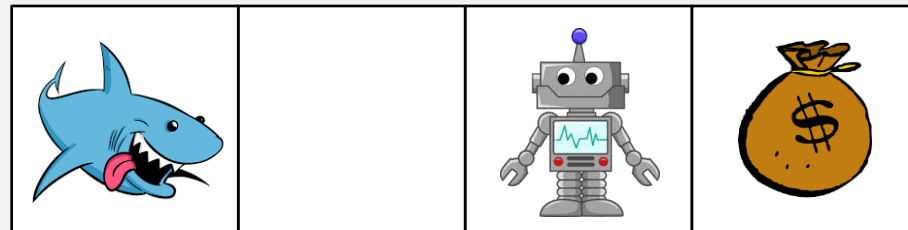
- Registrer sprog Dansk **Engelsk** Tysk
- he is a nurse
- she is a doctor
- he is beautiful
- she is strong
- 59 / 5.000

Bottom Panel (Estisk to English):

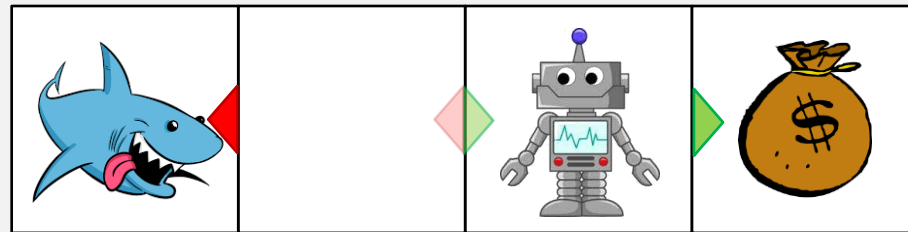
- Registrer sprog **Estisk** Engelsk Dansk
- ta on õde
- ta on arst
- ta on ilus
- ta on tugev
- 43 / 5.000

the model is only as good as the data it's trained on

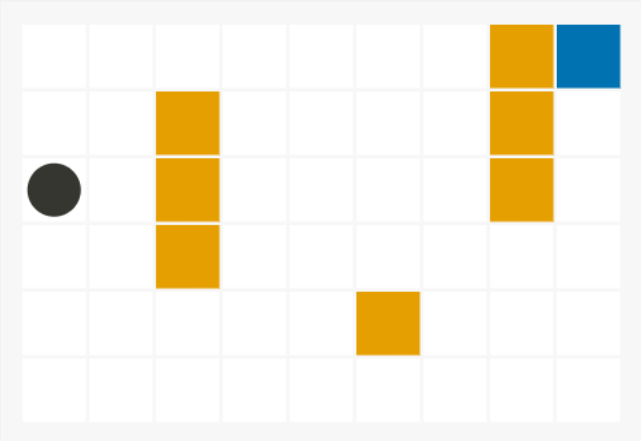
REINFORCEMENT LEARNING



REINFORCEMENT LEARNING



REINFORCEMENT LEARNING



REINFORCEMENT LEARNING

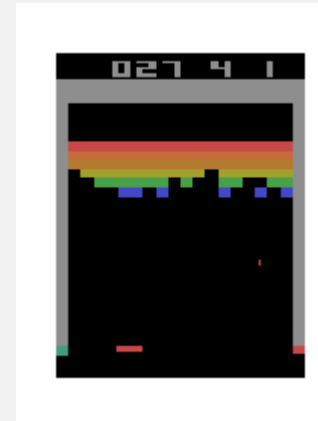
Before training



Early training



Late training



REINFORCEMENT LEARNING



Silver, D., Huang, A., Maddison, C. et al. Mastering the game of Go with deep neural networks and tree search. *Nature* **529**, 484–489 (2016)

AI ETHICS

It's all fun and games ...

... until our judicial system can no longer trust images and videos

... until chatbots start instructing children how to hurt themselves

... until self-driving cars kill pedestrians and no one can say who's responsible

... until you end up starring in deepfake pornography

AI ETHICS

1. Proportionality and Do No Harm

The use of AI systems must not go beyond what is necessary to achieve a legitimate aim. Risk assessment should be used to prevent harms which may result from such uses.

2. Safety and Security

Unwanted harms (safety risks) as well as vulnerabilities to attack (security risks) should be avoided and addressed by AI actors.

3. Right to Privacy and Data Protection

Privacy must be protected and promoted throughout the AI lifecycle. Adequate data protection frameworks should also be established.

4. Multi-stakeholder and Adaptive Governance & Collaboration

International law & national sovereignty must be respected in the use of data. Additionally, participation of diverse stakeholders is necessary for inclusive approaches to AI governance.

5. Responsibility and Accountability

AI systems should be auditable and traceable. There should be oversight, impact assessment, audit and due diligence mechanisms in place to avoid conflicts with human rights norms and threats to environmental wellbeing.

6. Transparency and Explainability

The ethical deployment of AI systems depends on their transparency & explainability (T&E). The level of T&E should be appropriate to the context, as there may be tensions between T&E and other principles such as privacy, safety and security.

7. Human Oversight and Determination

Member States should ensure that AI systems do not displace ultimate human responsibility and accountability.

8. Sustainability

AI technologies should be assessed against their impacts on 'sustainability', understood as a set of constantly evolving goals including those set out in the UN's Sustainable Development Goals.

9. Awareness & Literacy

Public understanding of AI and data should be promoted through open & accessible education, civic engagement, digital skills & AI ethics training, media & information literacy.

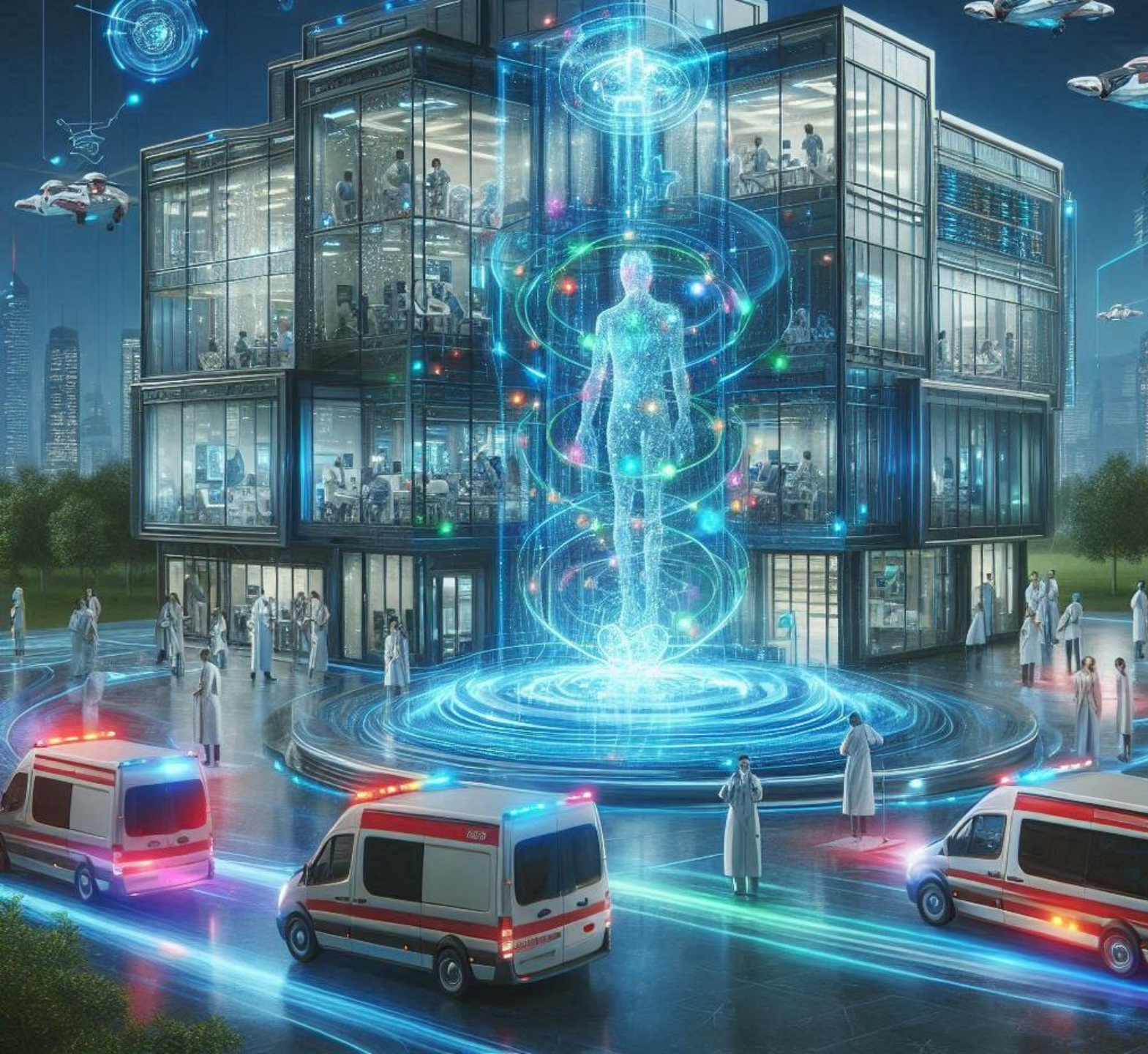
10. Fairness and Non-Discrimination

AI actors should promote social justice, fairness, and non-discrimination while taking an inclusive approach to ensure AI's benefits are accessible to all.



You

what do you think ai can do in 10 years



ADVANCED HEALTHCARE

AI WILL PLAY A
SIGNIFICANT ROLE IN
PERSONALIZED MEDICINE,
DISEASE DIAGNOSIS, DRUG
DISCOVERY, AND
TREATMENT OPTIMIZATION



AUTONOMOUS VEHICLES

SELF-DRIVING CARS AND
DRONES MAY BECOME
MORE COMMONPLACE,
REVOLUTIONIZING
TRANSPORTATION AND
LOGISTICS



NATURAL LANGUAGE PROCESSING

AI WILL CONTINUE TO
IMPROVE IN
UNDERSTANDING AND
GENERATING HUMAN-LIKE
TEXT, ENABLING MORE
NATURAL INTERACTIONS
WITH MACHINES



CLIMATE CHANGE SOLUTIONS

AI CAN AID IN CLIMATE
MODELING, RESOURCE
MANAGEMENT, AND THE
DEVELOPMENT OF
SUSTAINABLE
TECHNOLOGIES TO
COMBAT CLIMATE CHANGE



EDUCATION

AI-DRIVEN PERSONALIZED
LEARNING PLATFORMS
WILL ADAPT TO
INDIVIDUAL STUDENT
NEEDS, ENHANCING
EDUCATIONAL OUTCOMES



CYBERSECURITY

AI WILL BE CRUCIAL IN
DEFENDING AGAINST
CYBER THREATS,
IDENTIFYING
VULNERABILITIES, AND
RESPONDING TO ATTACKS
IN REAL-TIME



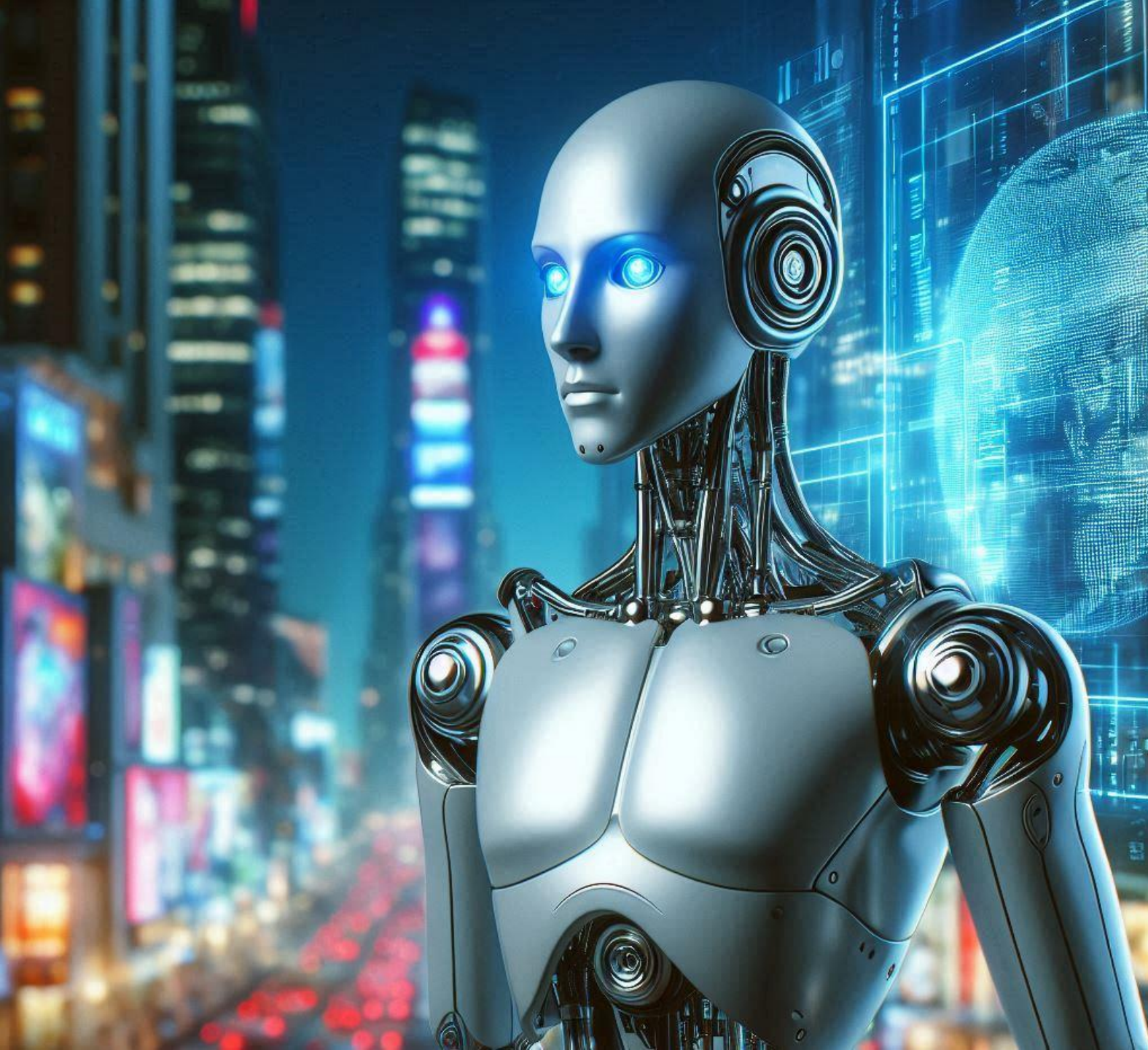
VIRTUAL ASSISTANTS

VIRTUAL ASSISTANTS WILL
BECOME EVEN MORE
INTEGRATED INTO DAILY
LIFE, ASSISTING WITH
TASKS, SCHEDULING, AND
INFORMATION RETRIEVAL



CREATIVE INDUSTRIES

AI WILL CONTRIBUTE TO
ART, MUSIC, AND
LITERATURE CREATION,
COLLABORATING WITH
HUMAN CREATORS TO
PRODUCE INNOVATIVE
WORKS



ROBOTICS

ADVANCES IN AI WILL
LEAD TO MORE
SOPHISTICATED ROBOTS
CAPABLE OF COMPLEX
TASKS IN
MANUFACTURING,
HEALTHCARE, AND
DOMESTIC SETTINGS



ETHICAL CONSIDERATIONS

THERE WILL BE INCREASED
FOCUS ON ADDRESSING THE
ETHICAL IMPLICATIONS OF
AI, INCLUDING BIAS
MITIGATION, TRANSPARENCY,
AND ACCOUNTABILITY IN AI
SYSTEMS

Only time will tell what's going to happen ...

