

Modern A.I.



Matthew Renze

DATA SCIENCE CONSULTANT

@matthewrenze matthewrenze.com

Overview



Machine Learning

Deep Learning

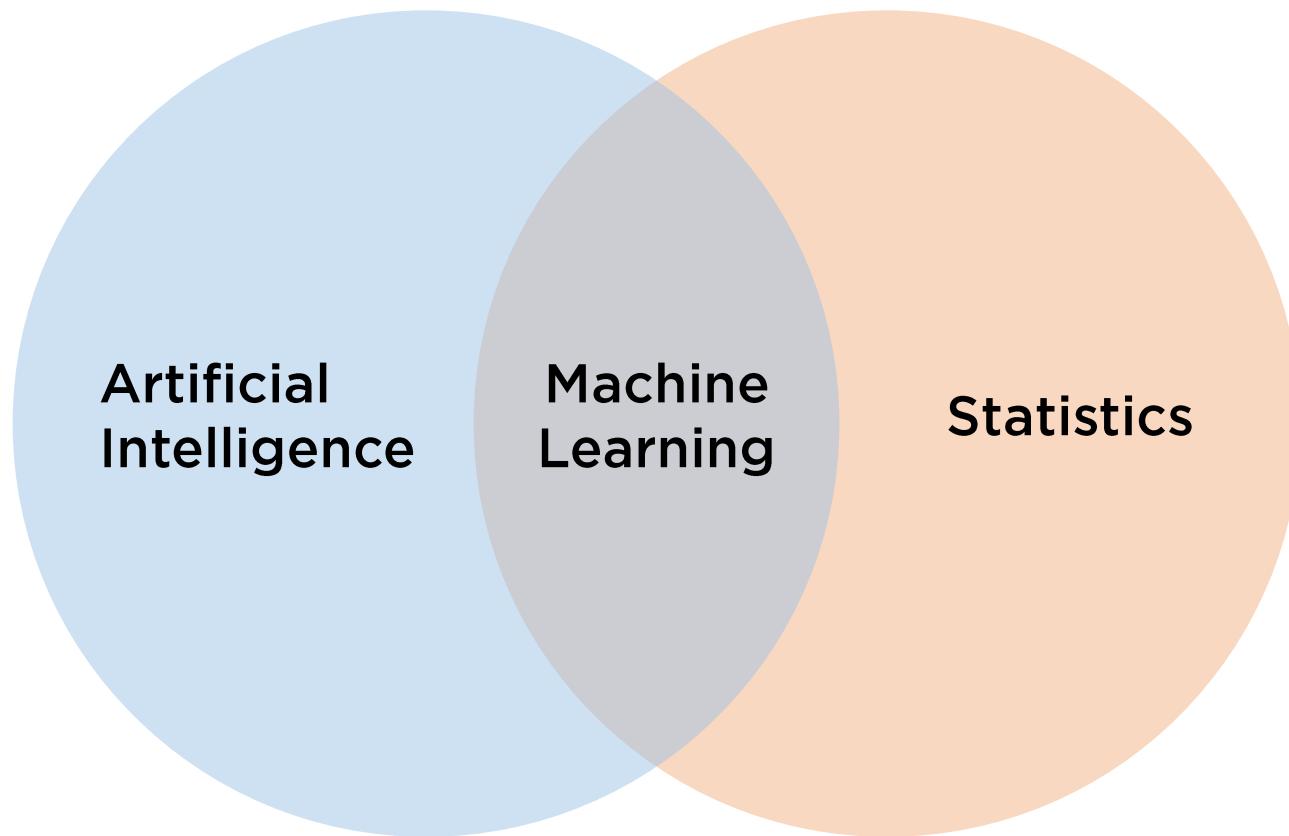
Reinforcement Learning

Other A.I. Trends

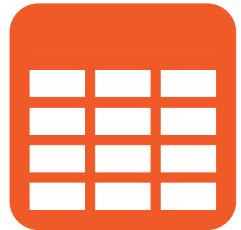
State-of-the-Art A.I.

Machine Learning

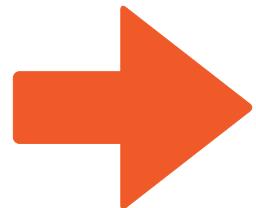
Machine Learning



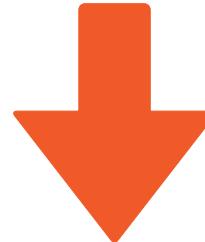
Machine Learning



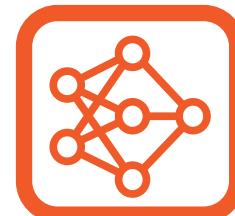
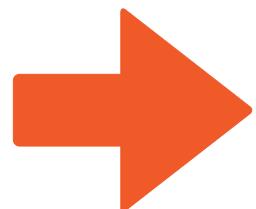
Data



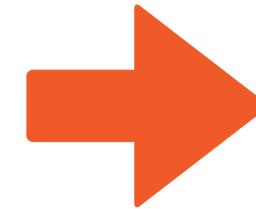
Algorithm



New data

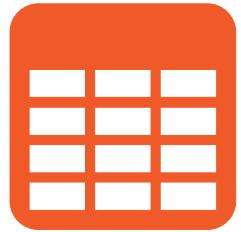


Model

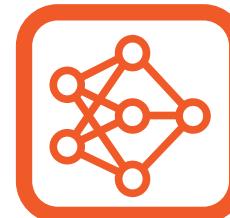
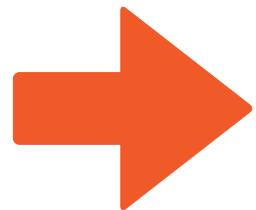


Prediction

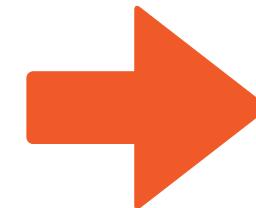
Machine Learning



New data



Model



Prediction

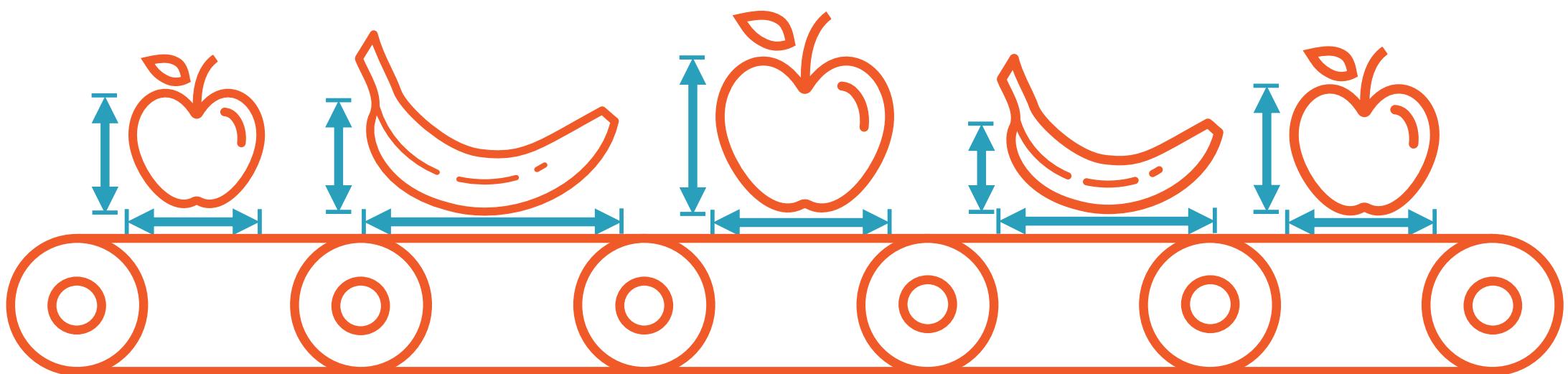
input

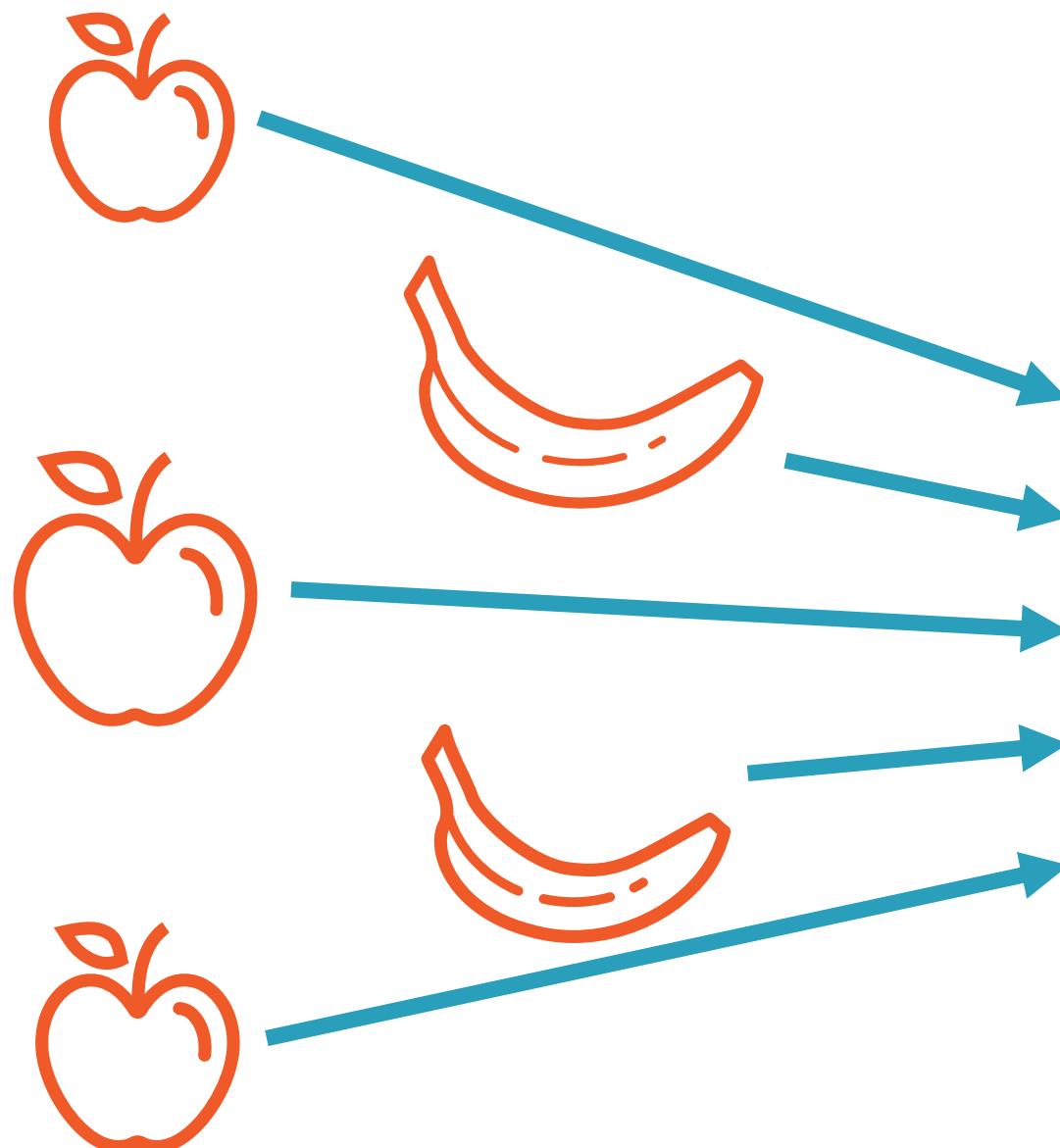


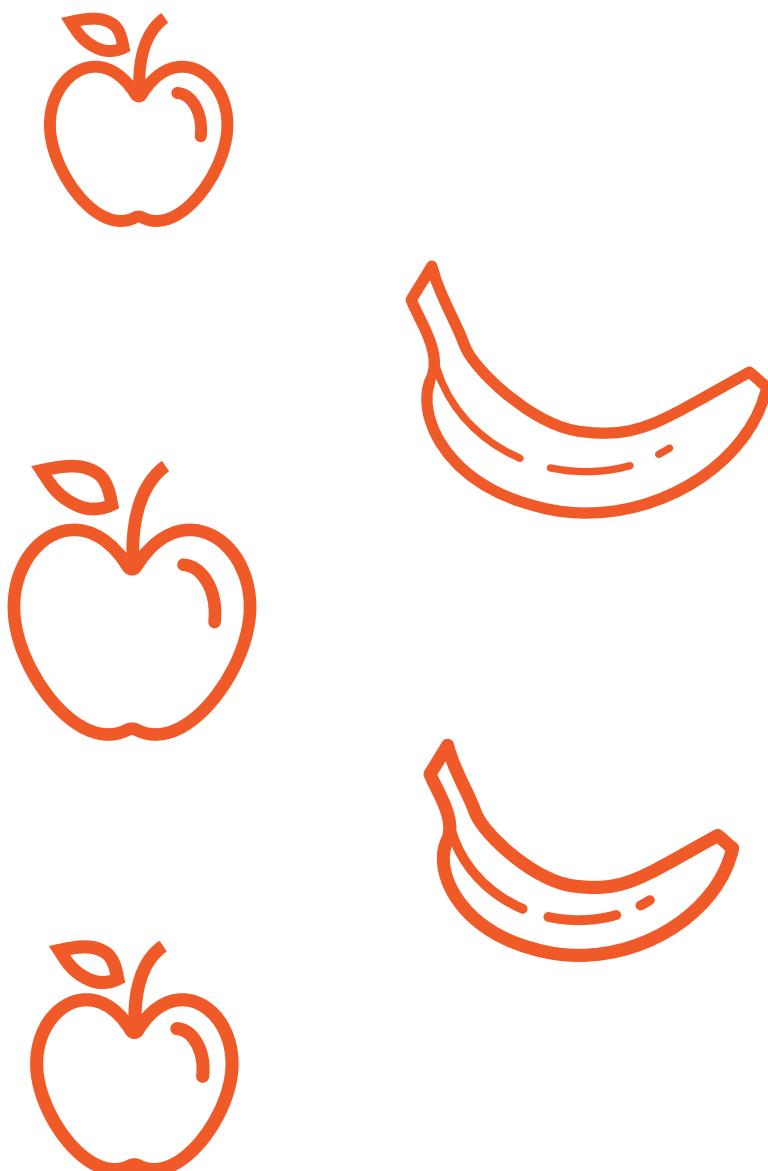
$f(x)$



output

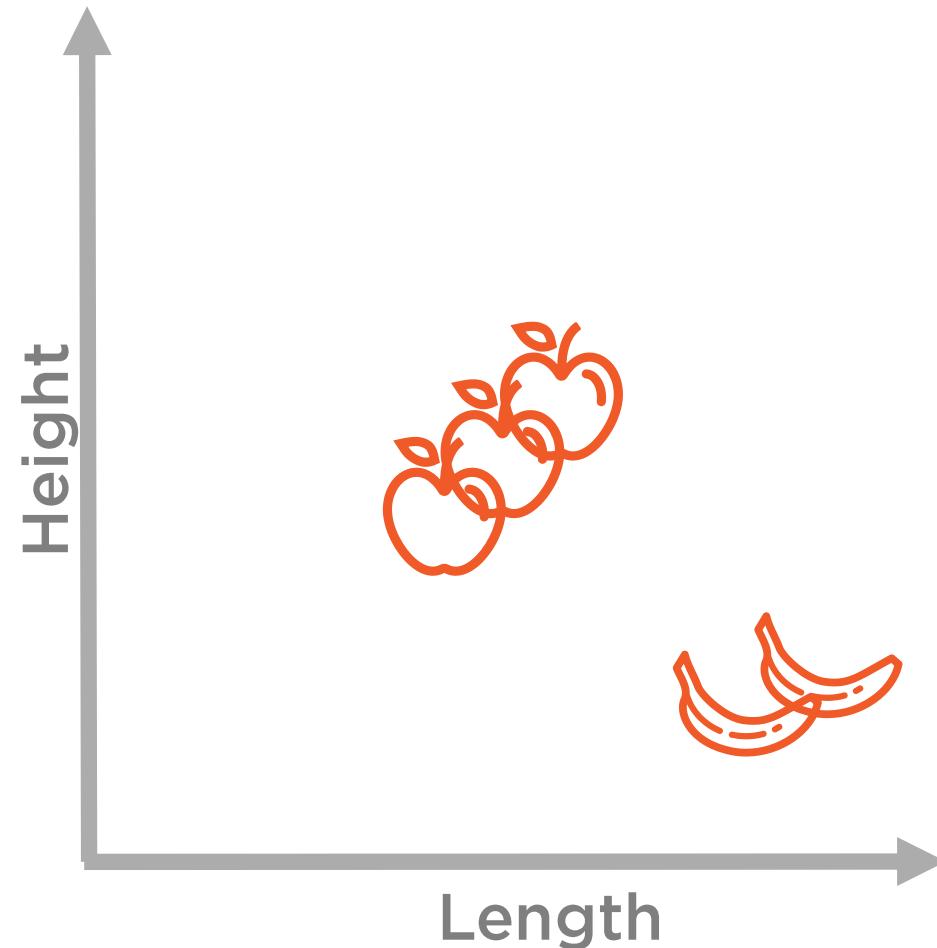




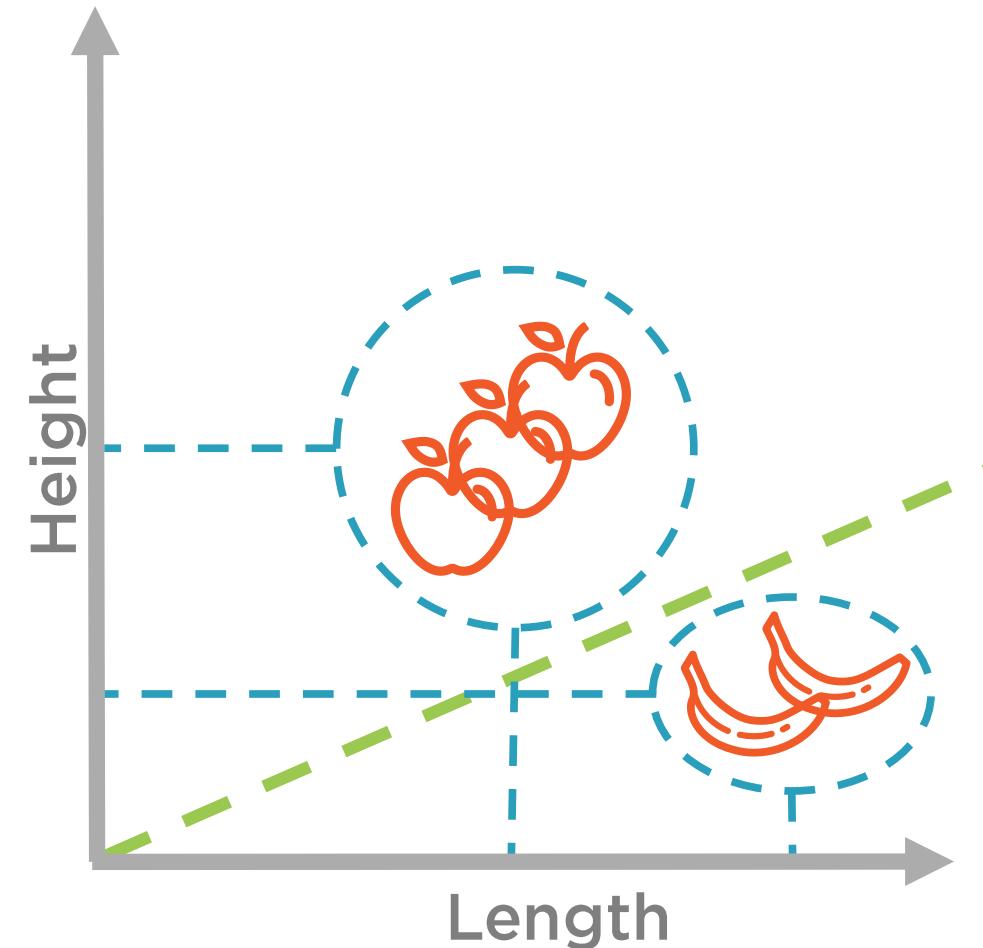


Length	Height	Type
6.8	7.0	Apple
19.0	3.6	Banana
8.0	8.3	Apple
15.2	3.1	Banana
7.3	7.5	Apple

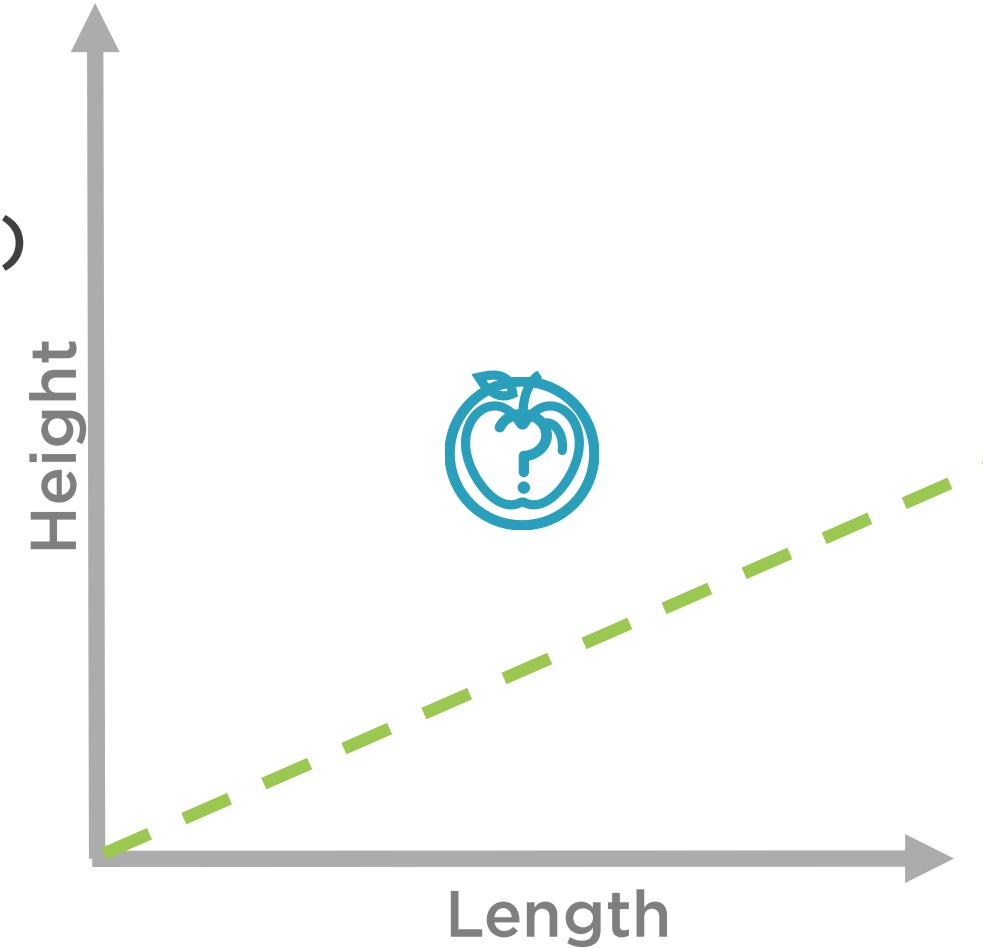
Length	Height	Type
6.8	7.0	Apple
19.0	3.6	Banana
8.0	8.3	Apple
15.2	3.1	Banana
7.3	7.5	Apple



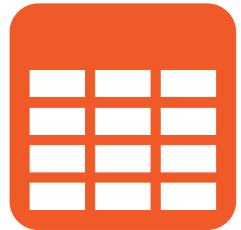
Length	Height	Type
6.8	7.0	Apple
19.0	3.6	Banana
8.0	8.3	Apple
15.2	3.1	Banana
7.3	7.5	Apple



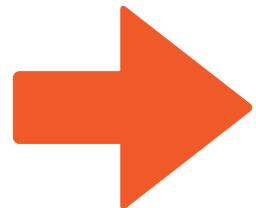
Length	Height	Type
7.5	7.7	Apple (99%)



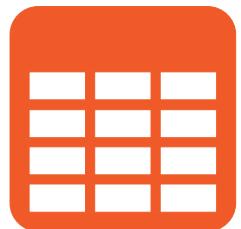
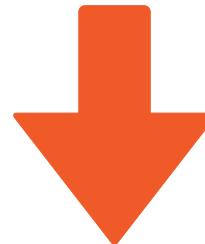
Machine Learning



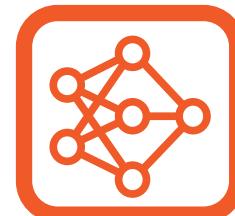
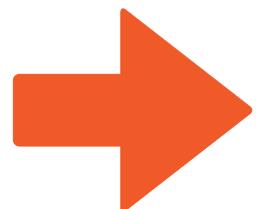
Data



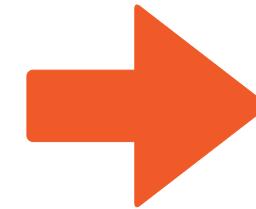
Algorithm



New data

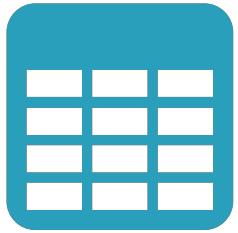


Model

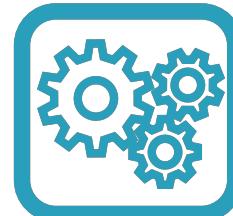
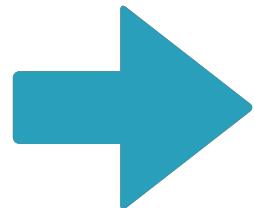


Prediction

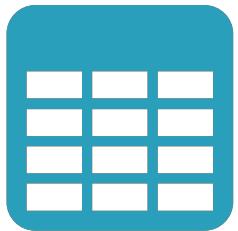
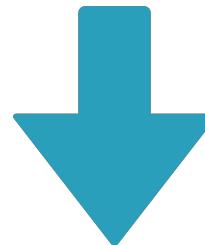
Machine Learning



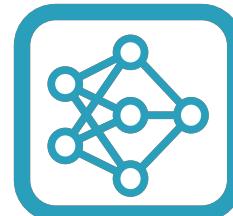
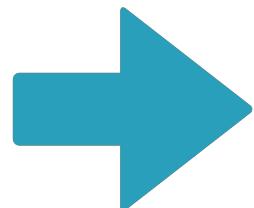
Data



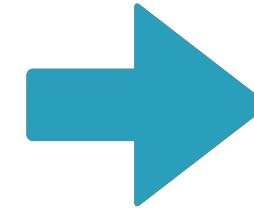
Algorithm



New data

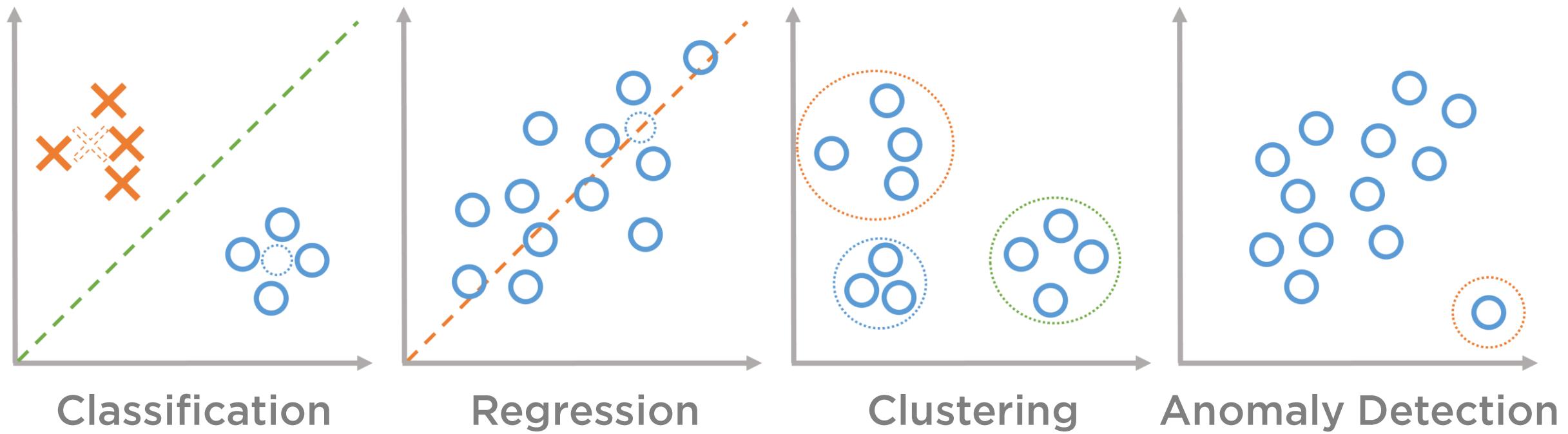


Model

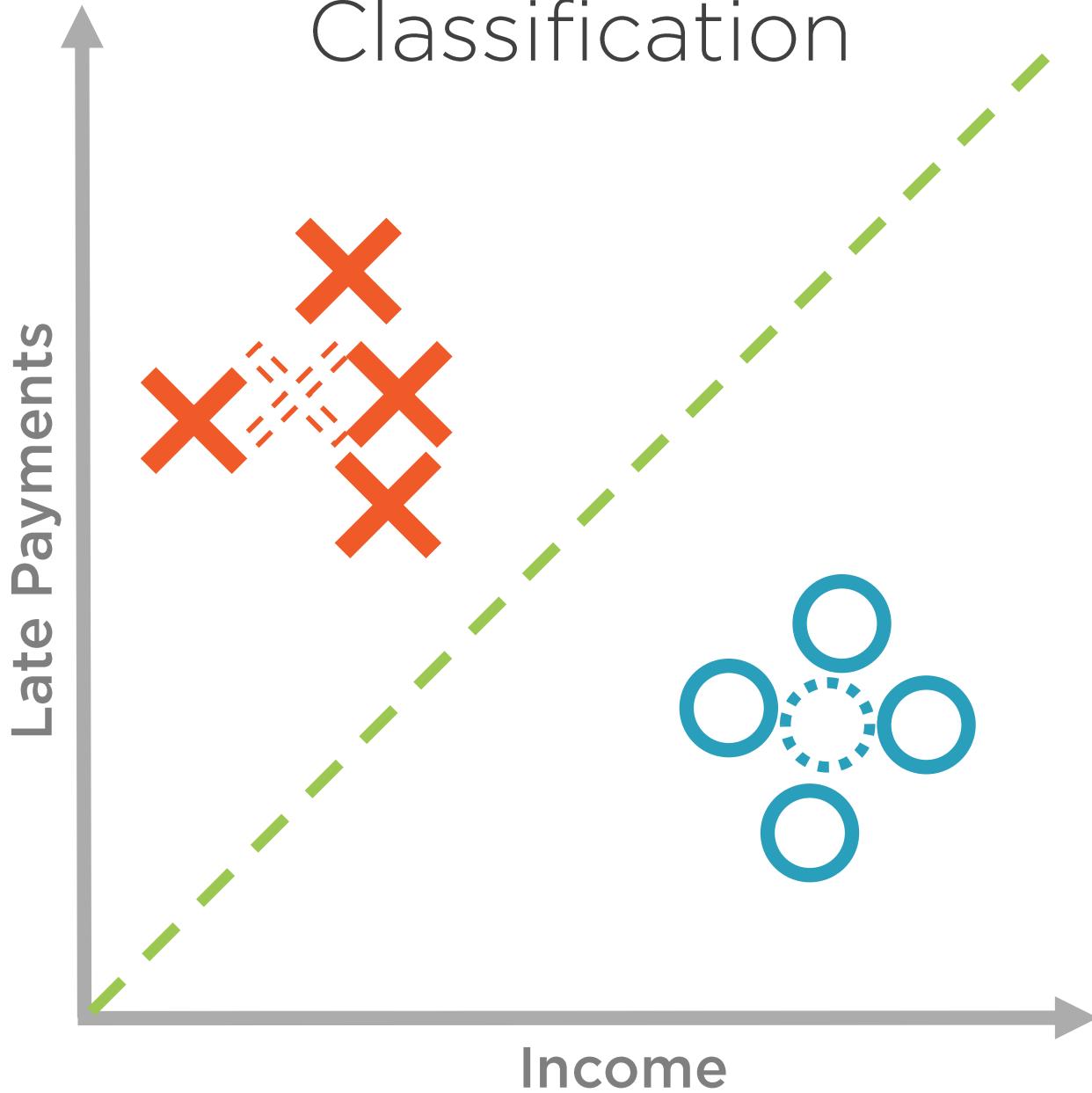


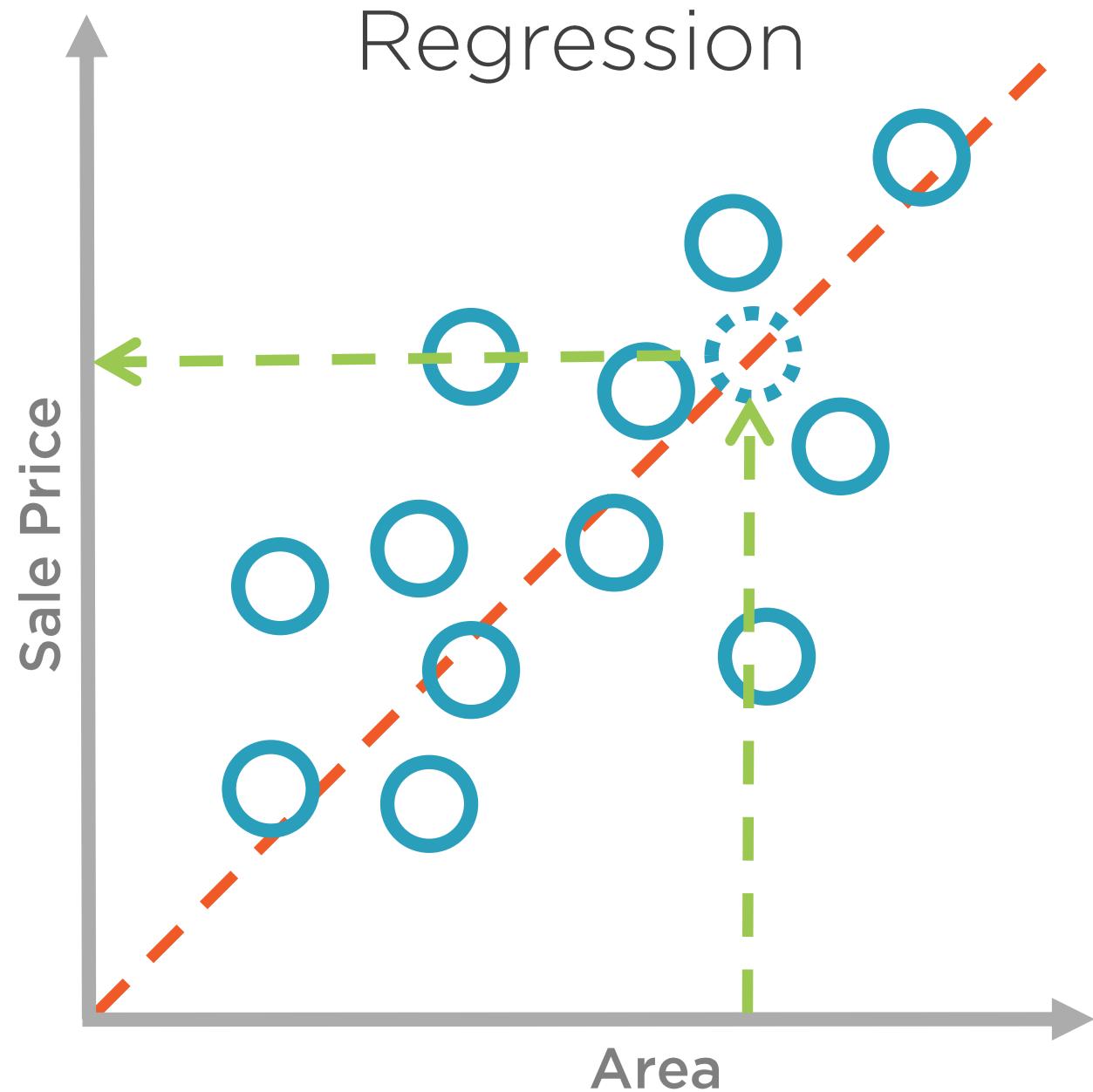
Prediction

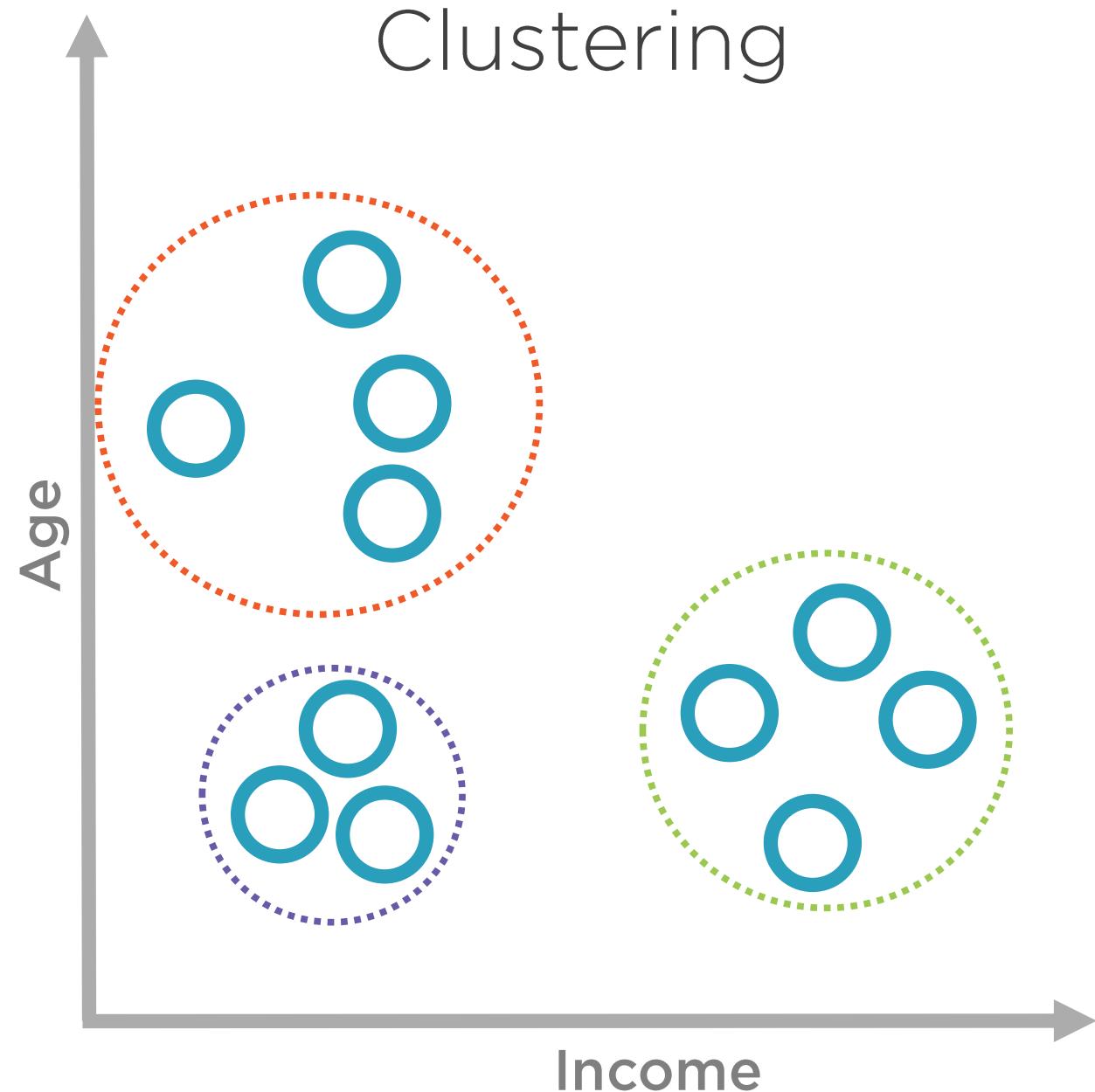
Machine Learning Tasks



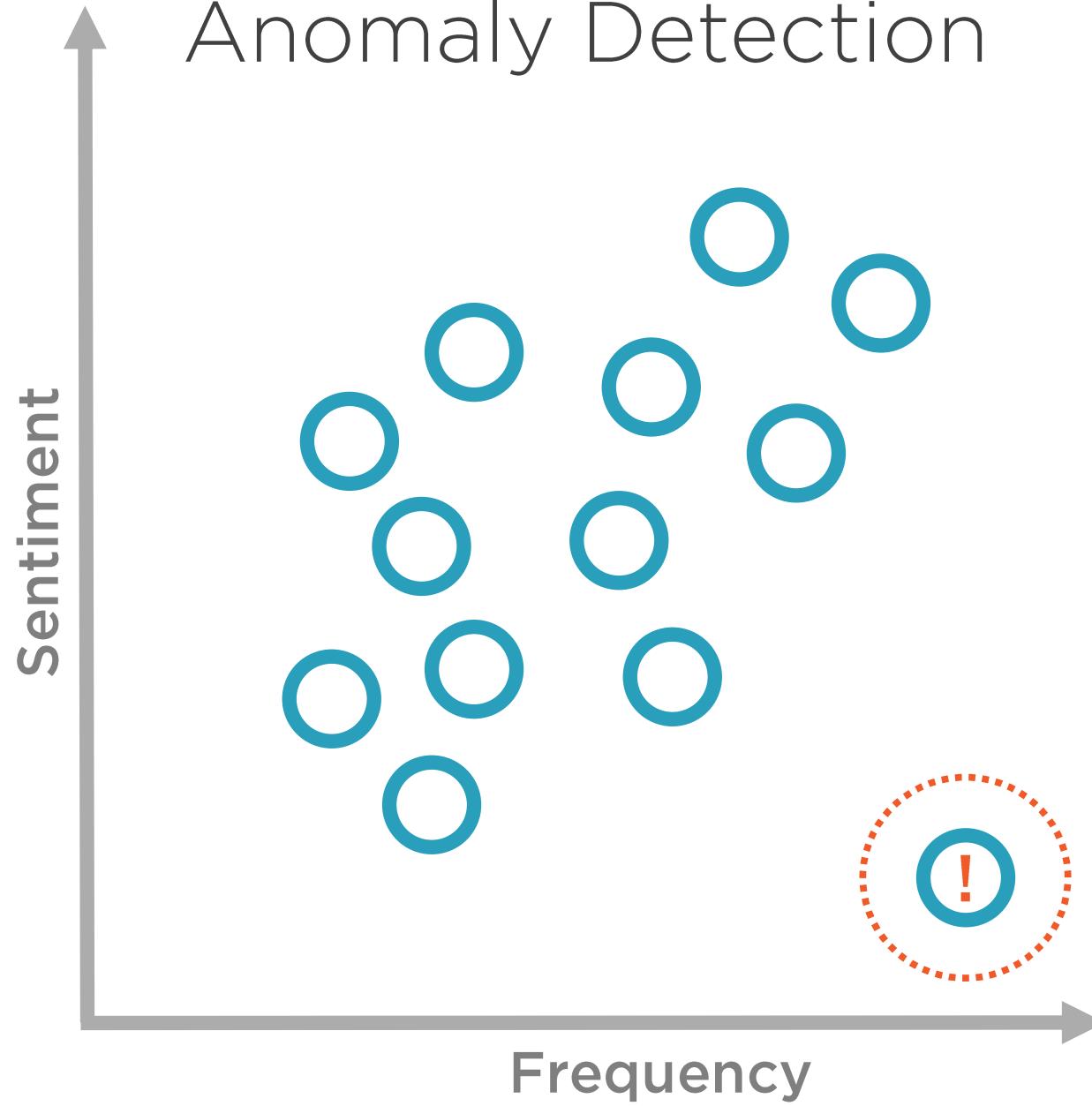
Classification







Anomaly Detection



Machine Learning

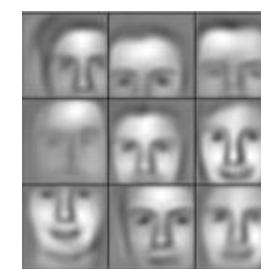
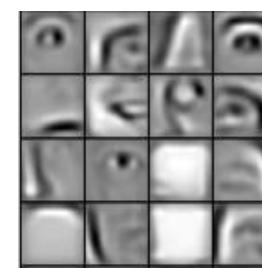
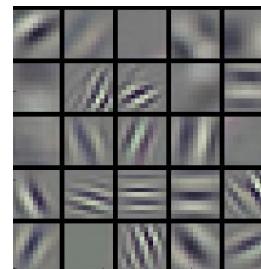
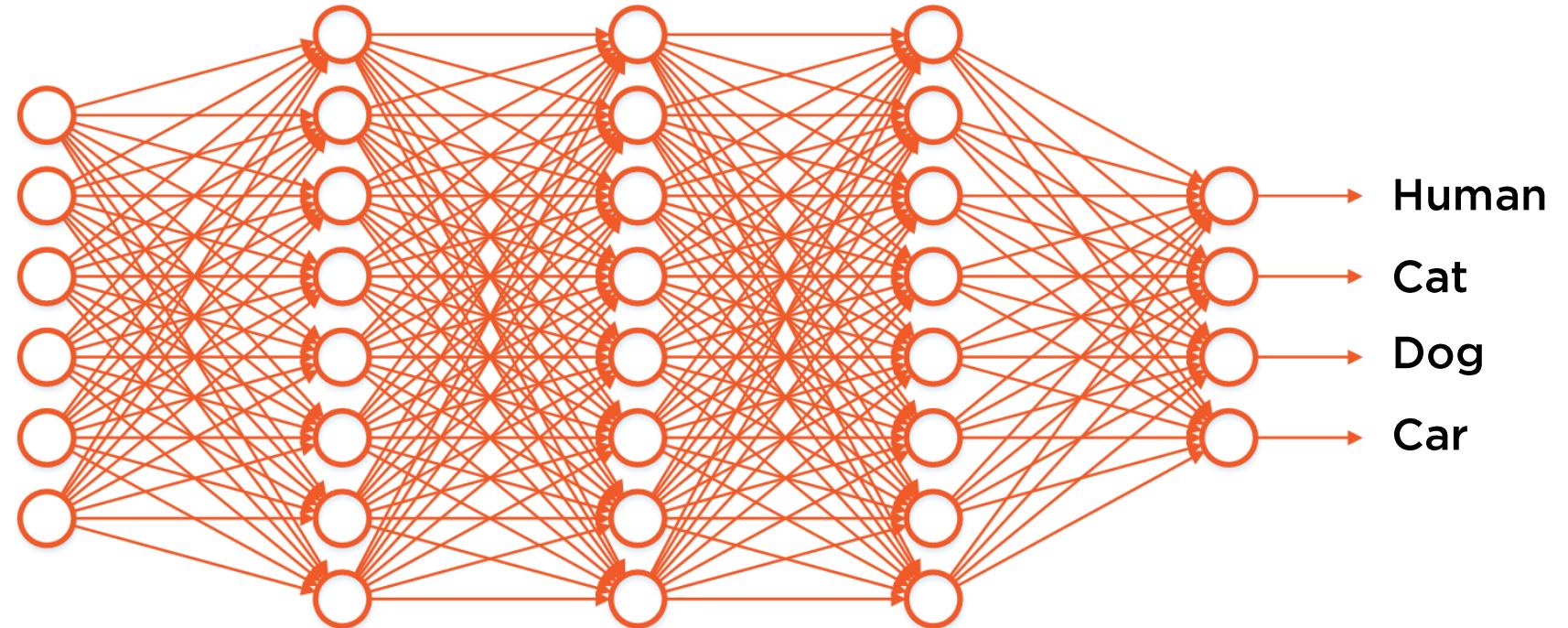
Make
better
decisions

Create
smarter
products

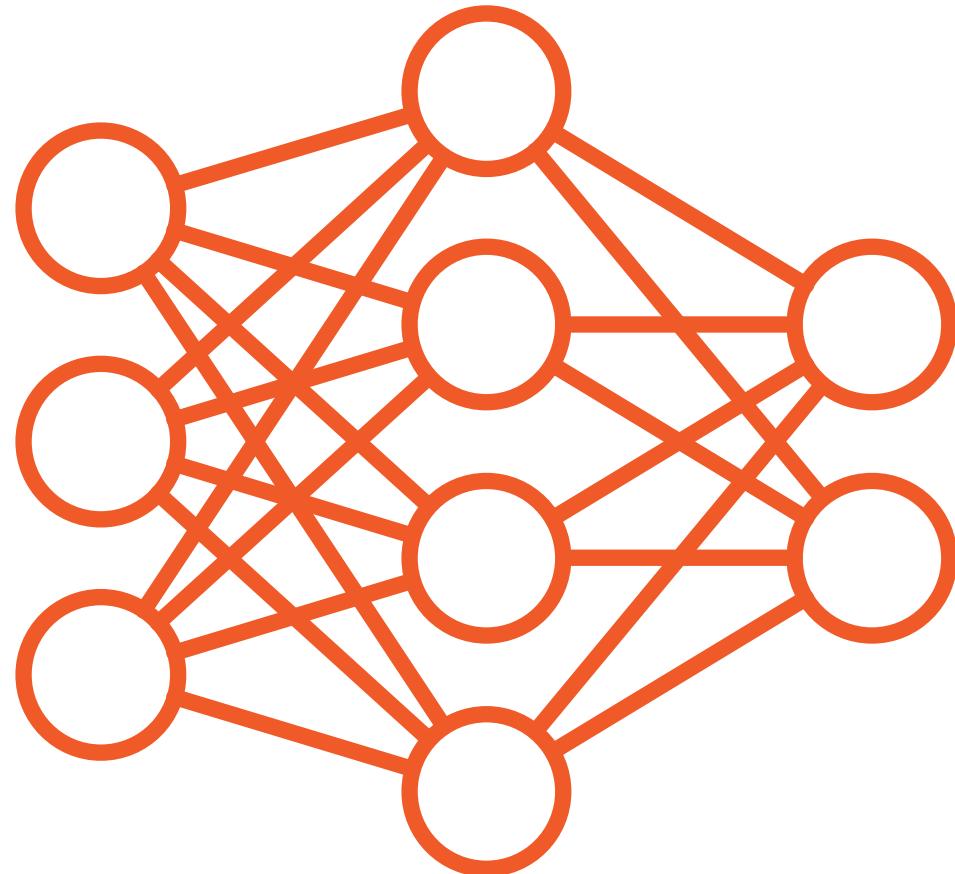
Automate
manual
labor

Deep Learning

Deep Learning



Neural Network

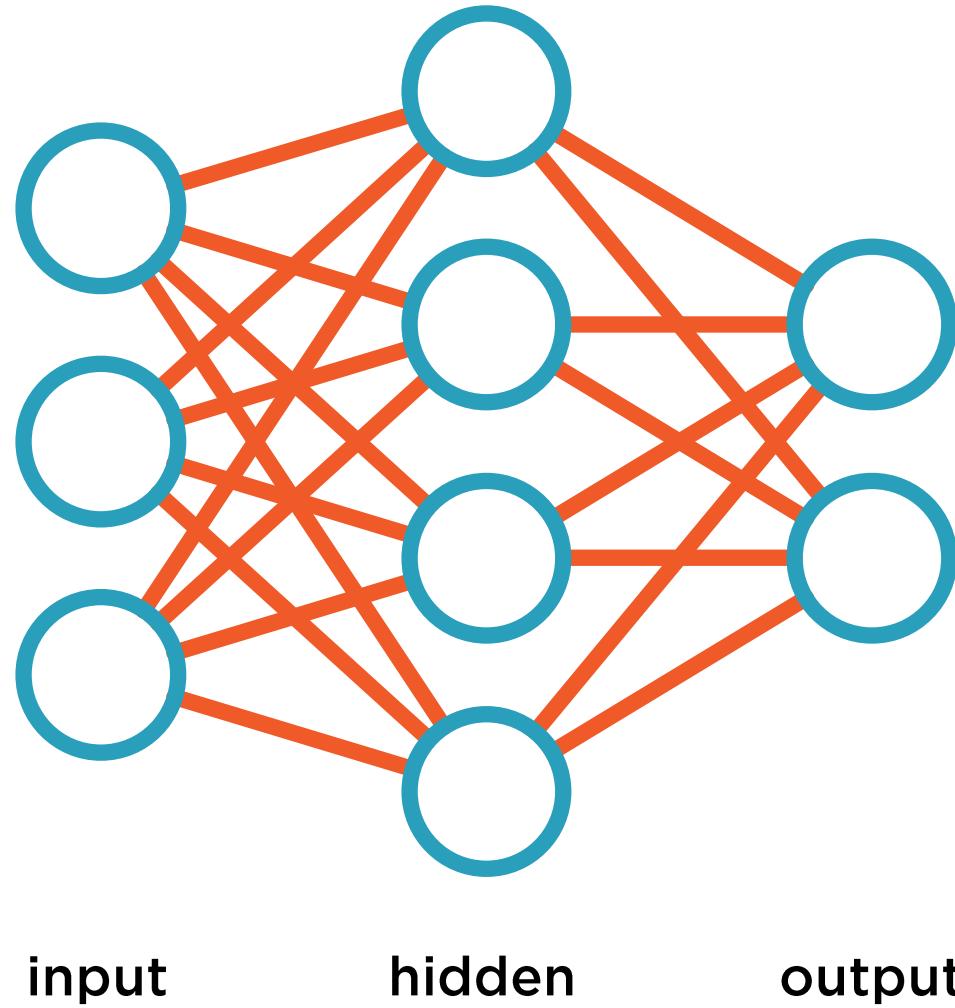


input

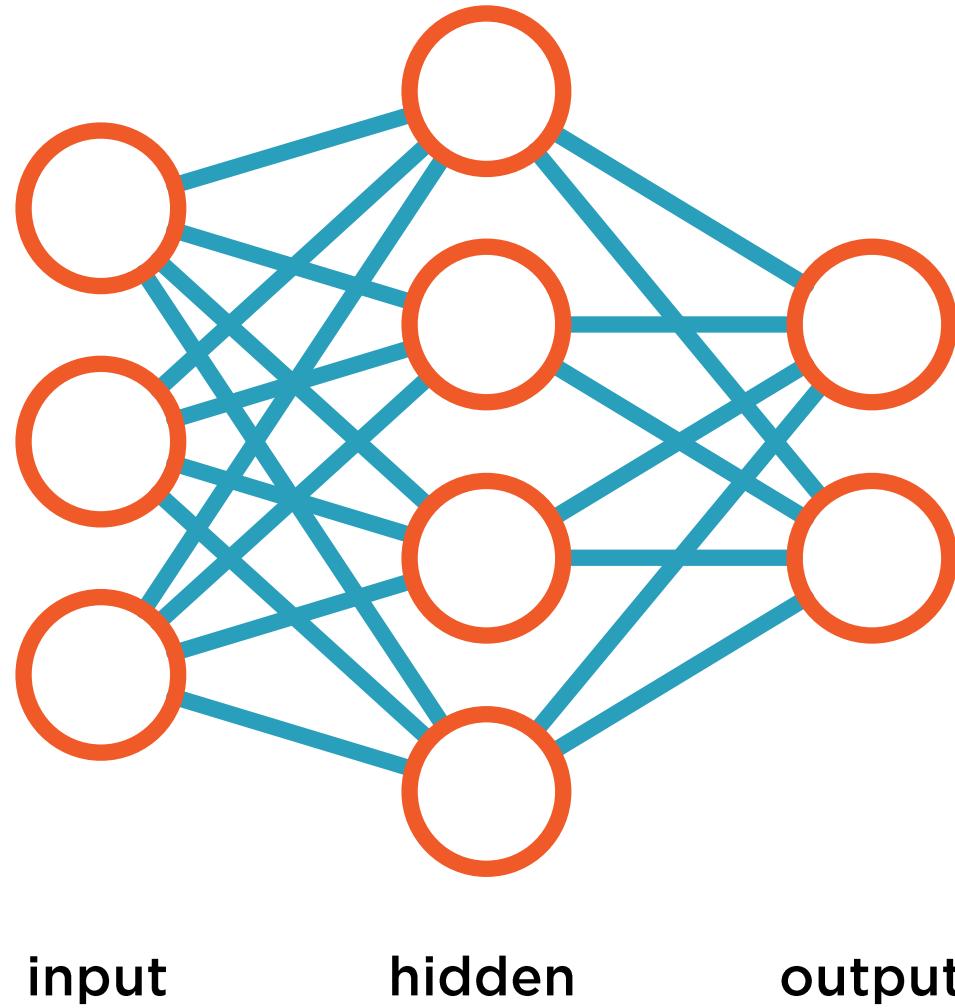
hidden

output

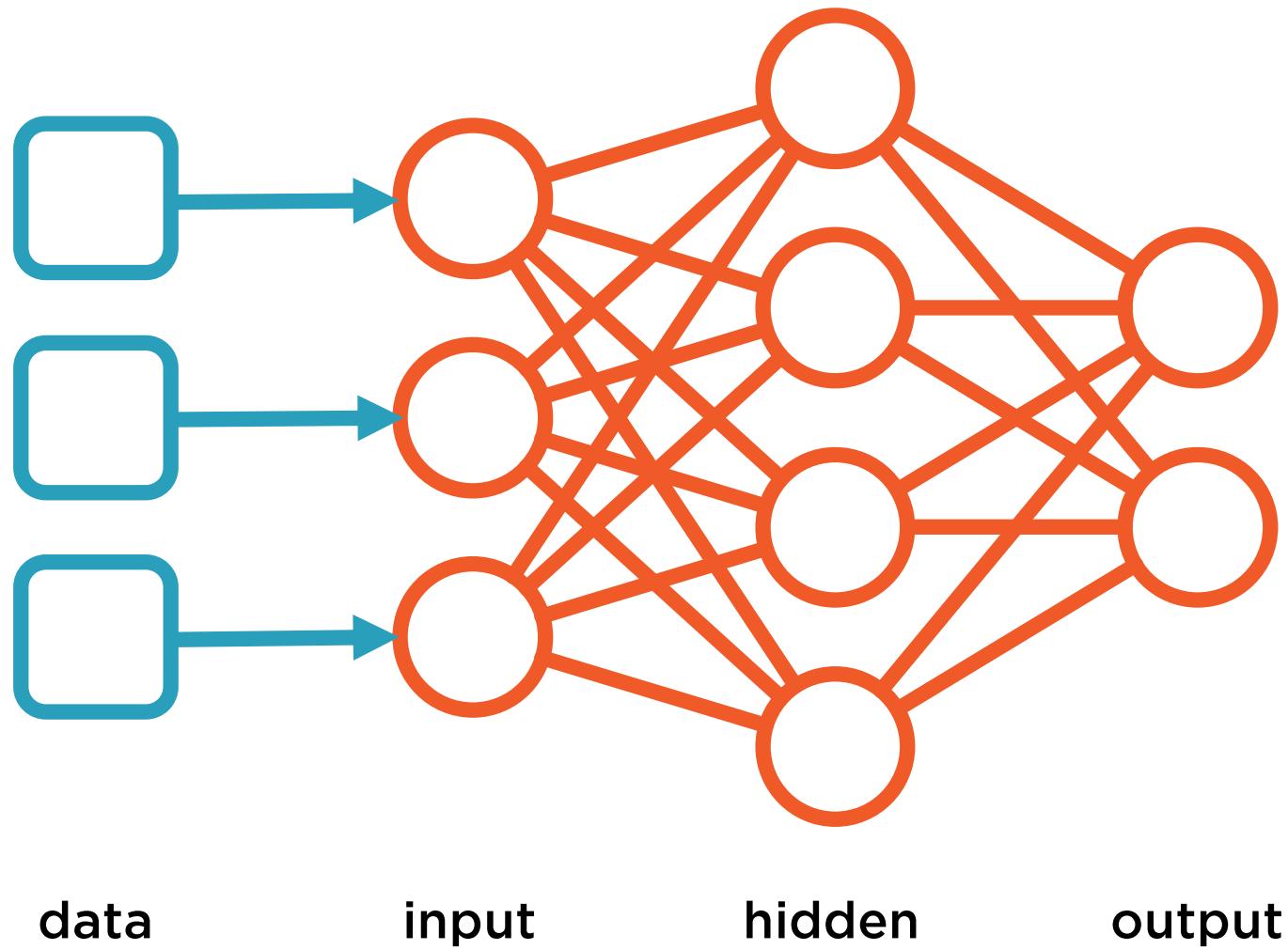
Neural Network



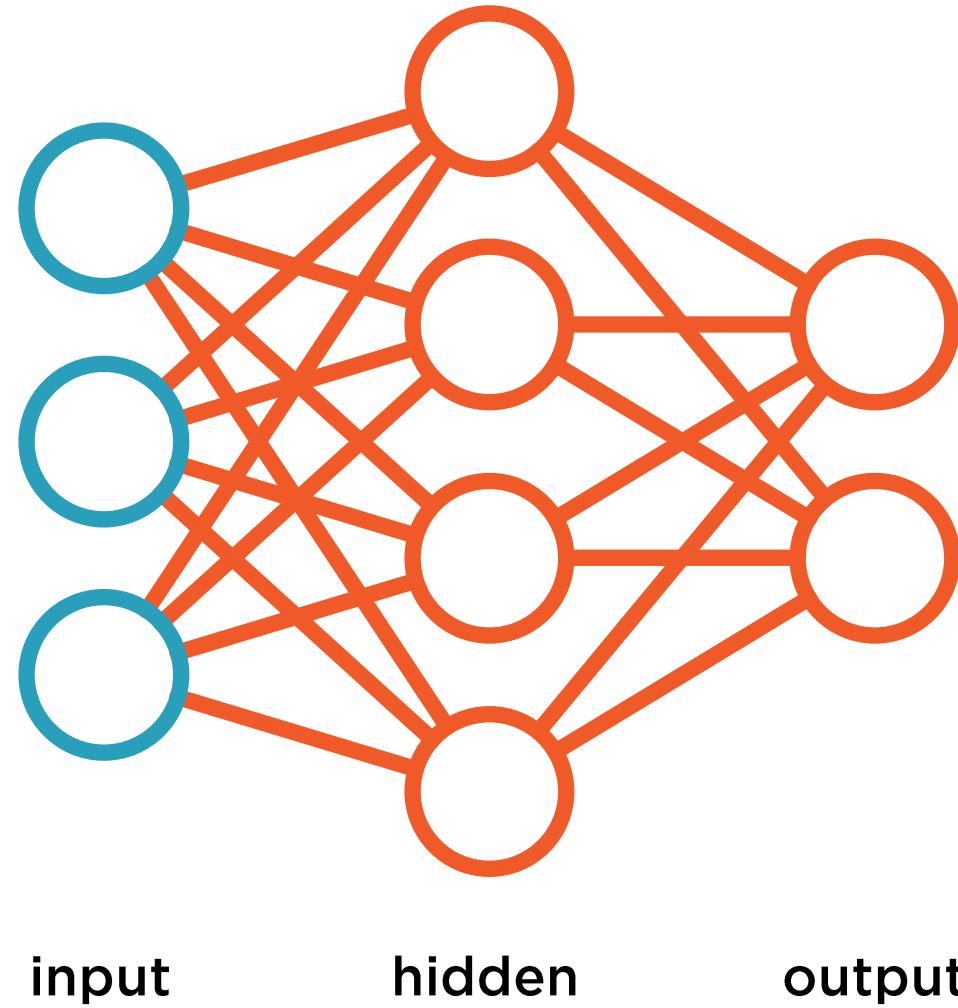
Neural Network



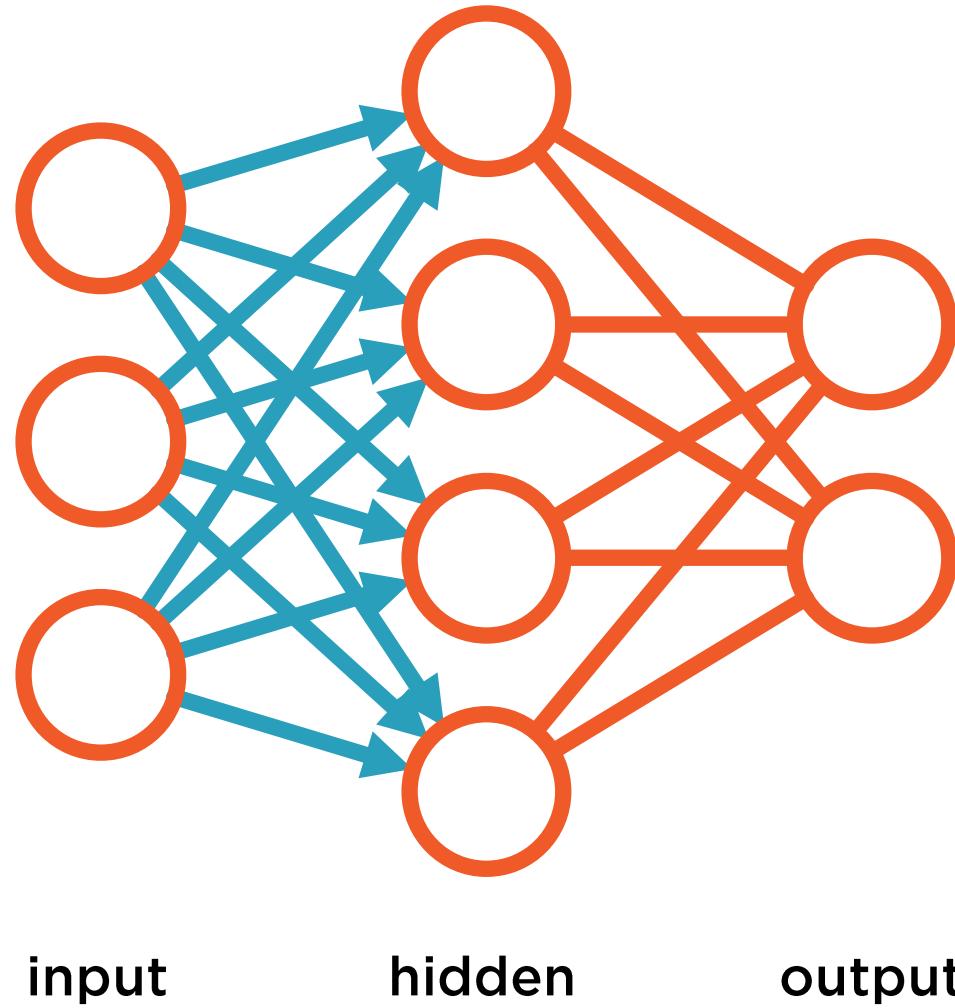
Neural Network



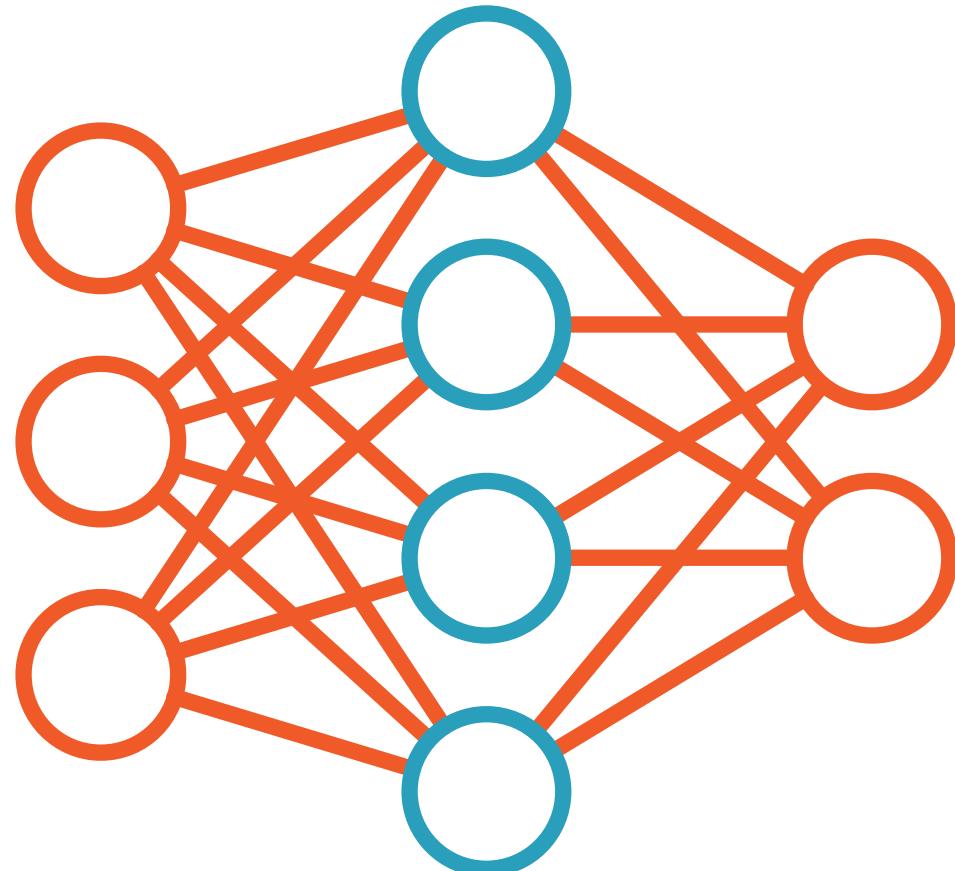
Neural Network



Neural Network



Neural Network

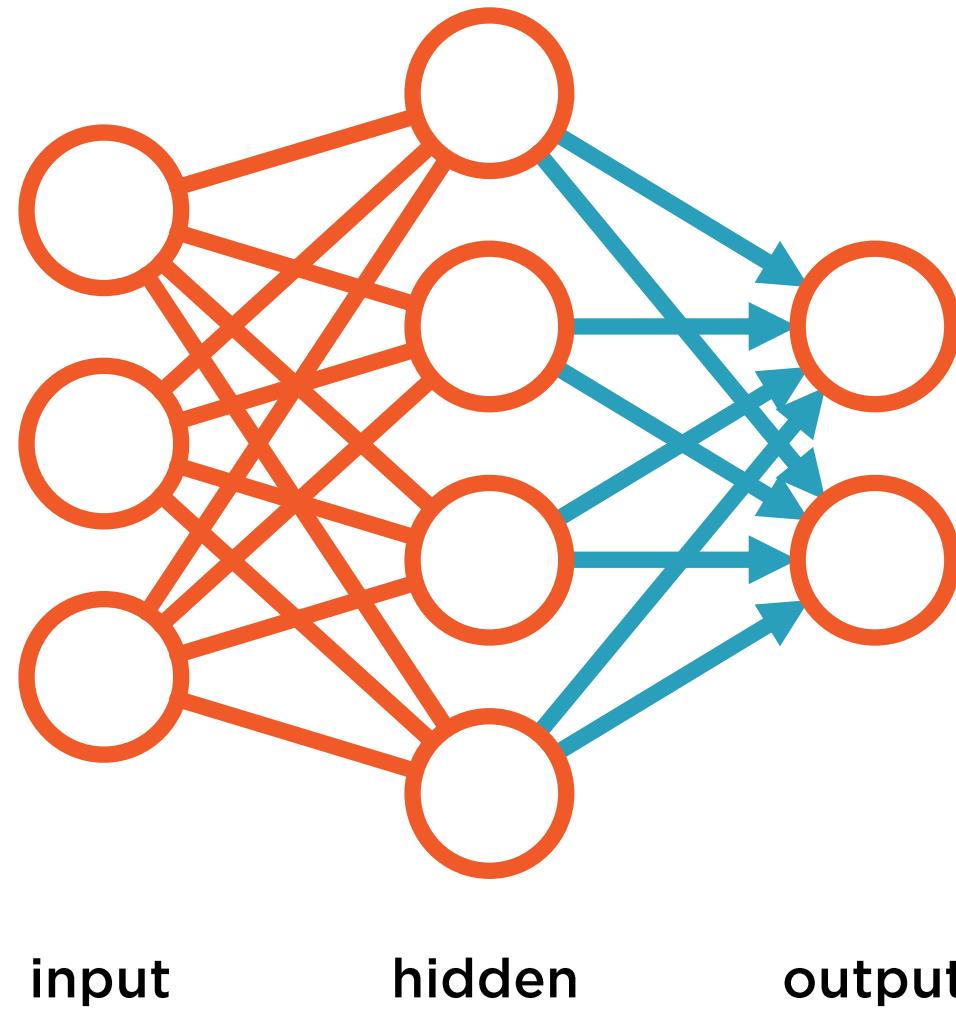


input

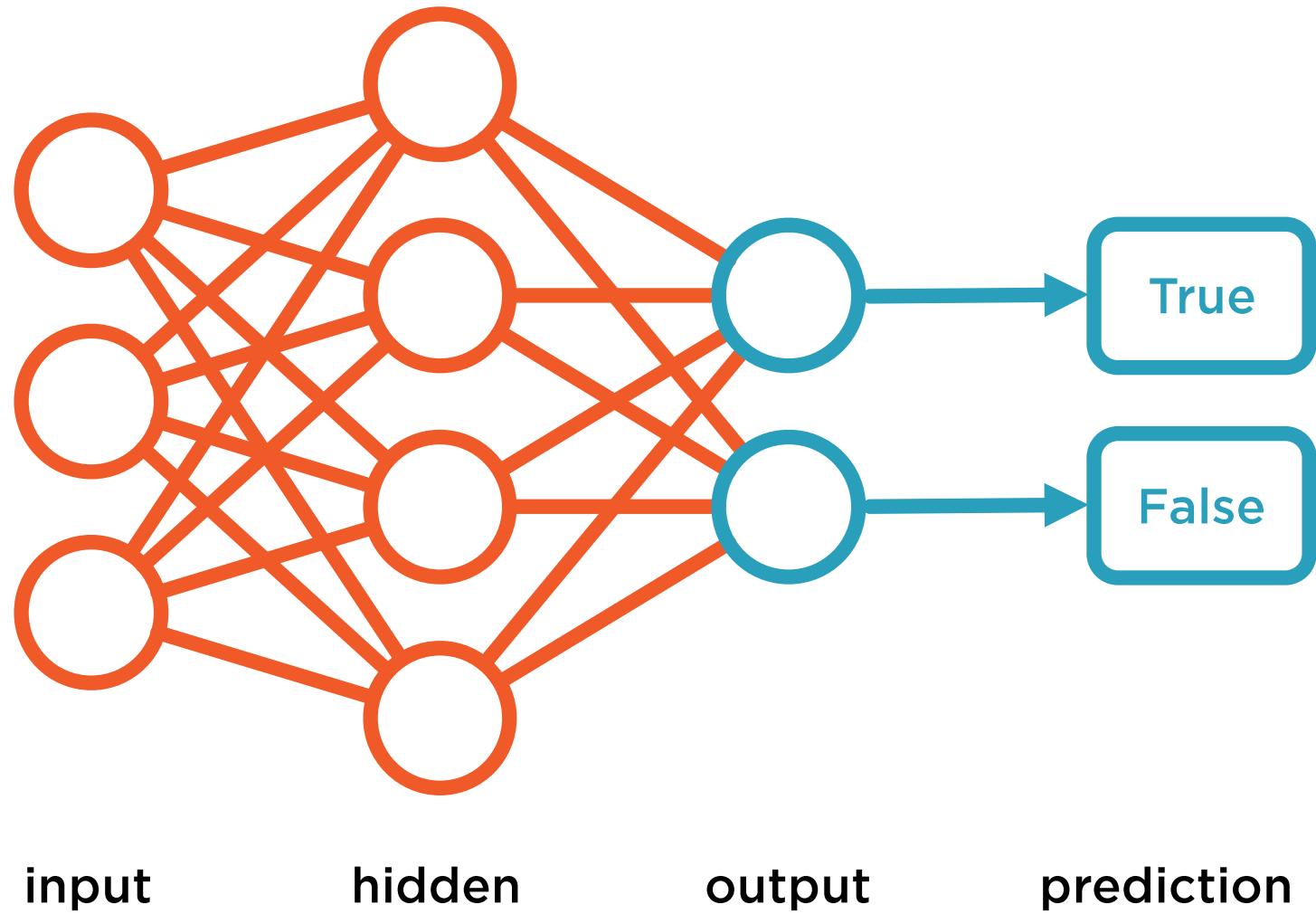
hidden

output

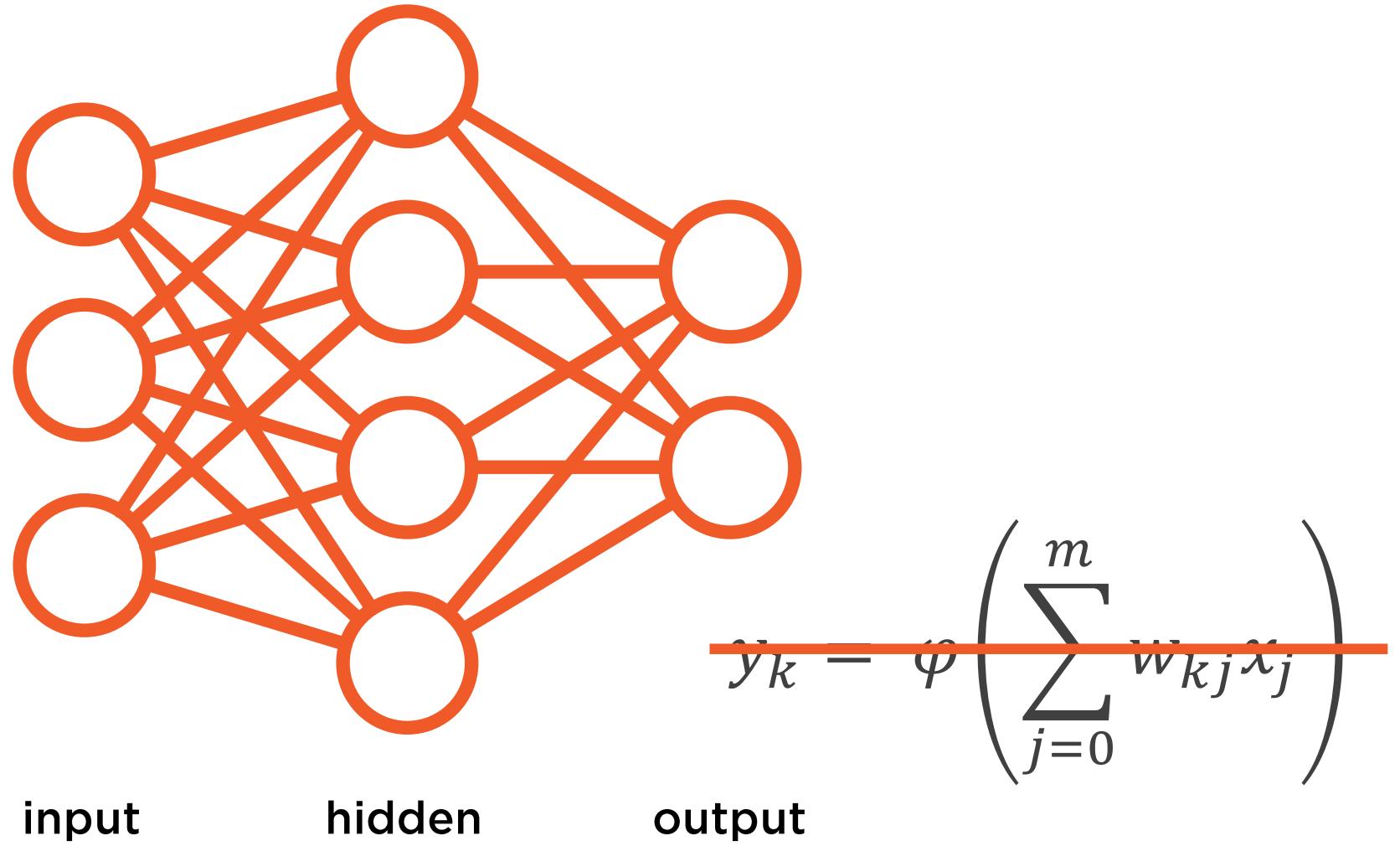
Neural Network



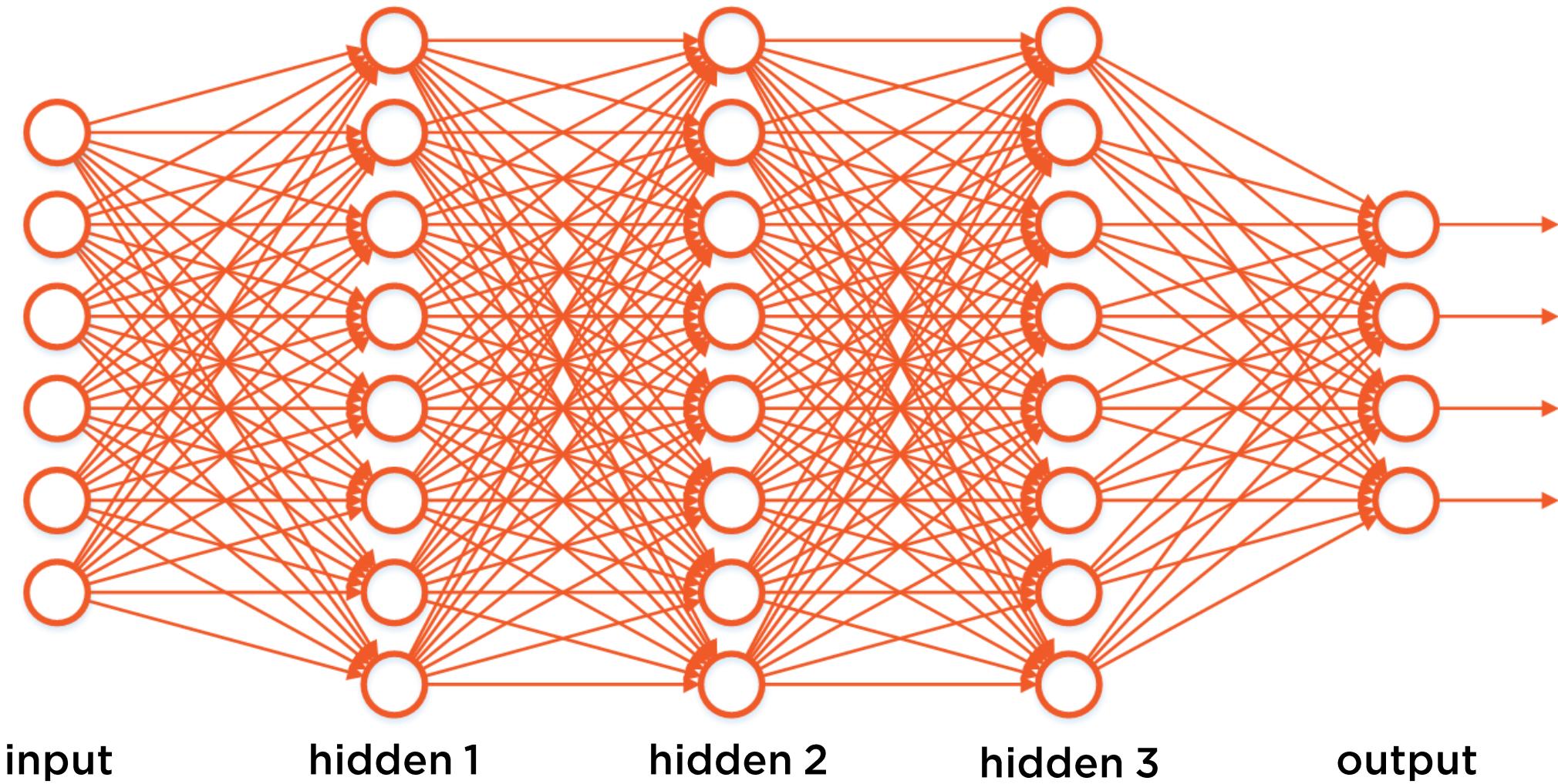
Neural Network



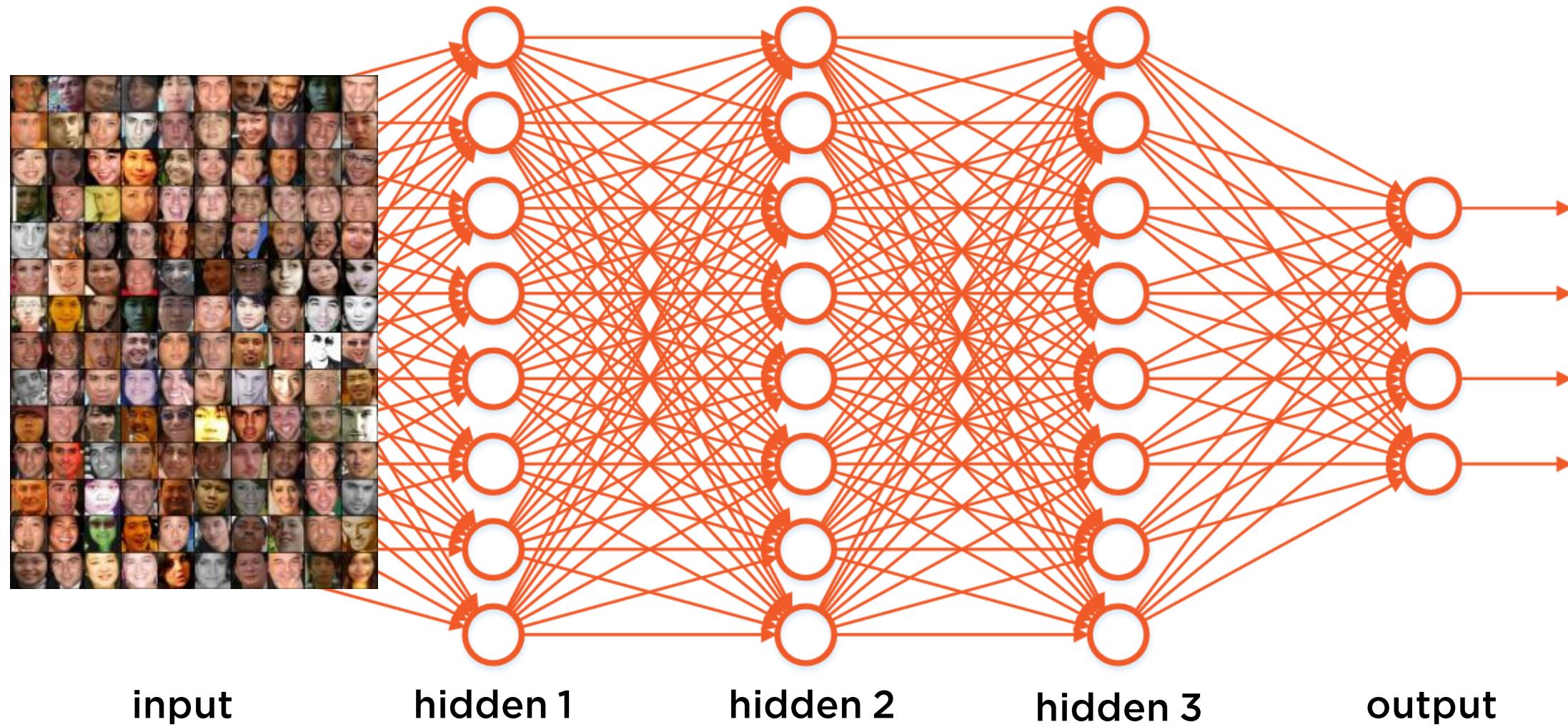
Neural Network



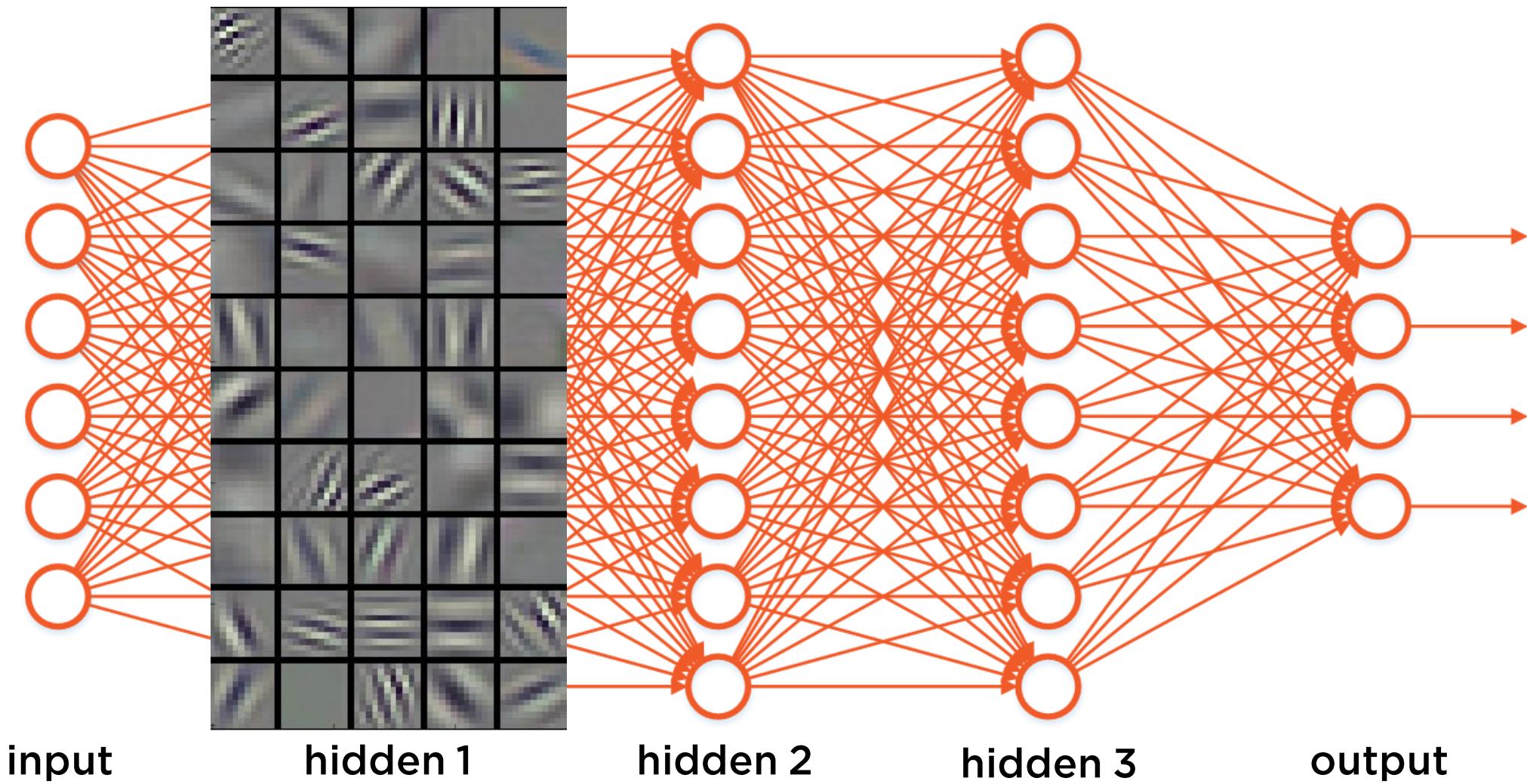
Deep Neural Network



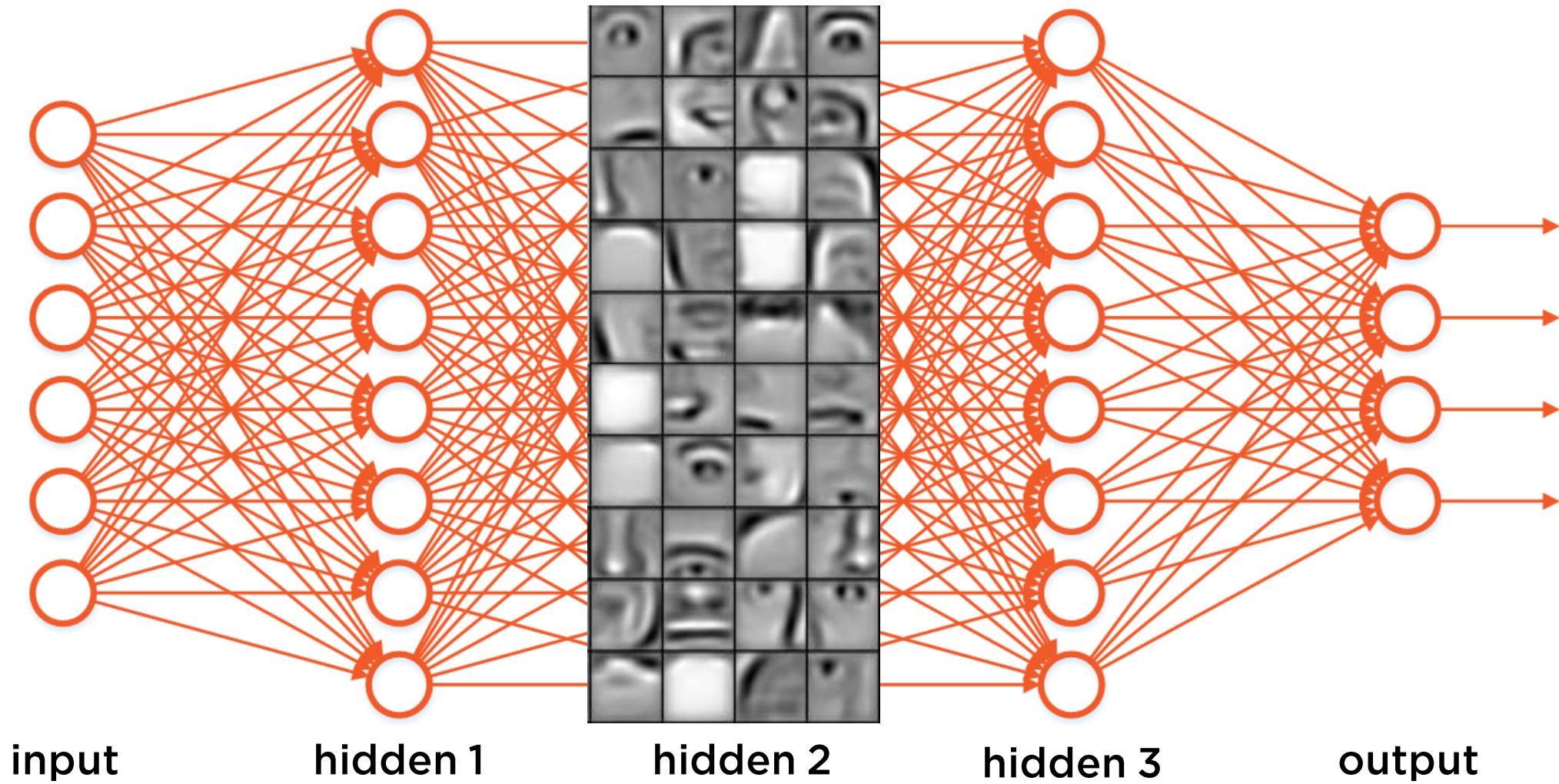
Deep Neural Network



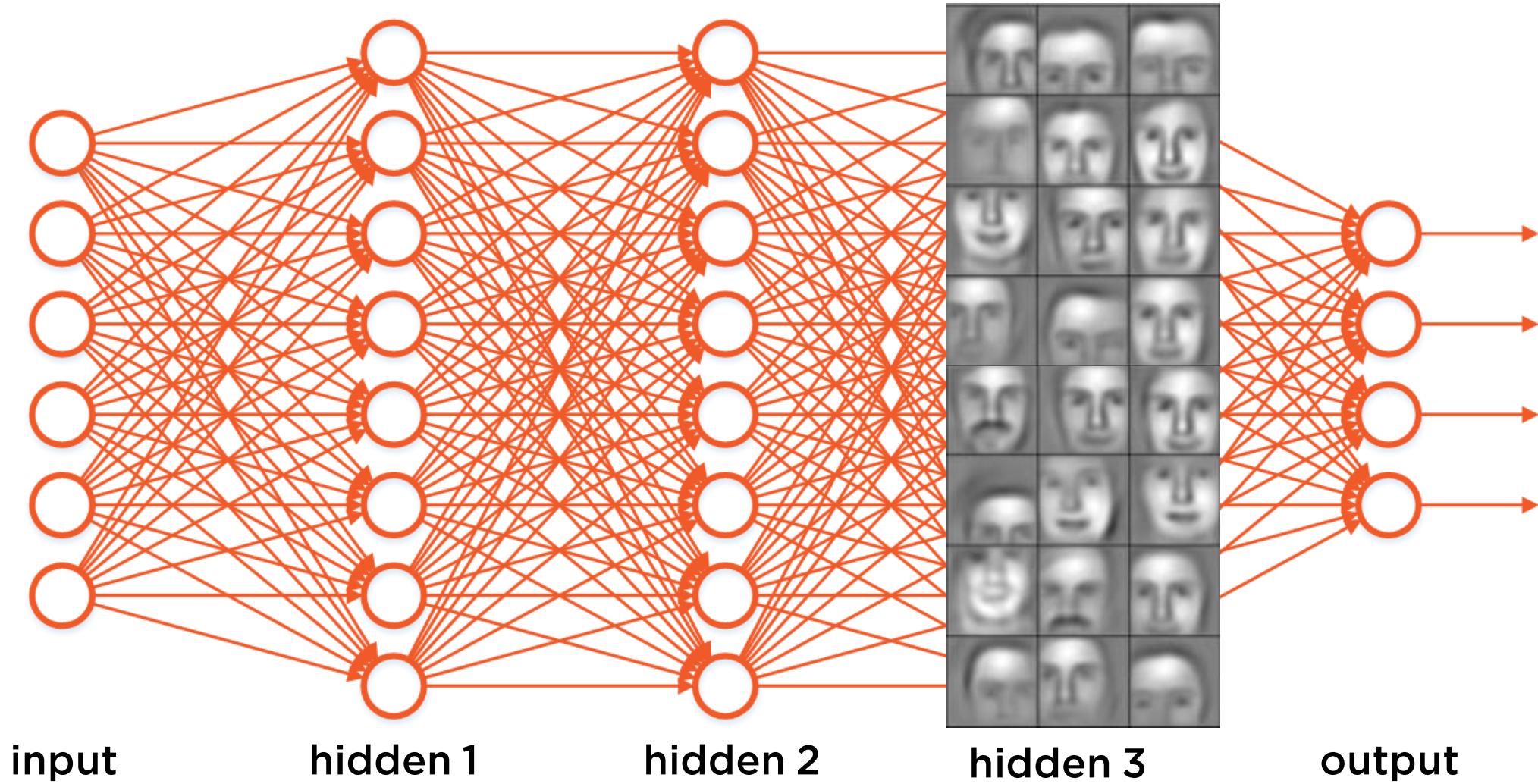
Deep Neural Network



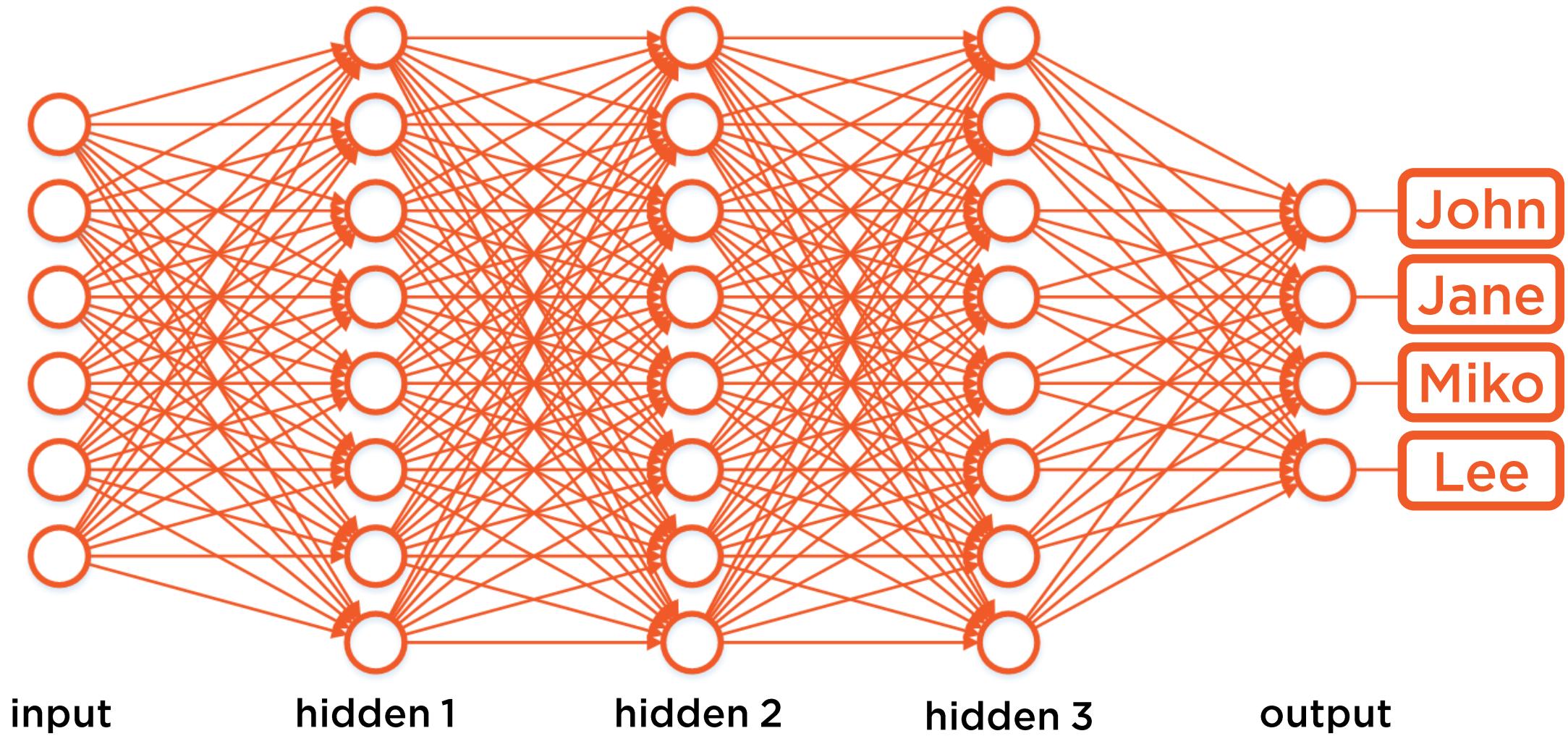
Deep Neural Network



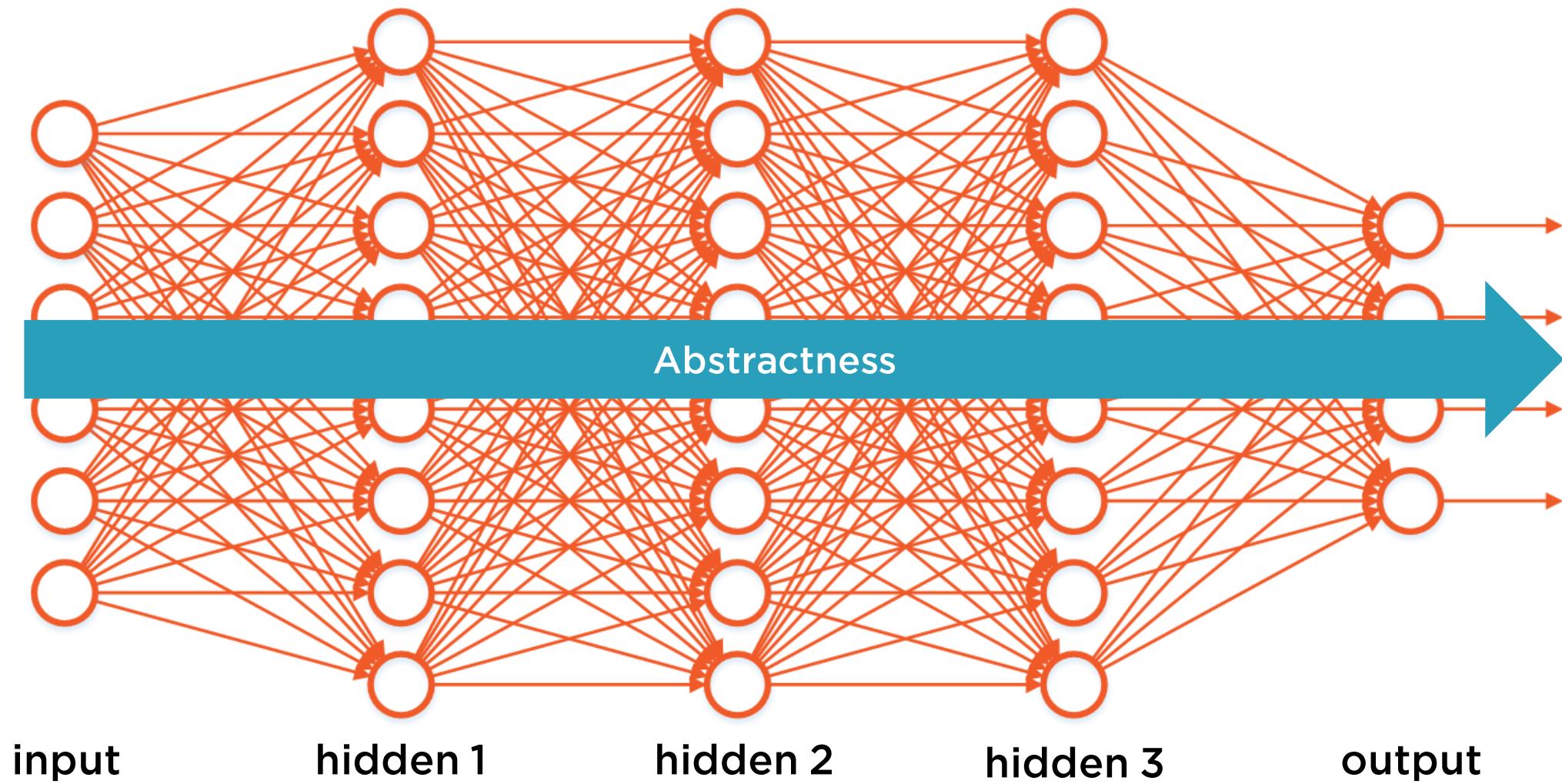
Deep Neural Network



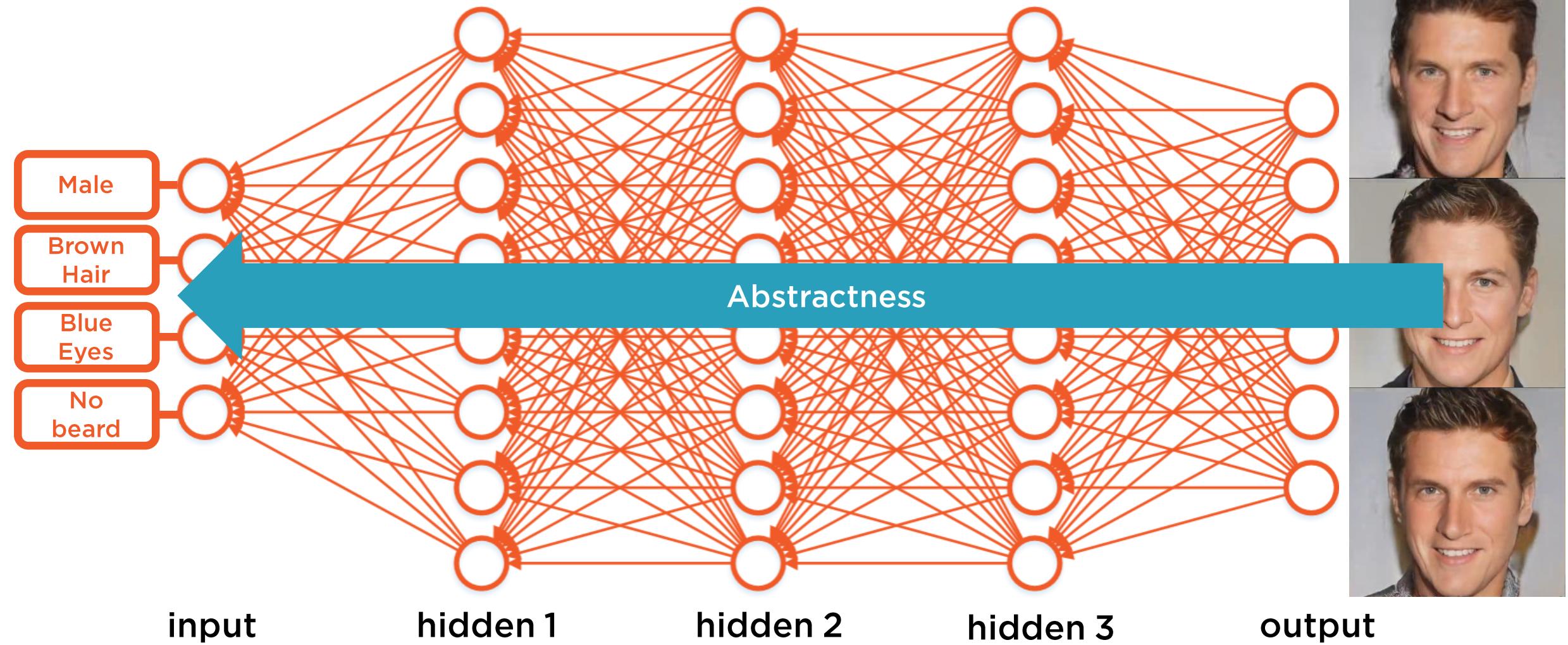
Deep Neural Network



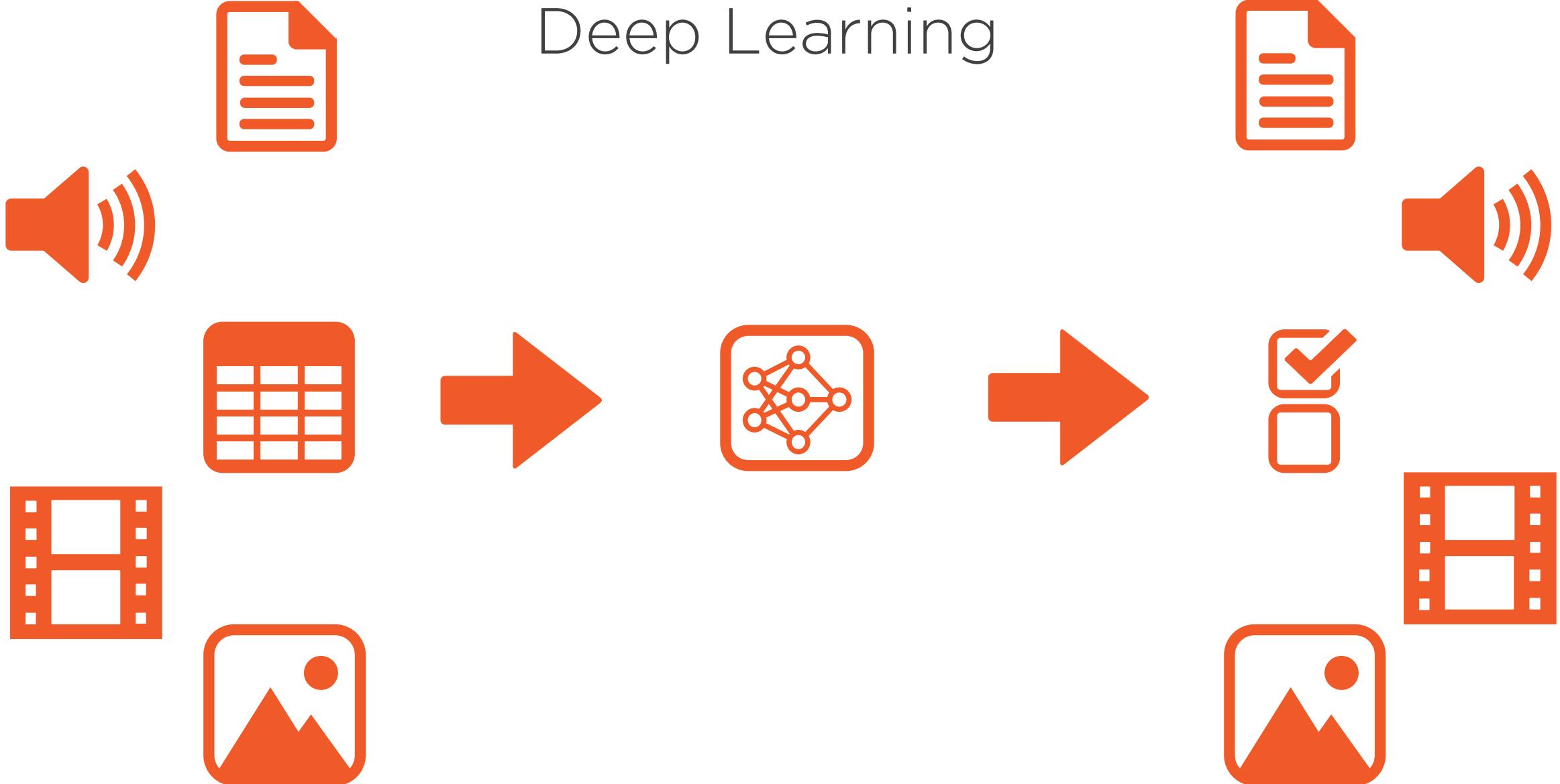
Deep Neural Network

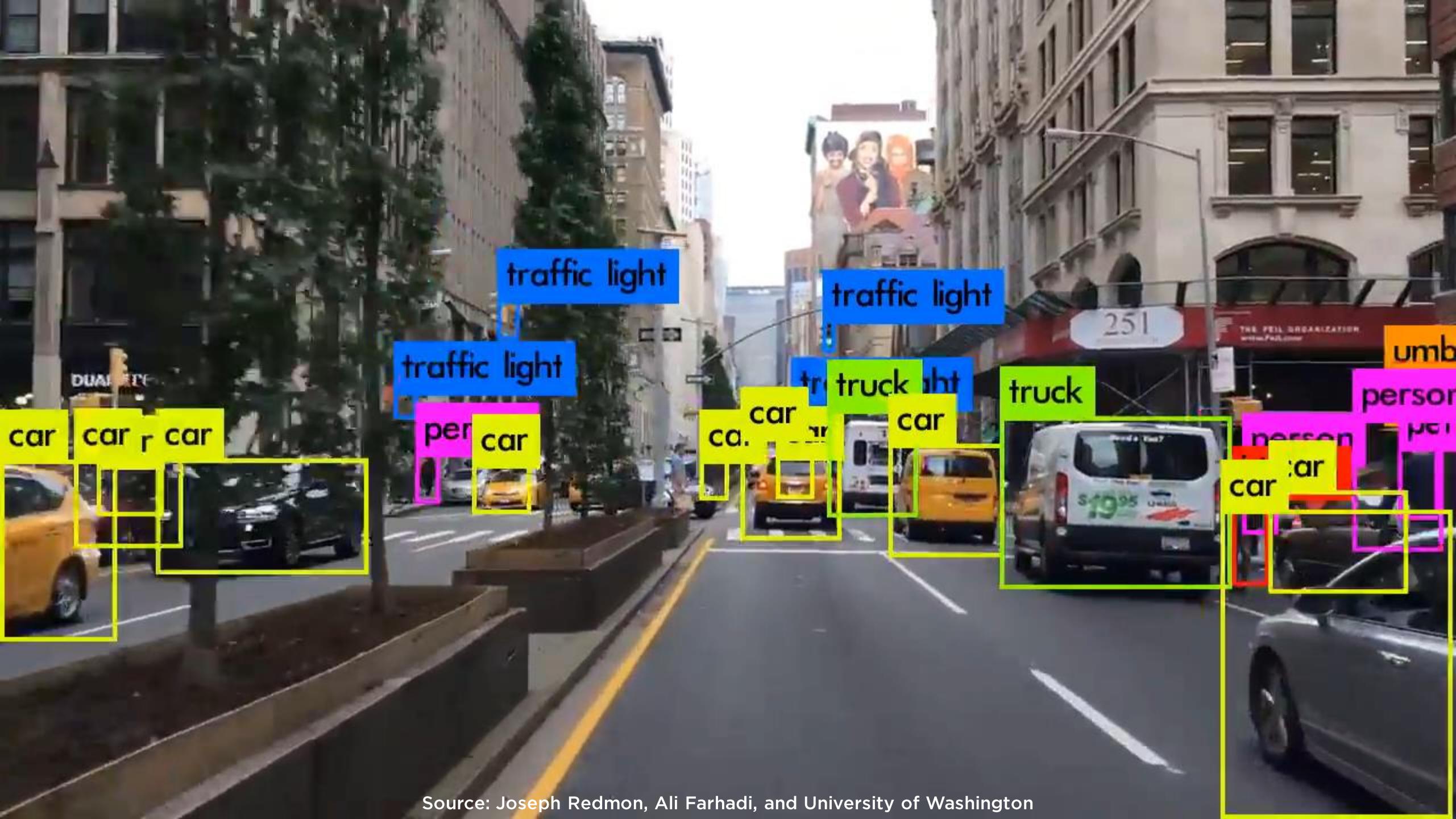


DNN Generator



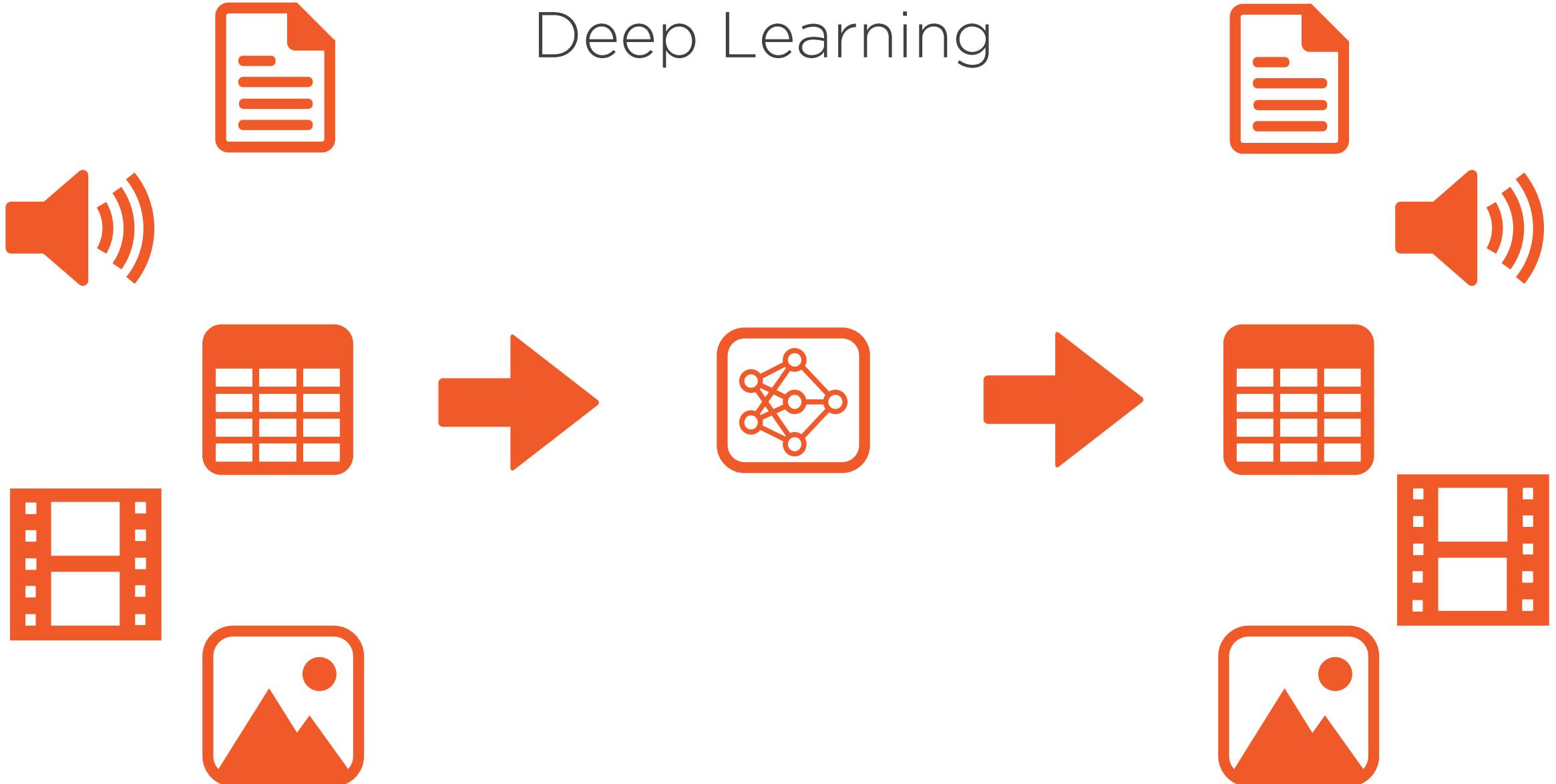
Deep Learning





Source: Joseph Redmon, Ali Farhadi, and University of Washington

Deep Learning

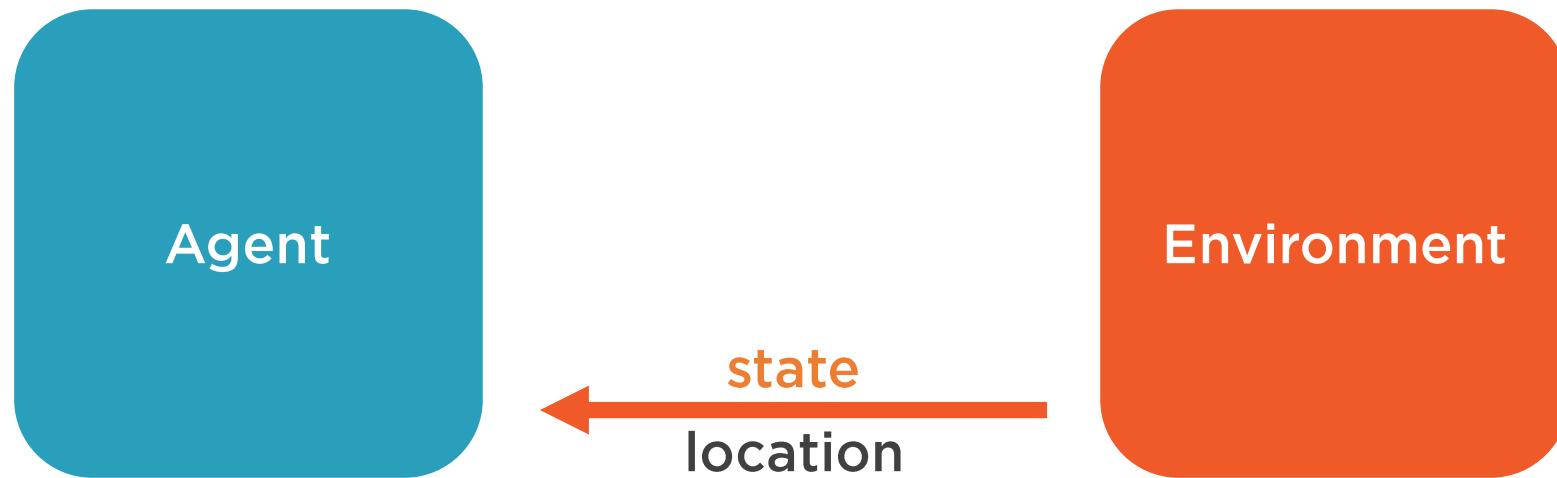


Reinforcement Learning

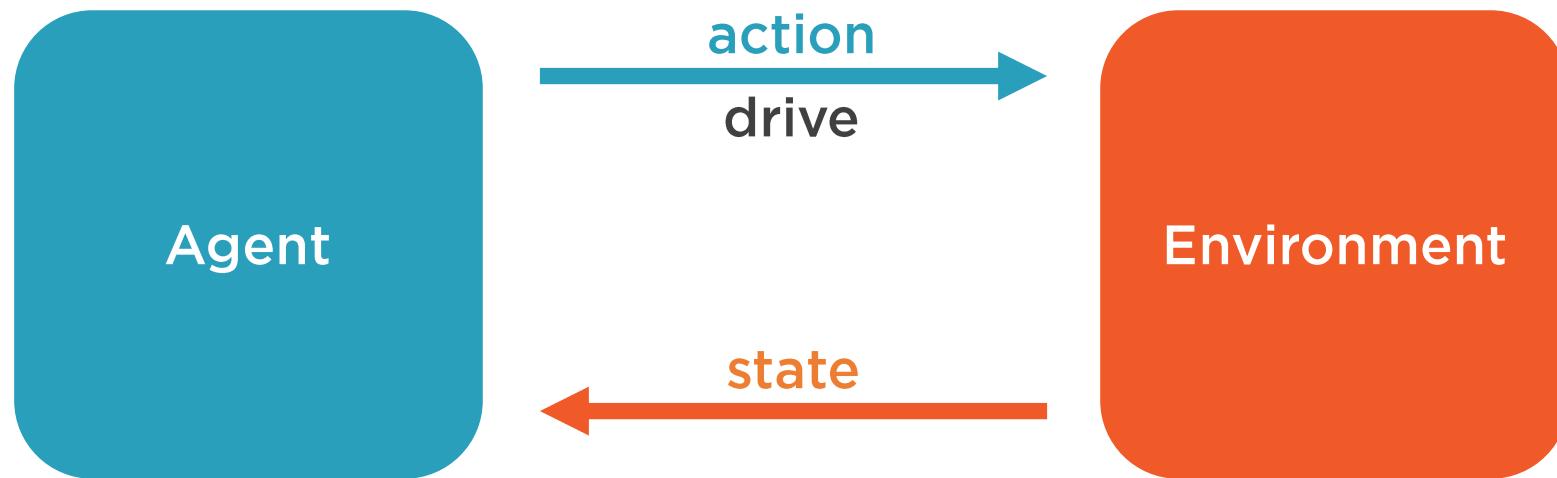
Reinforcement Learning



Reinforcement Learning



Reinforcement Learning



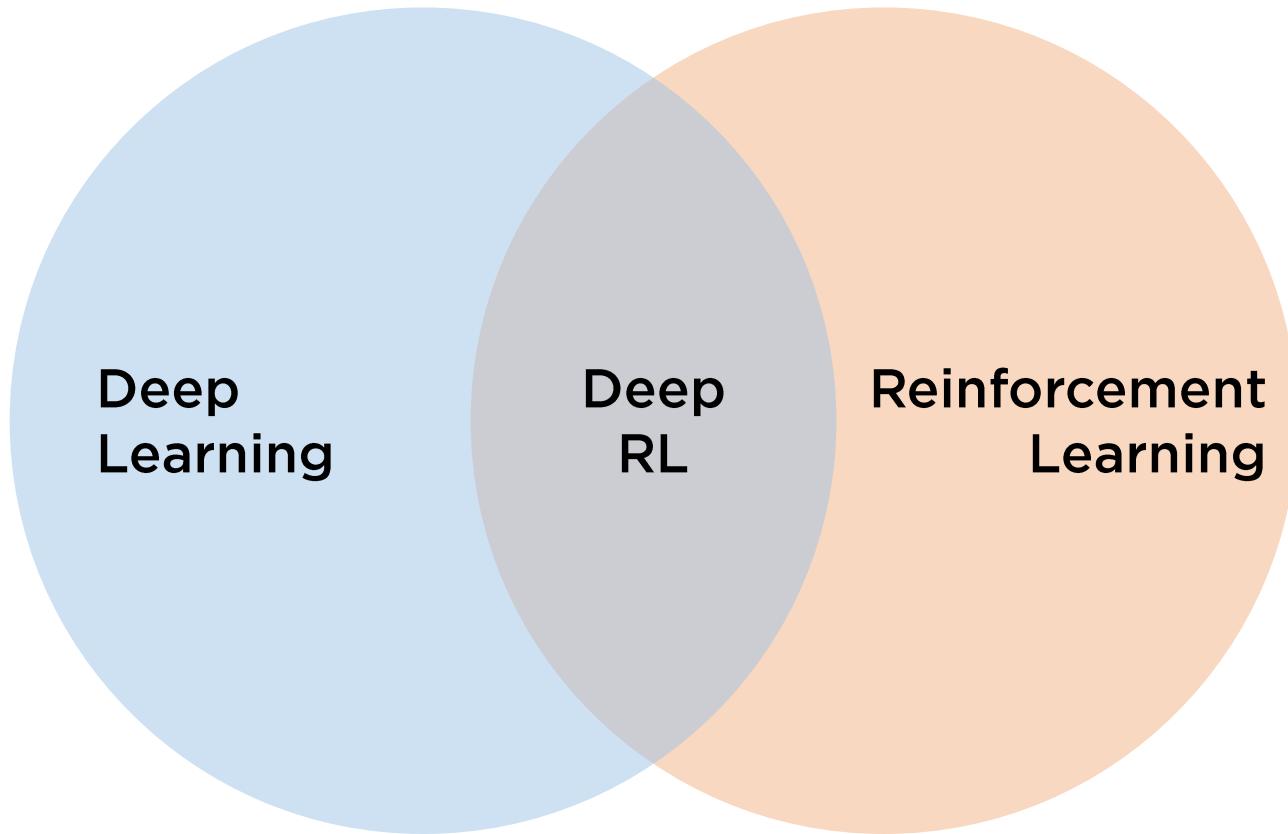
Reinforcement Learning



Reinforcement Learning

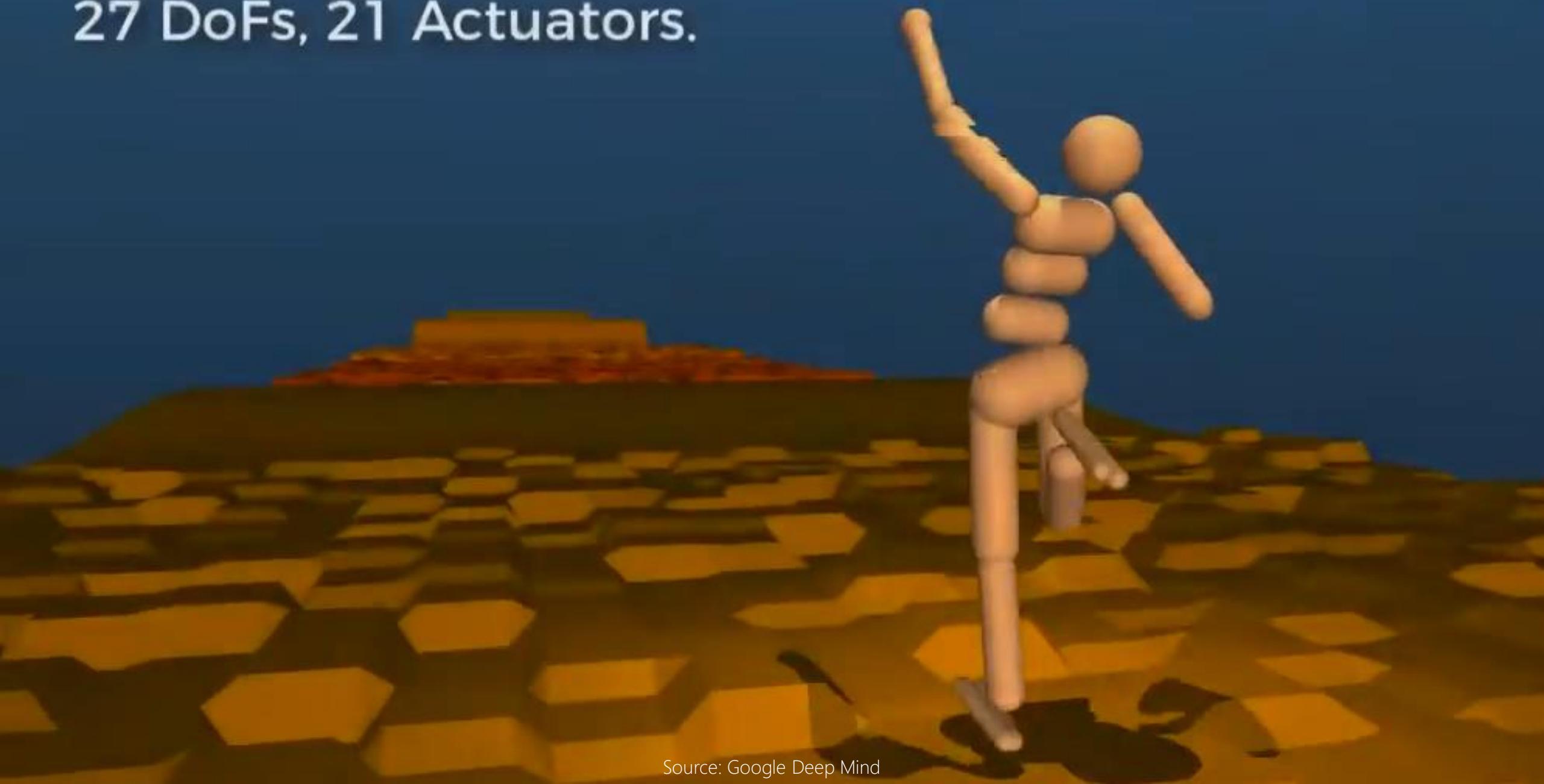


Deep Reinforcement Learning



100 Training Episodes

Humanoid:
27 DoFs, 21 Actuators.



It's not all just fun and games!

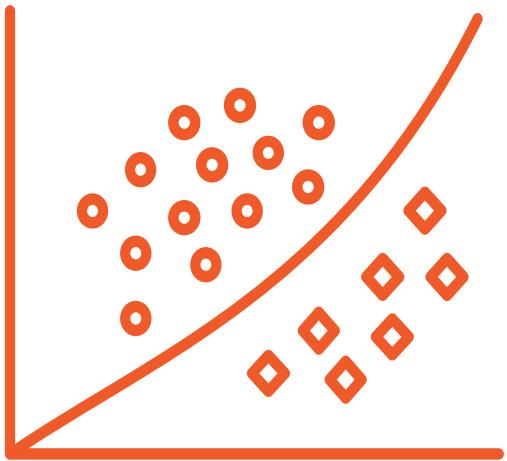


Reinforcement Learning

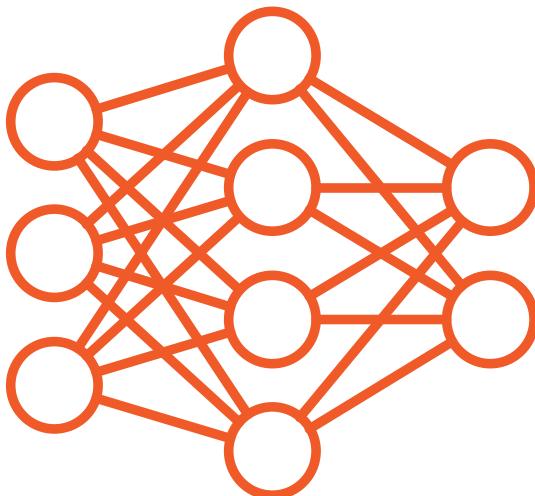


Other A.I. Trends

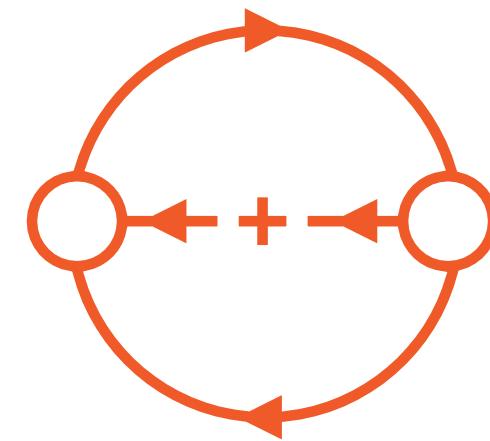
Data-driven AI Trends



Machine
Learning

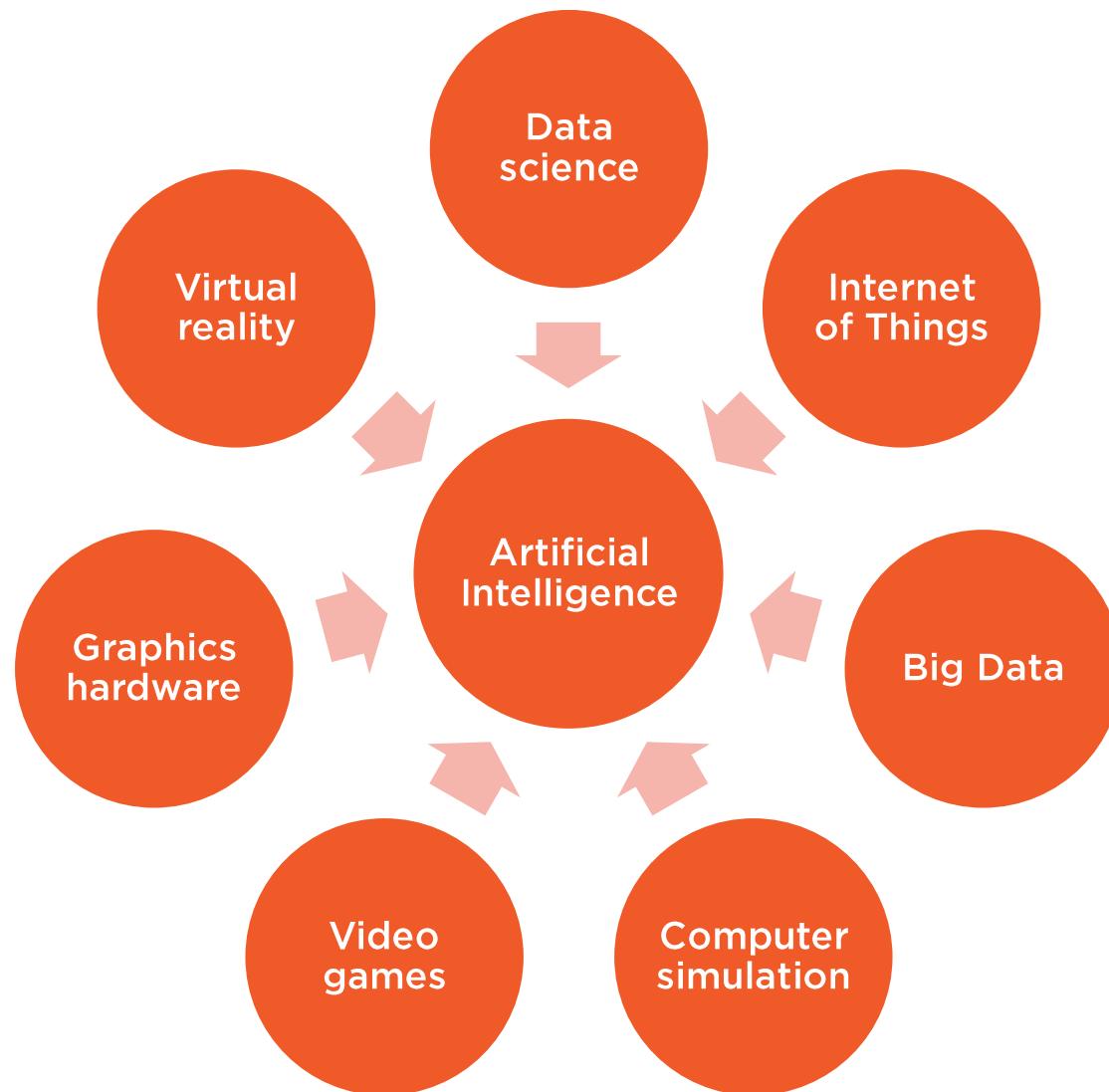


Deep
Learning

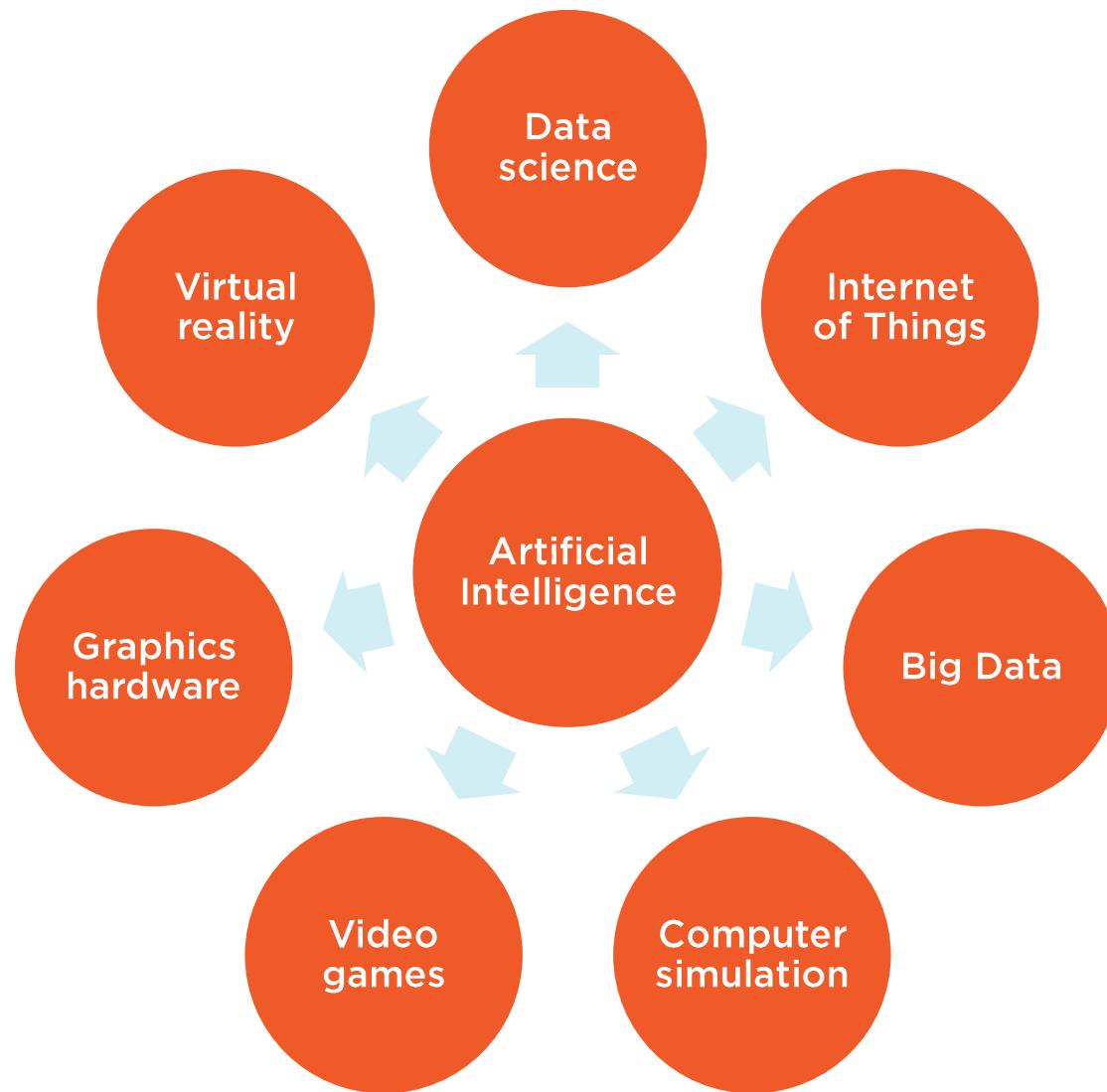


Reinforcement
Learning

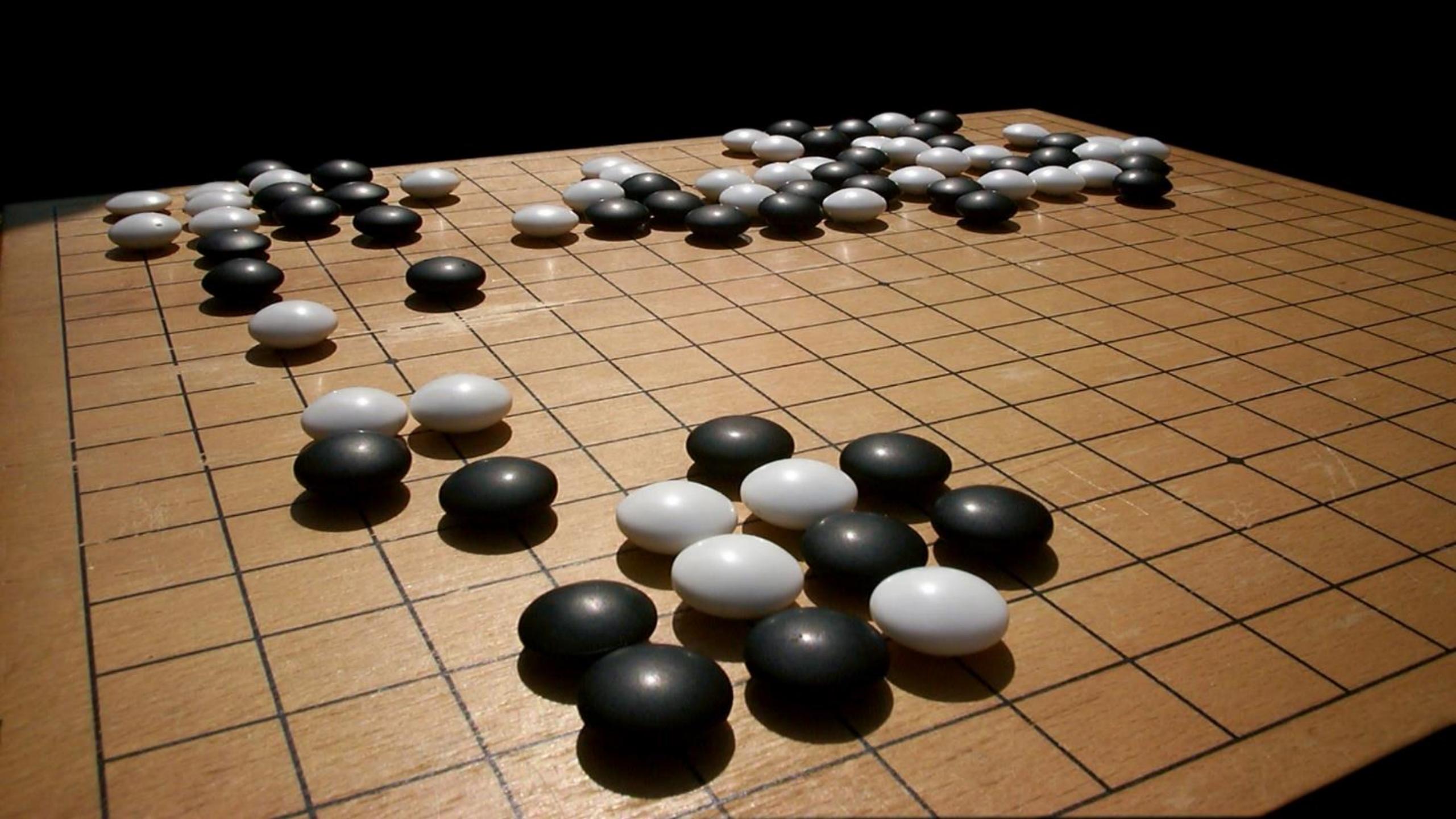
Other Trends

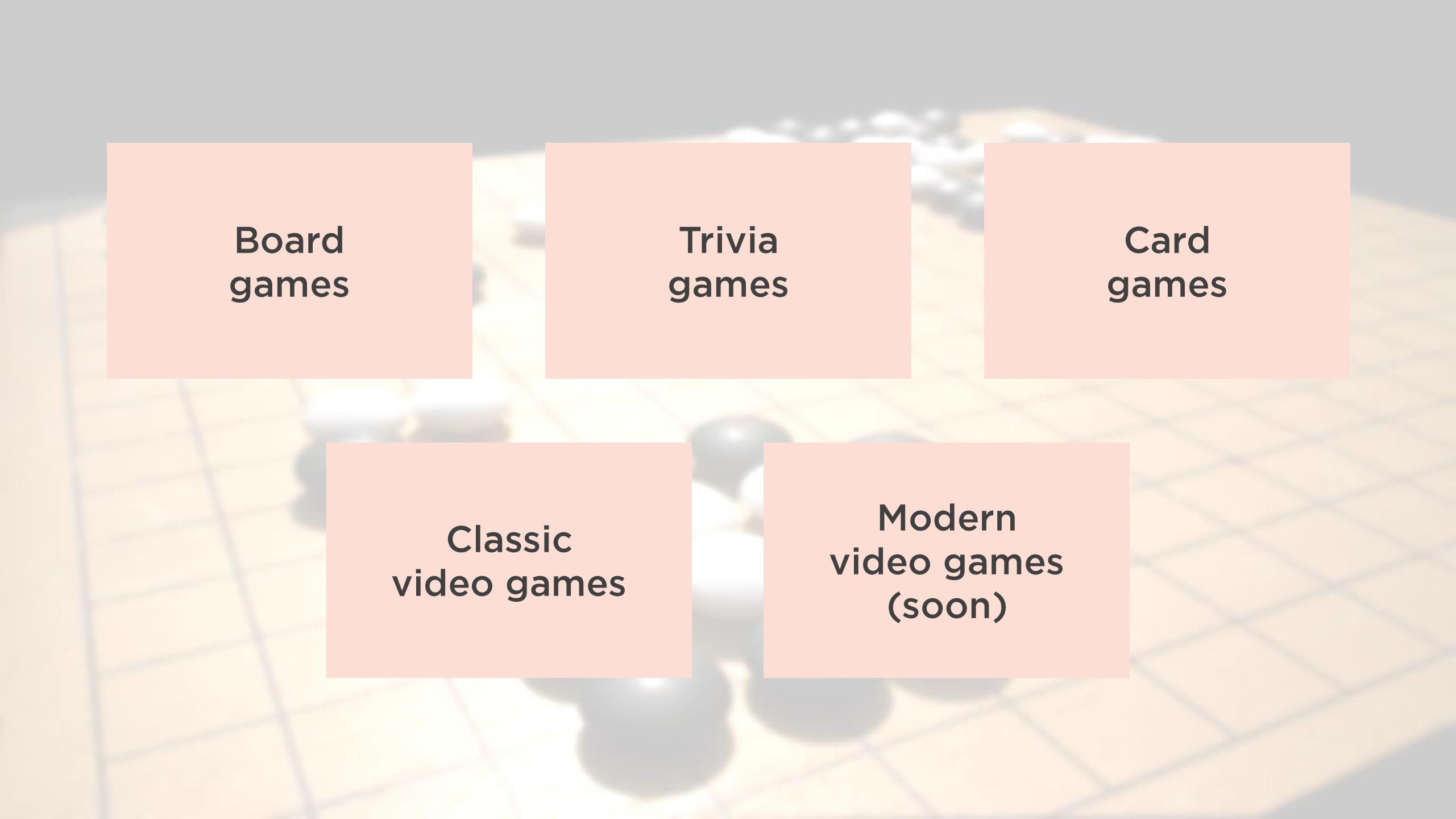


Other Trends



State-of-the-Art A.I.





A faint background image of a vintage board game box with a floral pattern is visible behind the text blocks.

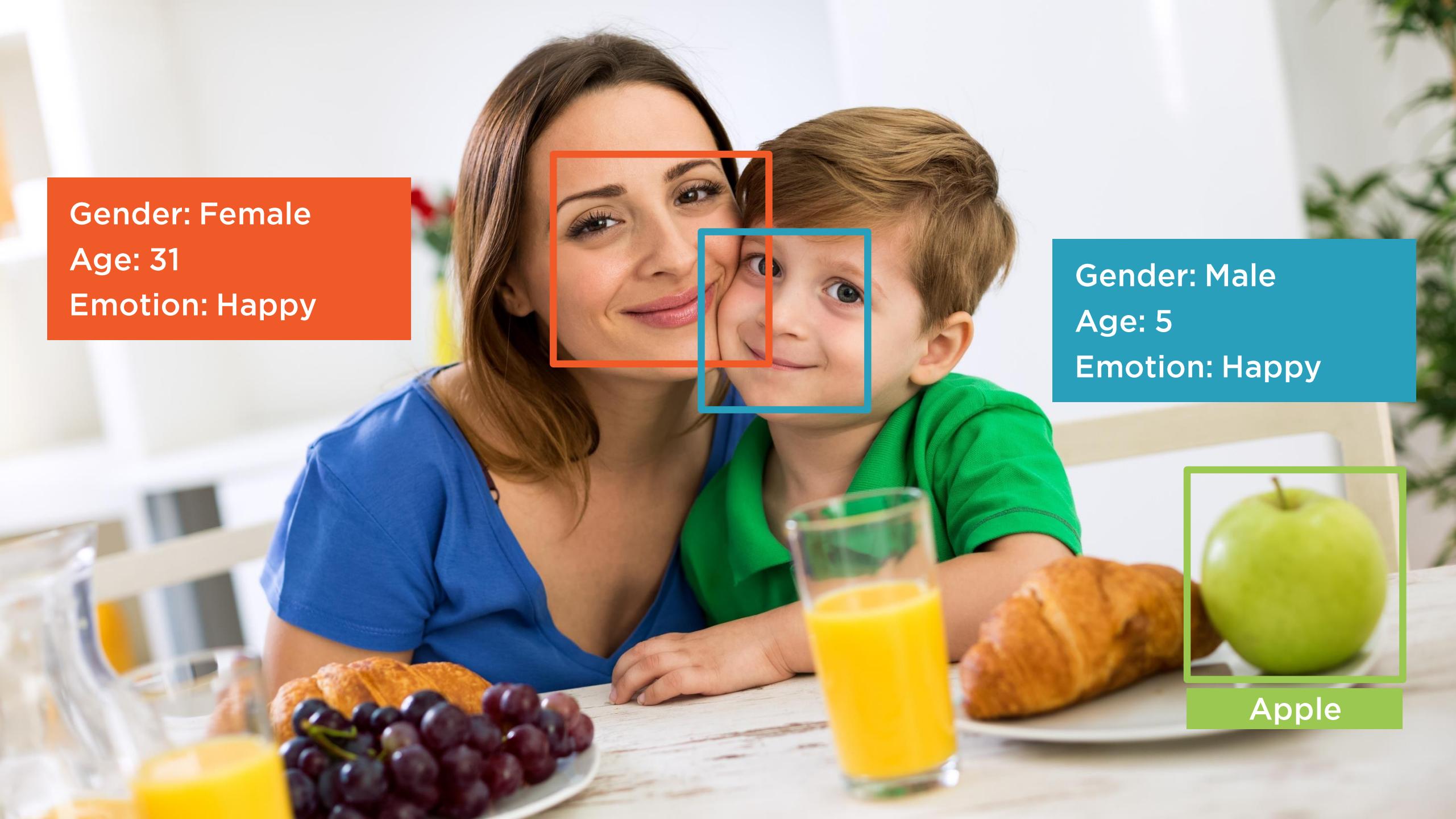
Board
games

Trivia
games

Card
games

Classic
video games

Modern
video games
(soon)

A photograph of a woman and a young boy smiling at a breakfast table. The woman is on the left, wearing a blue top, and the boy is on the right, wearing a green shirt. They are both smiling warmly at the camera. The background shows a bright kitchen environment with various breakfast items like croissants, grapes, and orange juice on the table.

Gender: Female

Age: 31

Emotion: Happy



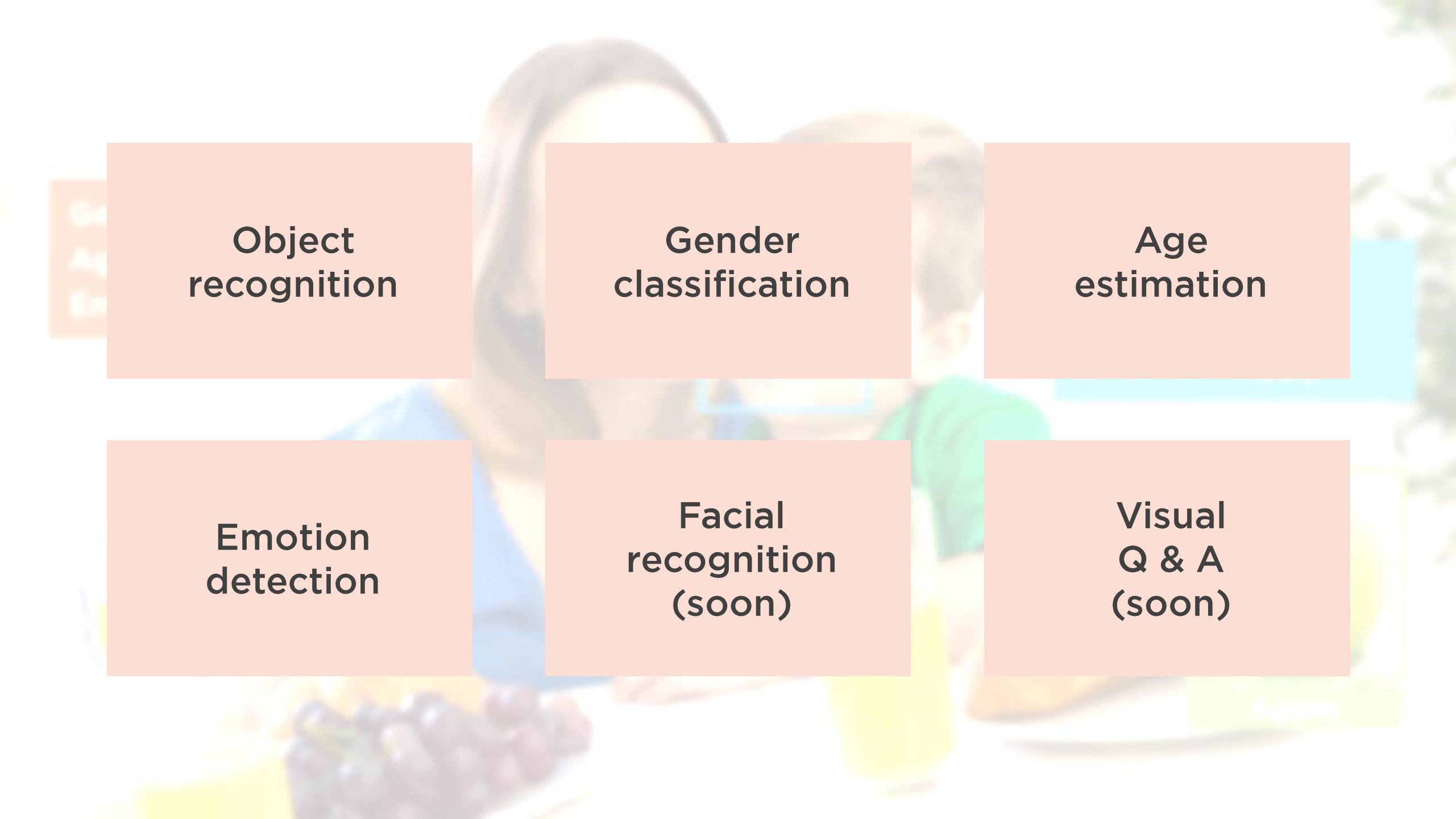
Gender: Male

Age: 5

Emotion: Happy



Apple

A blurred background image shows a woman with long dark hair smiling and holding a smartphone in her right hand. A young child is visible behind her, looking towards the phone. The scene is set outdoors with some greenery in the background.

**Object
recognition**

**Gender
classification**

**Age
estimation**

**Emotion
detection**

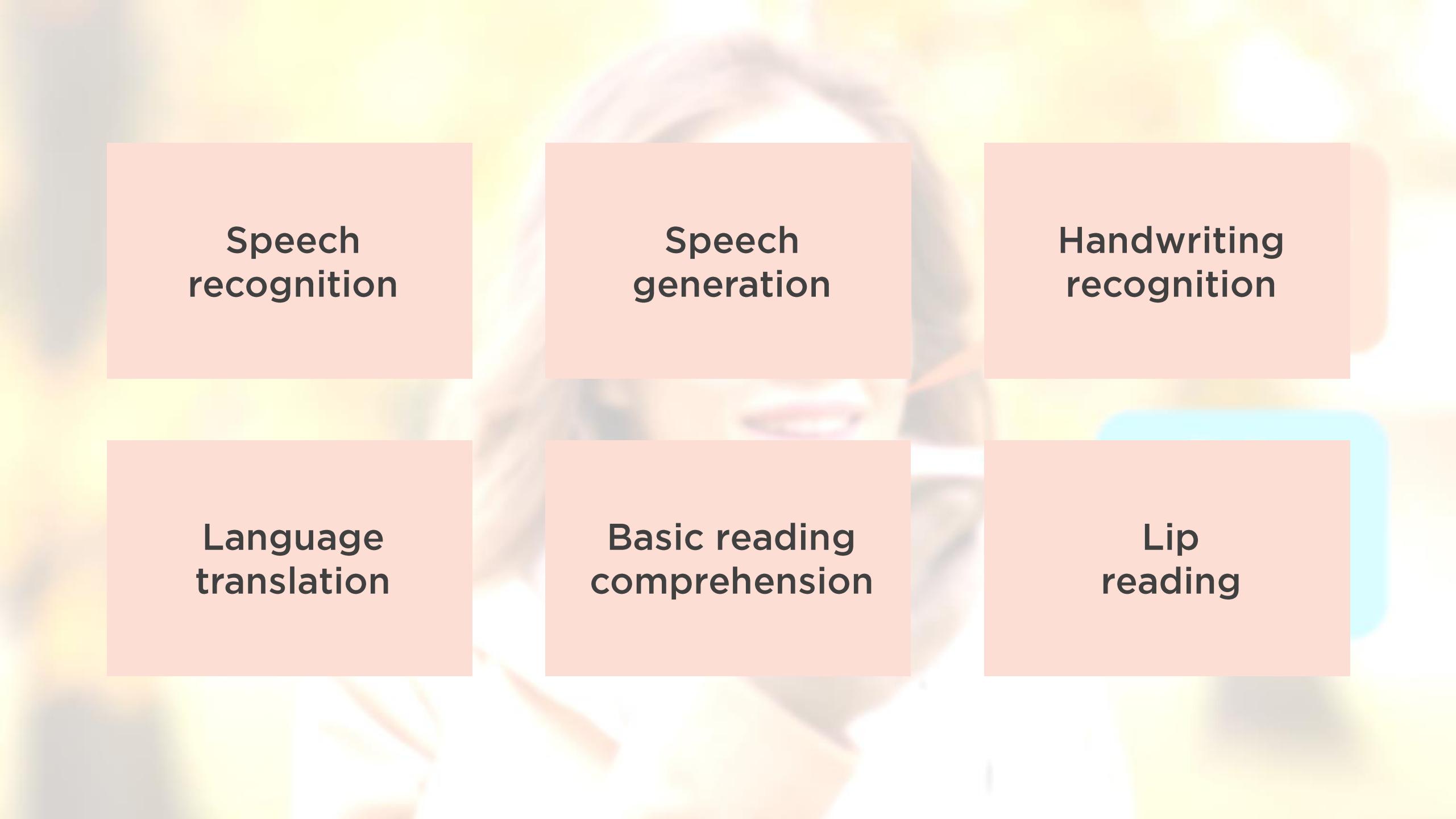
**Facial
recognition
(soon)**

**Visual
Q & A
(soon)**



Schedule a haircut for me for tomorrow around noon.

Ok. I've scheduled an appointment for tomorrow at noon.



A person's face is blurred in the background, with several semi-transparent colored circles (yellow, orange, green, blue) overlaid on the right side.

Speech
recognition

Speech
generation

Handwriting
recognition

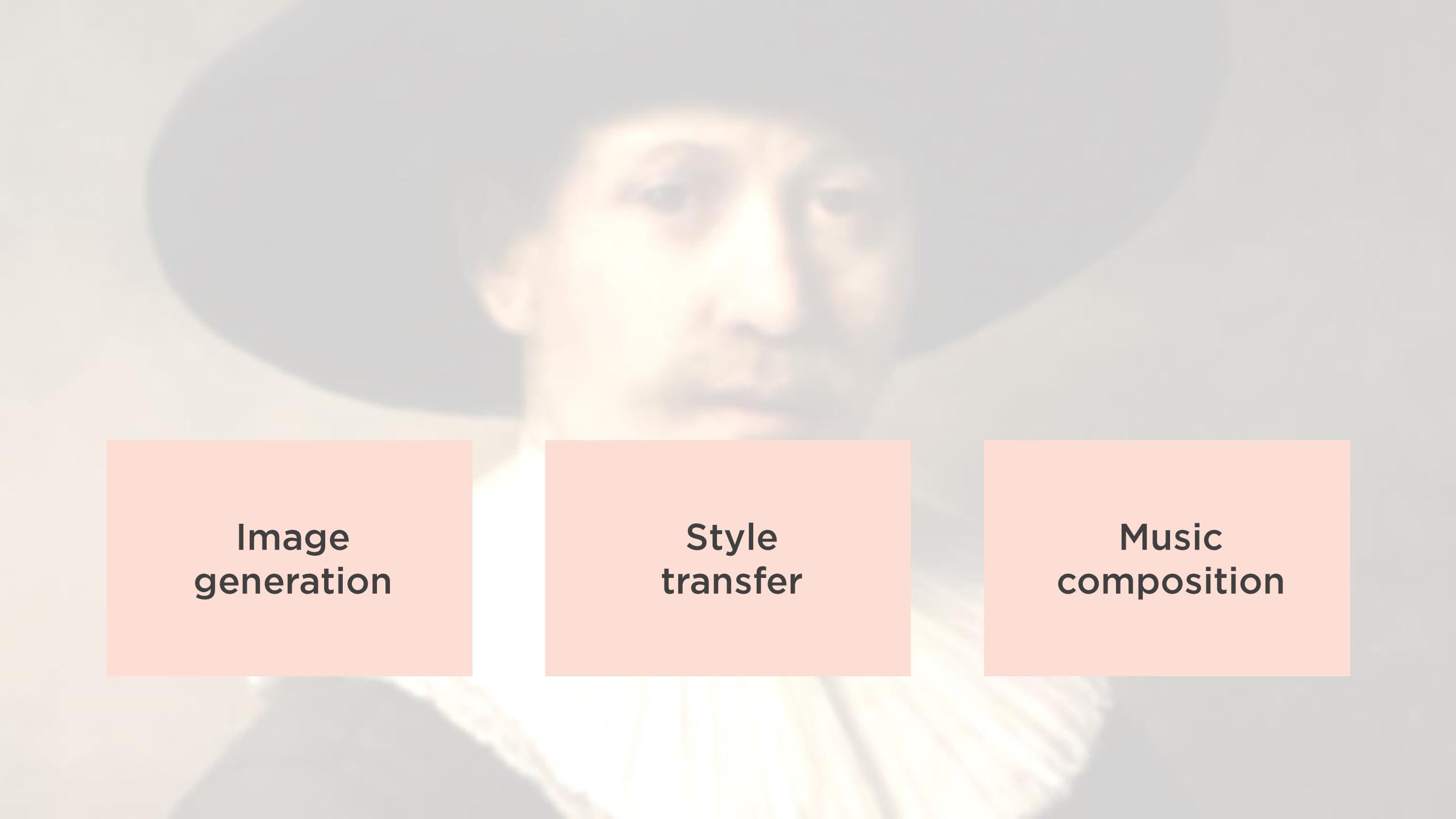
Language
translation

Basic reading
comprehension

Lip
reading



Sources: The Next Rembrandt, Microsoft
ING, J. Walter Thompson Amsterdam

The background of the image features a person from the waist up, wearing a dark t-shirt, playing a white grand piano. A large, warm, glowing orb, resembling a sun or moon, is positioned behind their head, casting a soft, golden glow over their hair and shoulders. The overall atmosphere is dreamlike and artistic.

**Image
generation**

**Style
transfer**

**Music
composition**

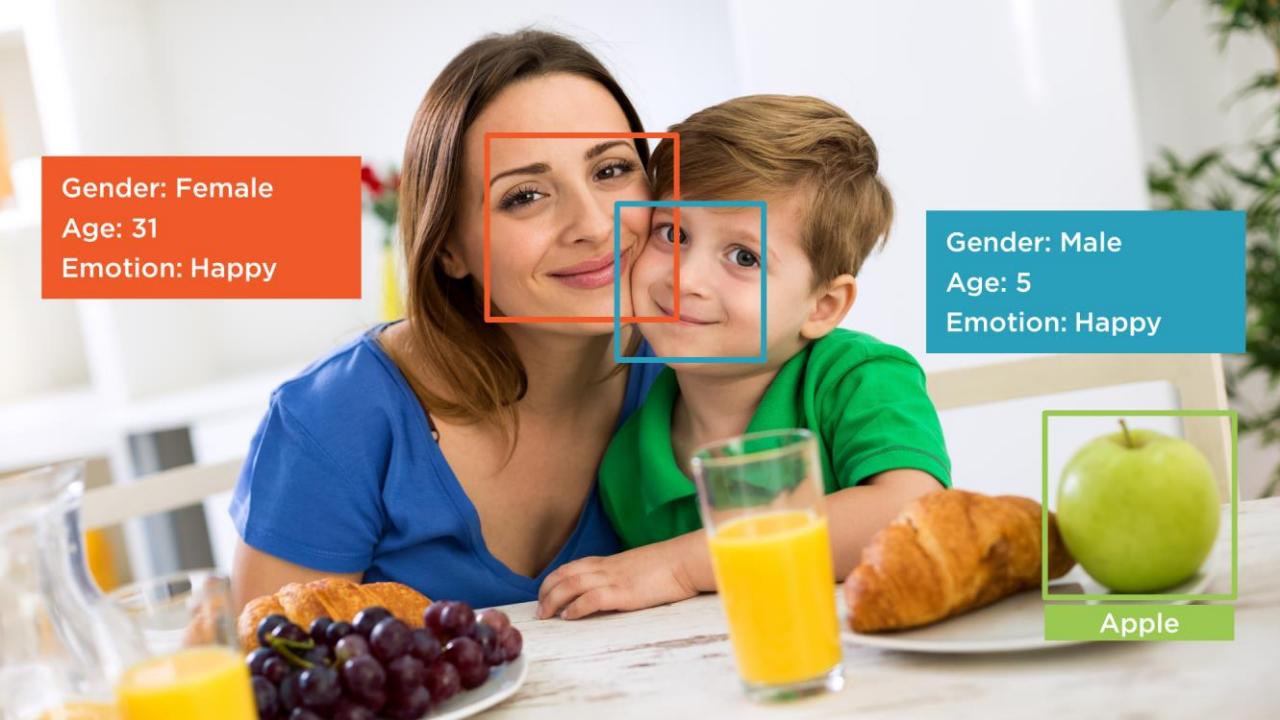
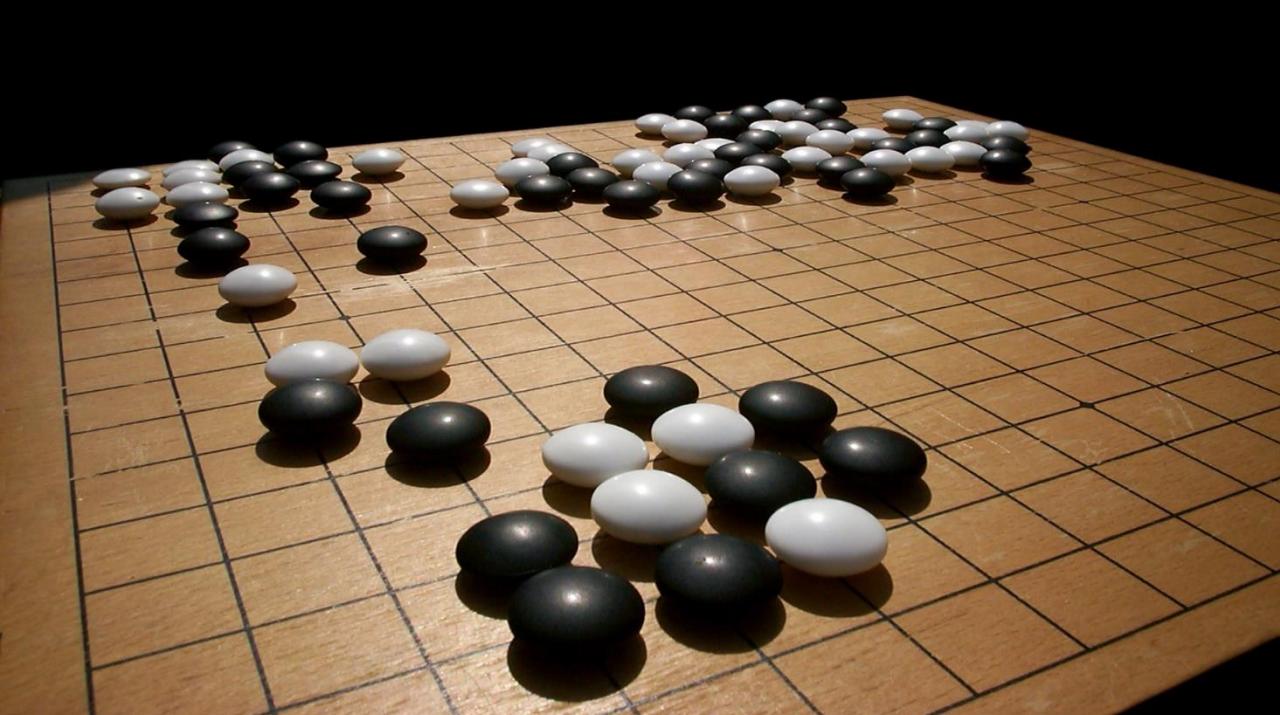




Disease
diagnosis

Treatment
recommendation

Prognosis
prediction



Summary

Summary



Machine Learning

Deep Learning

Reinforcement Learning

Other A.I. Trends

State-of-the-Art A.I.