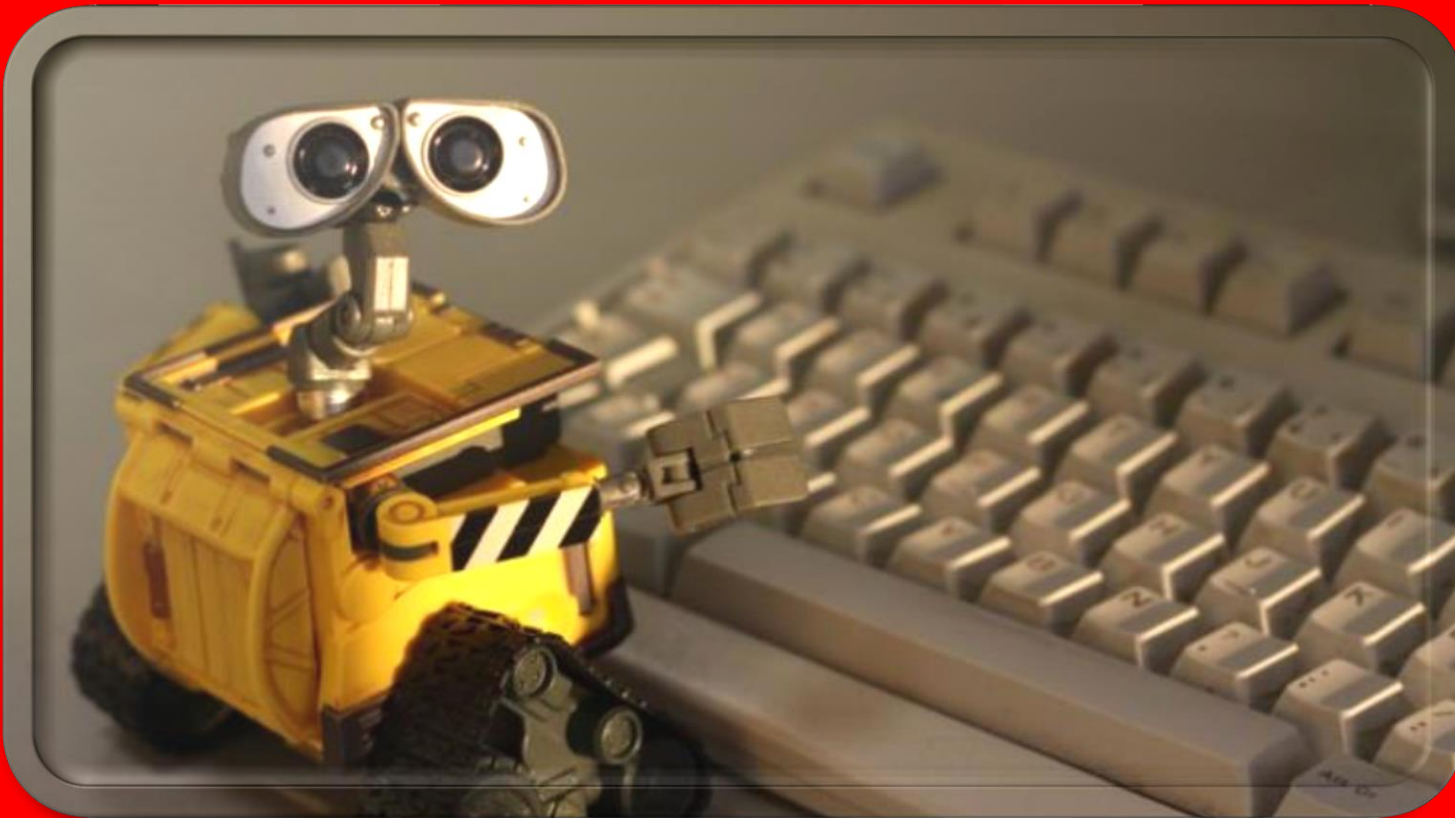


TestNet spring event
15 May 2018



Testing with AI



The road to a self-learning test robot

TestNet workgroup 'Testen met AI'

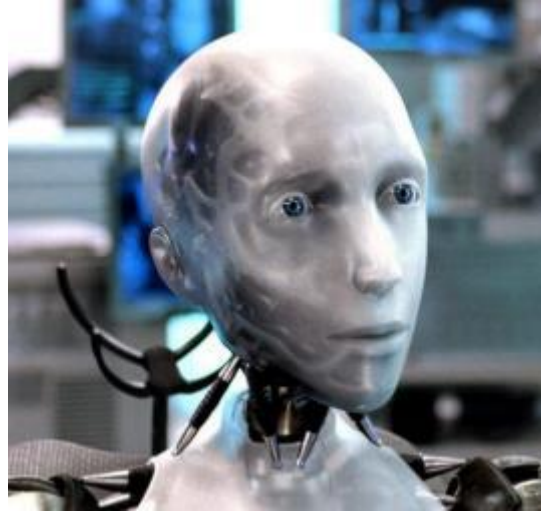
Sander Mol
Marco Verhoeven

What inspired us: AI tool plays breakout



- Tool only sees pixels, no ball, no cohesion
- Tool discovers it can have interactions
- Tool discovers the purpose of the game
- Tool achieves the perfect score in the most efficient way

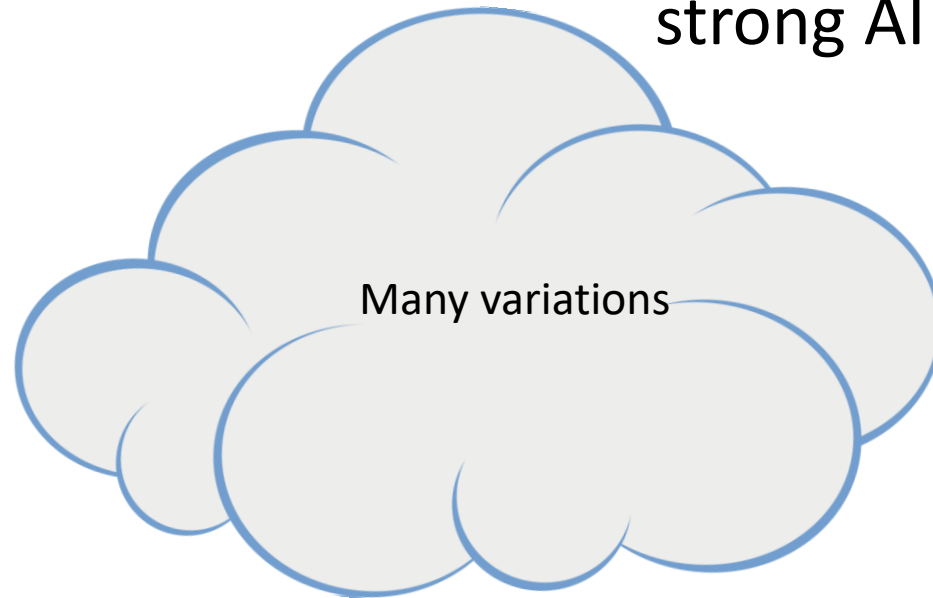
What is AI (the common perception)



What is AI

Artificial General Intelligence / human level AI

strong AI



narrow AI / weak AI



Why is AI popular again?

AI already mentioned in the 50's

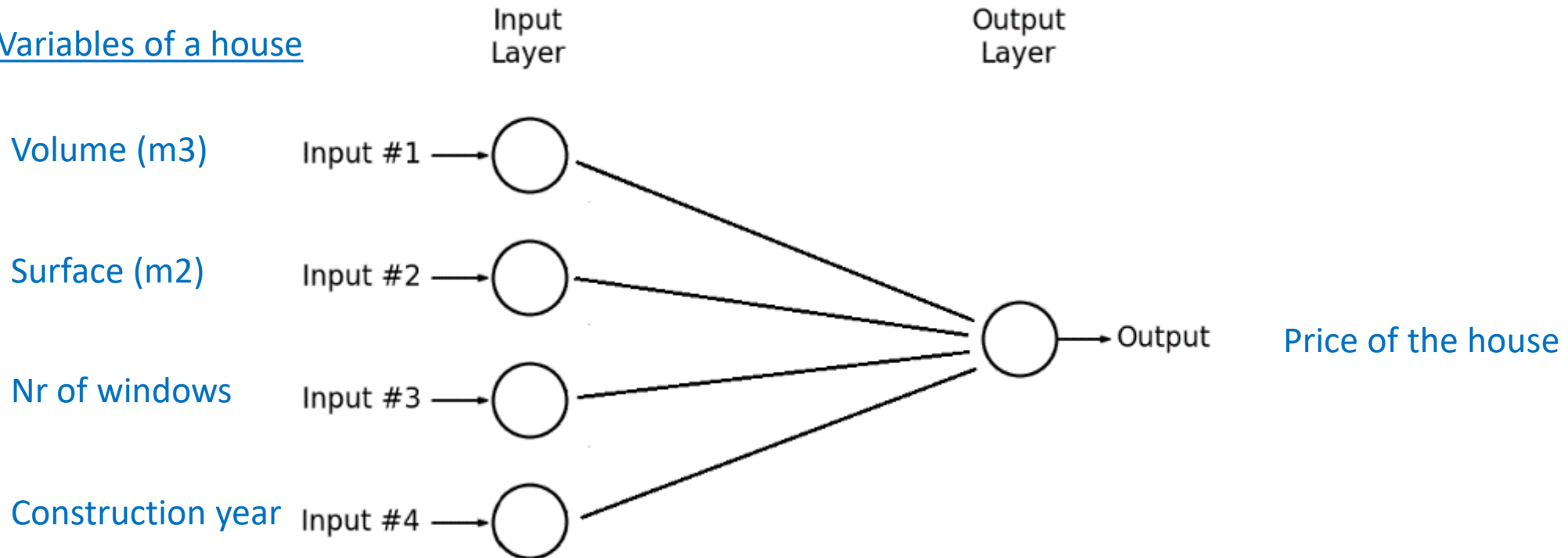
Attention slipped through a critical book in 1969

But certainly also: we have much more computing power today!

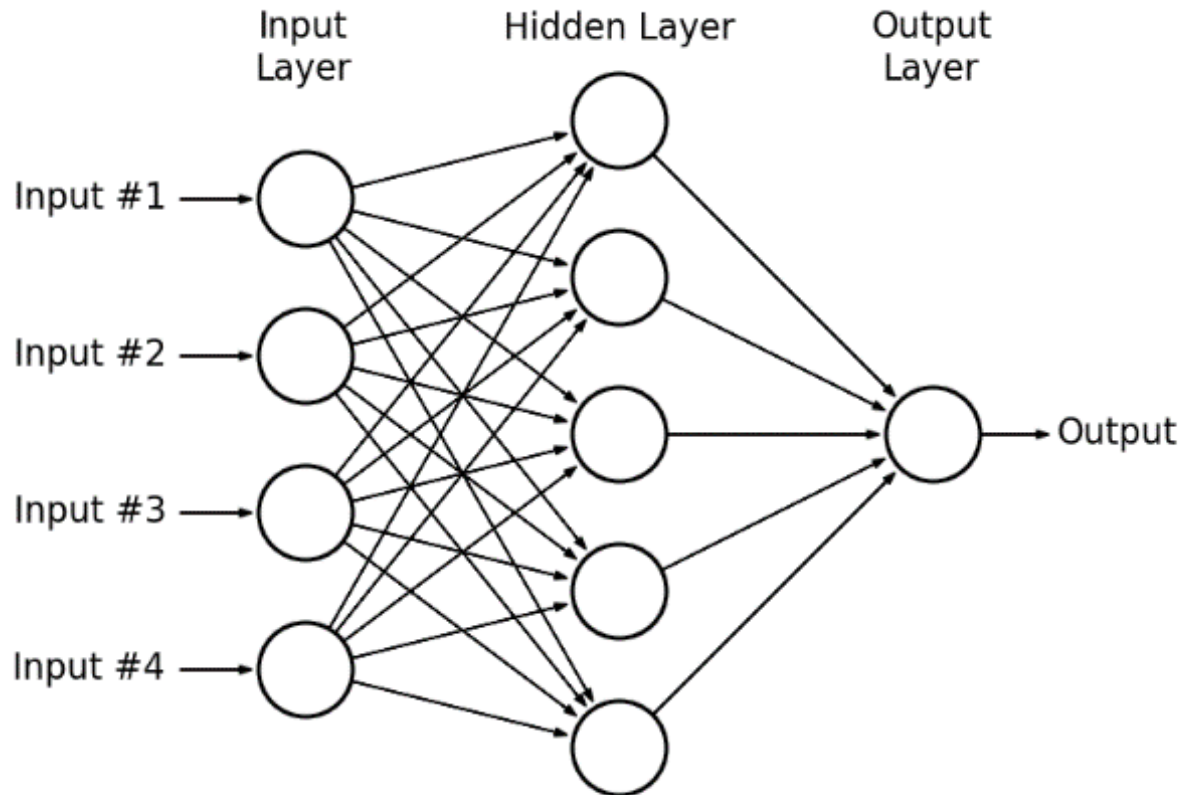


The starting point : input / output

Variables of a house



Neural network



Output is usually:
"The expectation that
something is true (1,0) or
is not true (0,0).

For example: the chance
that something is a cat

Training a neural network

Trainingset:

#1: input variabele 1 t/m 4, output value = 1,0 (a cat)

#2: input variabele 1 t/m 4, output value = 1,0 (a cat)

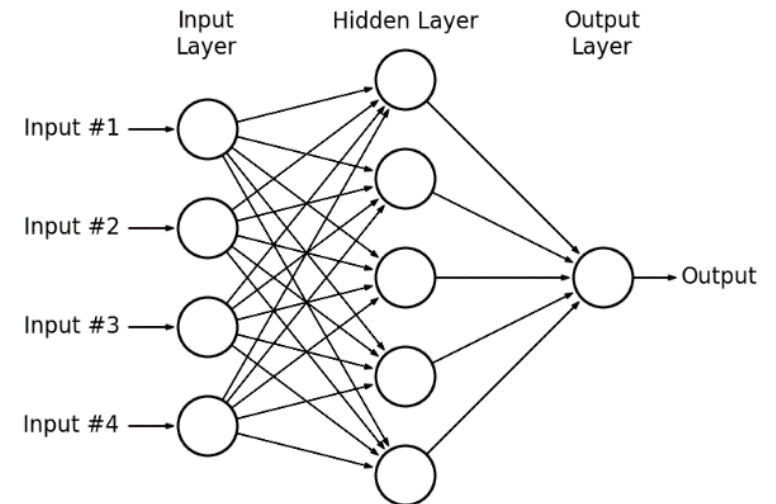
#3: input variabele 1 t/m 4, output value = 0,0 (not a cat)

#4: input variabele 1 t/m 4, output value = 1,0 (a cat)

#5: input variabele 1 t/m 4, output value = 0,0 (not a cat)

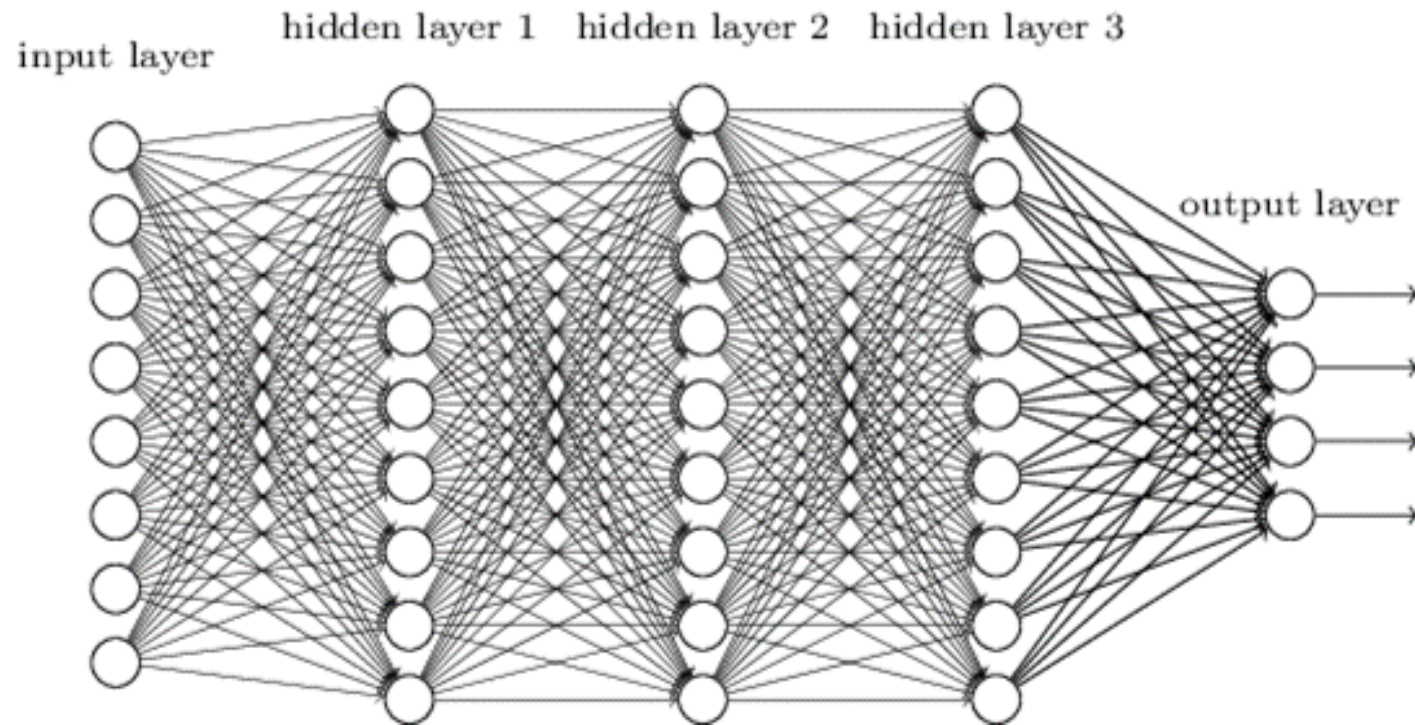
...

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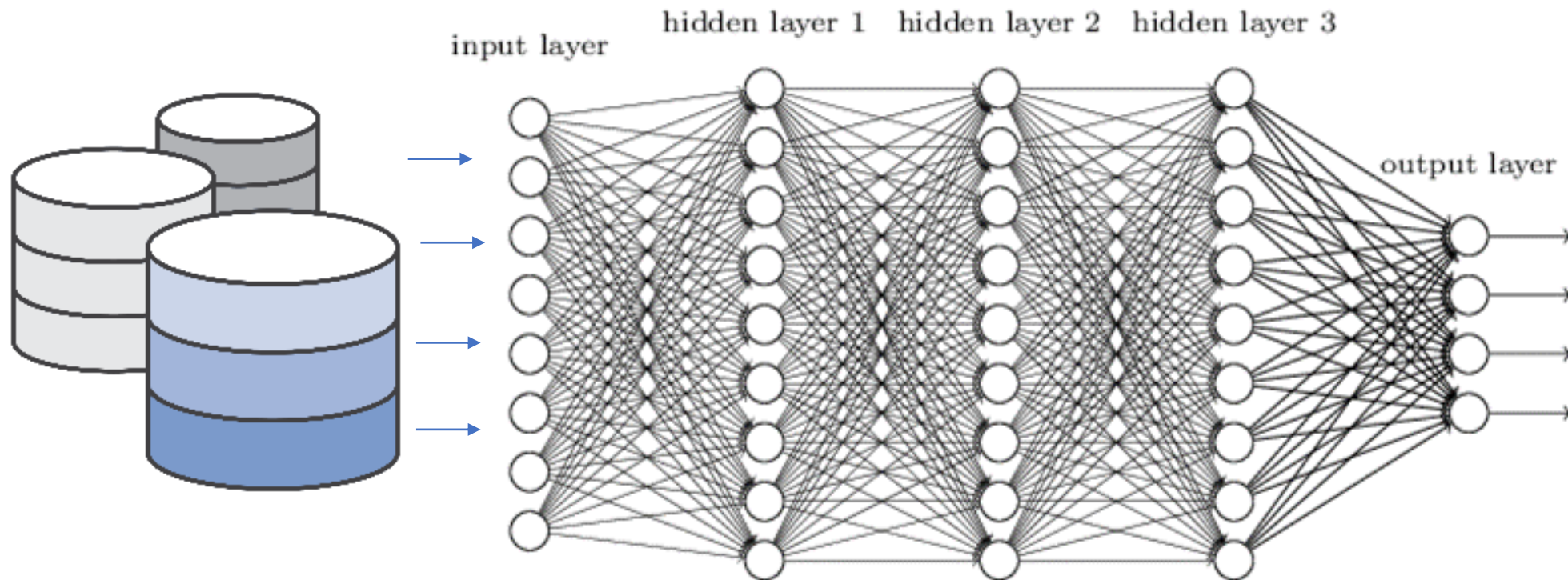
Deep neural network

Deep neural network



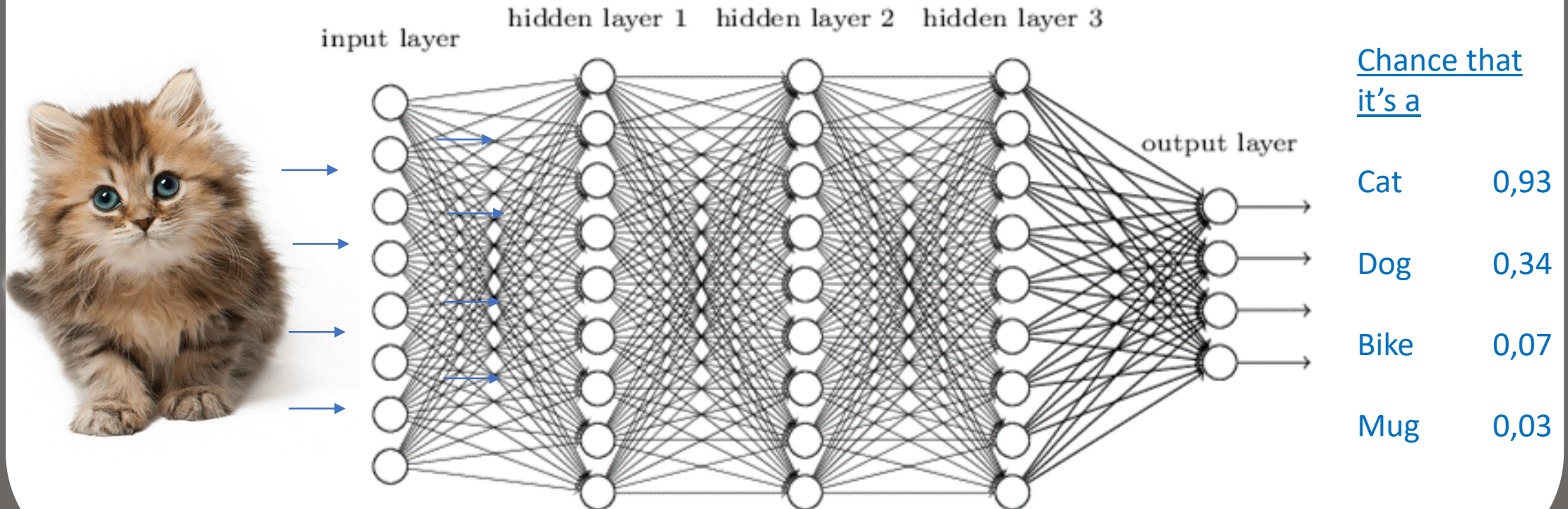
A lot of data, also unstructured

Deep neural network



Recognizing images

Deep neural network



What can it do: recognize objects

Mugs (which we did with the workgroup) Buttons



Elektrische fiets verzekeren?

Heeft u een elektrische fiets en wilt u deze verzekeren? Kies dan voor onze [elektrische fietsverzekering](#). De verzekering waarbij beschadiging aan de accu door vallen of stoten verzekerd is.

Verplichte verzekering voor snelle elektrische fiets

Sinds 1 januari 2017 worden elektrische fietsen die harder kunnen dan 25 kilometer per uur als motorrijtuig beschouwd. Dat betekent dat u voor uw high speed e-bike of speed pedelec een verzekering af moet sluiten. Bezit u een snelle elektrische fiets? [Bekijk onze dekking voor de High speed e-bike](#).

Ik heb een aanbod voor een collectieve verzekering

[Bereken uw premie >](#)

[Voordelen](#)

[Voorwaarden](#)

[Meer info](#)

[Veelgestelde vragen](#)

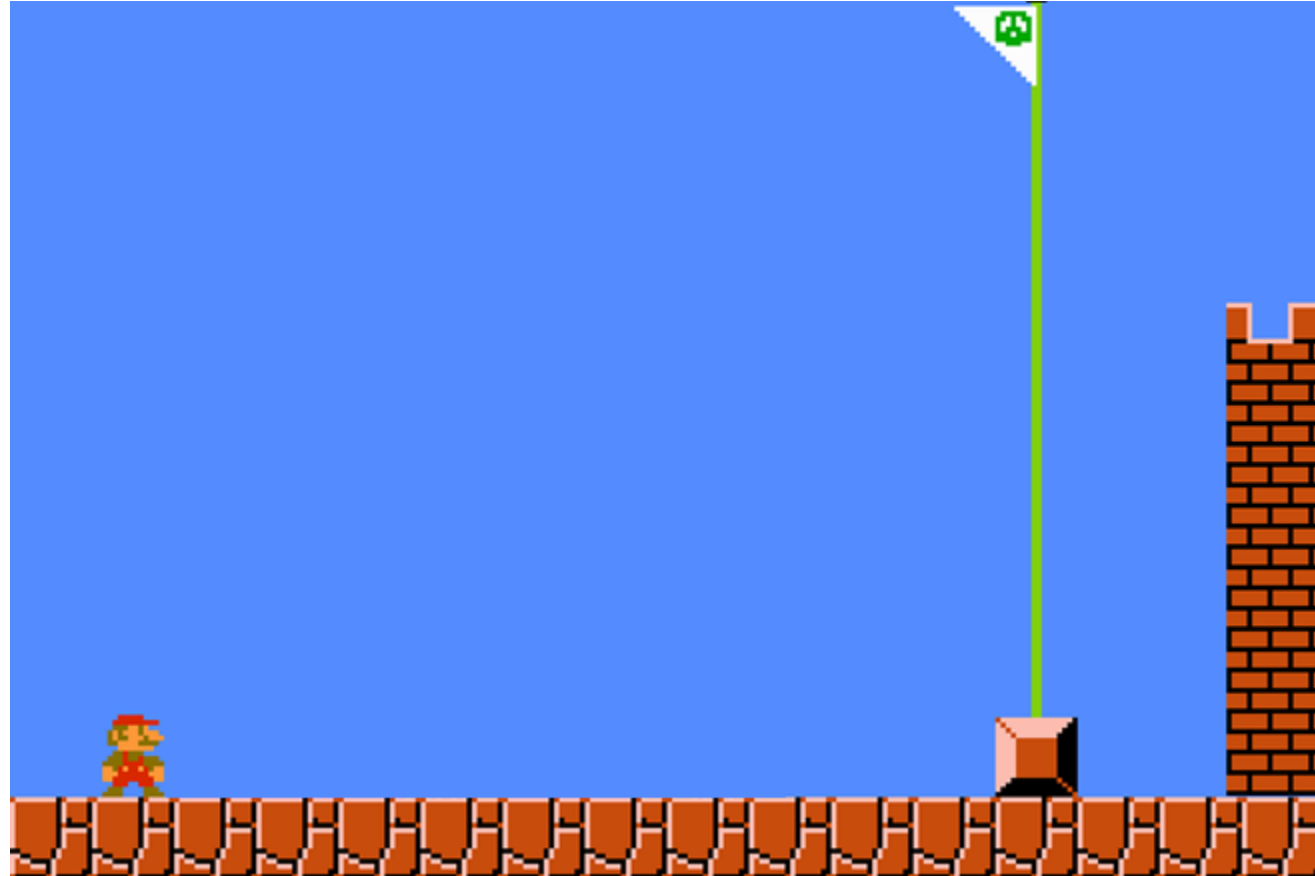
Voordelen van de Meeüs fietsverzekering

- ✓ Dagelijks opzegbaar
- ✓ Eigen risico bij diefstal € 0
- ✓ Vanaf 4e jaar korting op premie

What can it do: find paths

Mar I/O

Reward for touching the flag

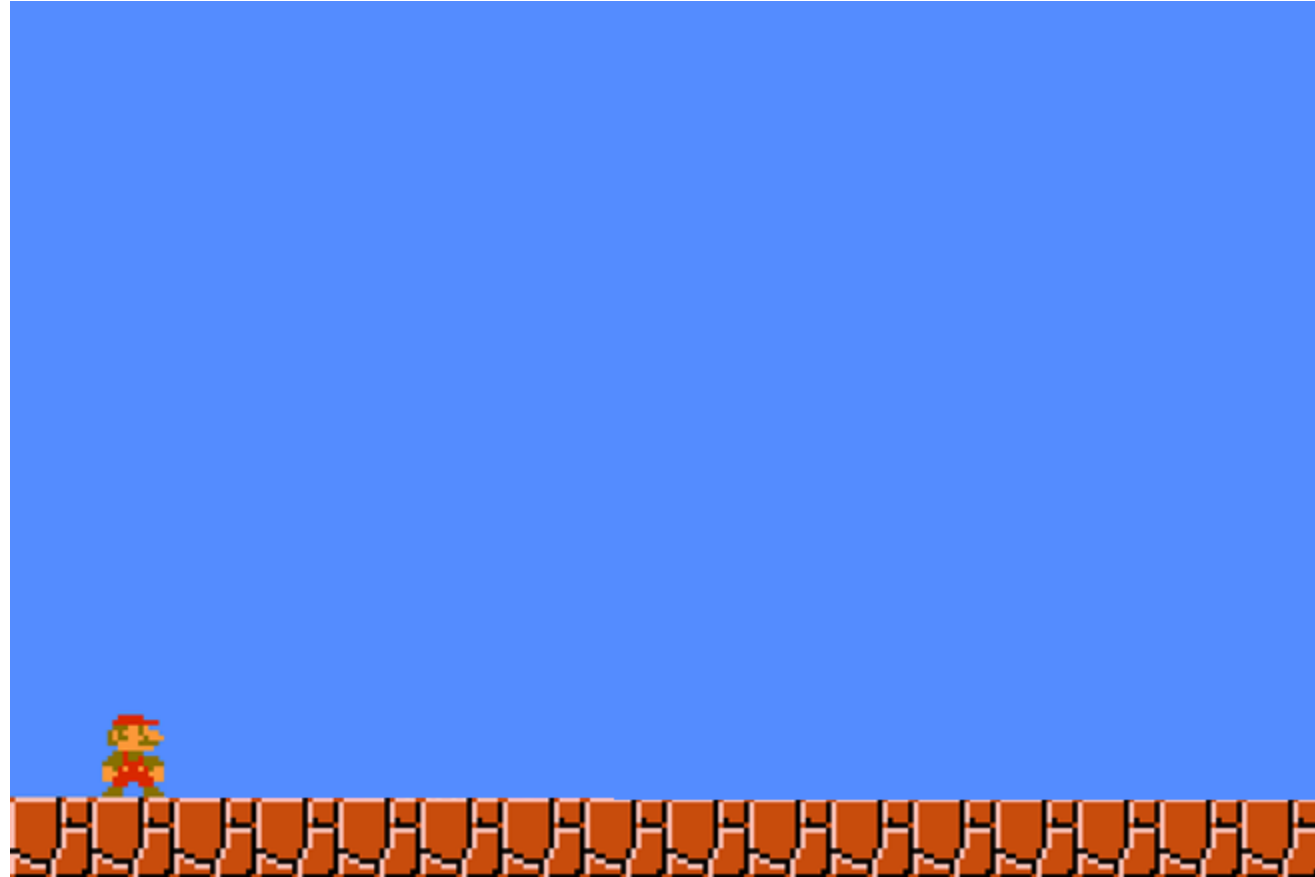


What can it do: find paths

Mar I/O

No flag?

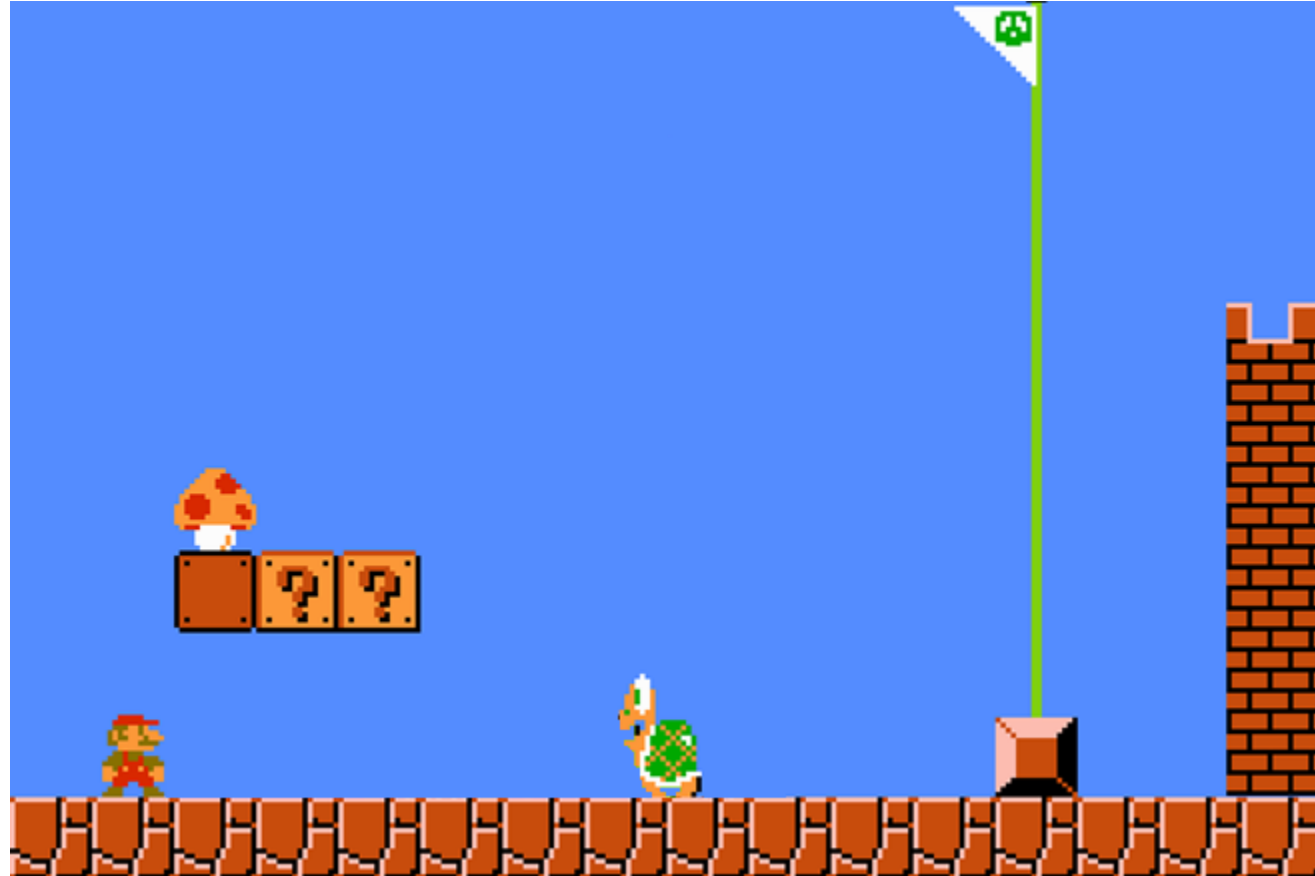
It turns out
that walking
to the right
most likely
leads to a
reward



What can it do: find paths

Mar I/O

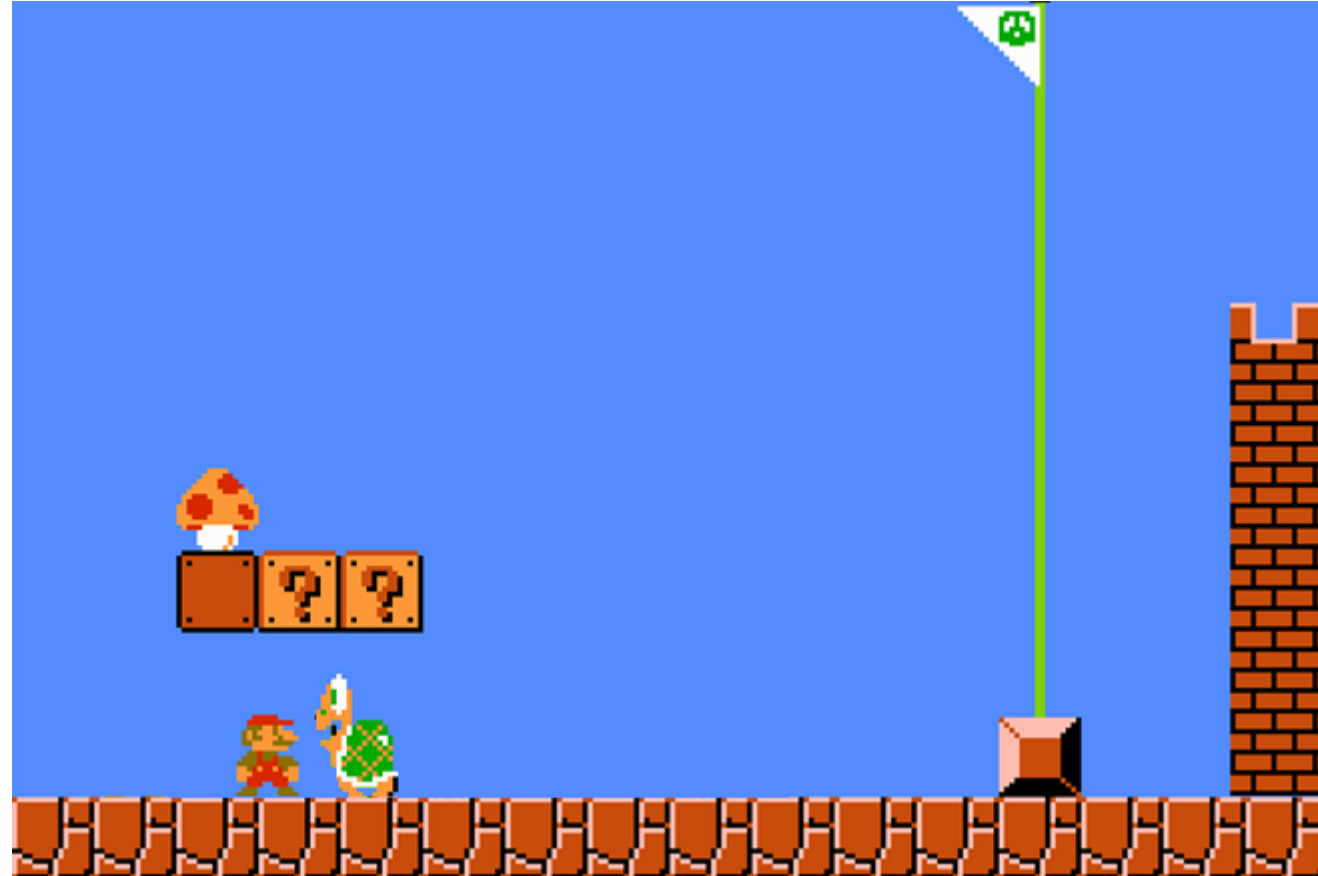
just walking
to the right
no longer
gives a
reward, must
be combined
with jumping



What can it do: find paths

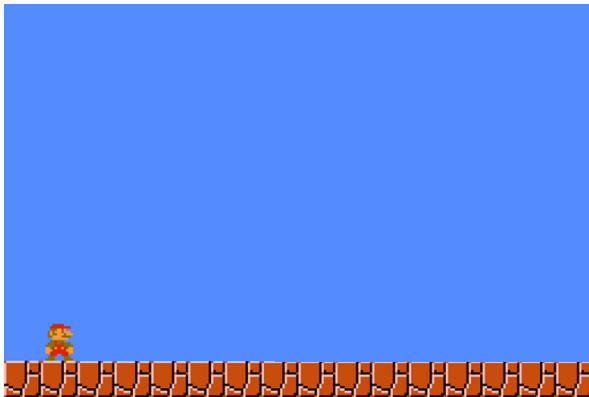
Mar I/O

somtimes
moving *left*
gives the
highest
reward



What can it do: find paths

What if we no longer look for a flag, but for a tekst like 'you will be paying'



Premie aansprakelijkheidsverzekering berekenen

[Uw verzekering](#) [Uw gegevens](#) [Betalen](#) [Samenvatting](#)

⌵ ✓ **Aansprakelijkheidsverzekering Particulieren**

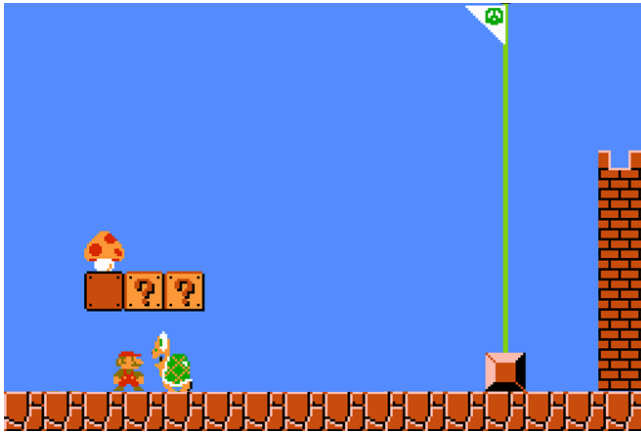
Samenstelling huishouden * ⓘ

Verzekerd bedrag *

Bereken premie >

What can it do: find paths

And sometimes you will run into obstacles



Premie fietsverzekering berekenen

[Uw verzekering](#)

[Uw gegevens](#)

[Betalen](#)

[Samenvatting](#)

☑ Fietsverzekering

Soort fiets

* Selecteer  ▼



Merk

* 

Nieuwe fiets

* Ja ▼

Nieuwwaarde

* 



Bedrag accessoires

*

Postcode

*   

Bereken premie



What can it do: analyse texts

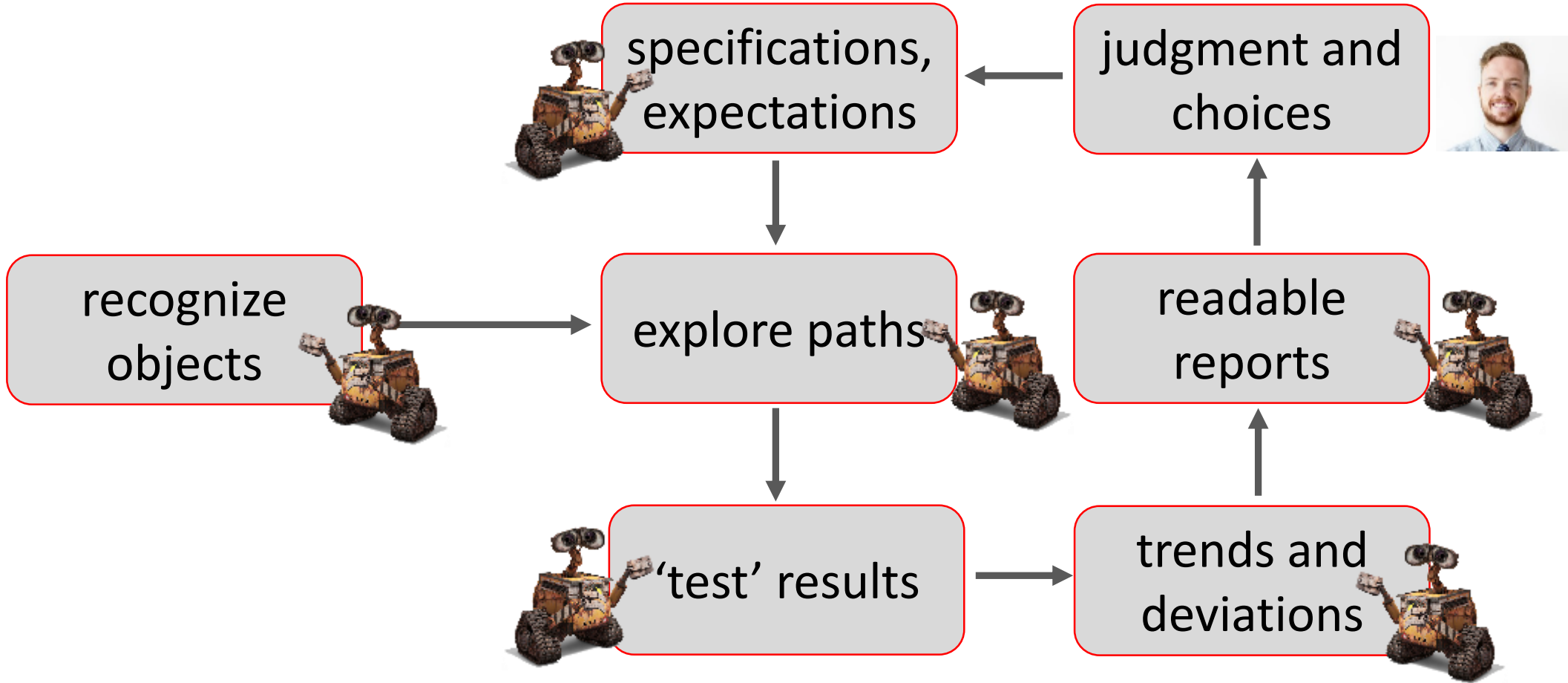
Go through requirements, designs and other sources, looking for:

- What is the expected effect
- What is important
- Data that makes the tests more efficient

In short: come up with smarter tests!



Summary: the robot can test!



Intermediate steps for the coming years

Recognize objects

Find paths

Analyze texts

Pattern recognition

Generate data

Processing natural language (NLP)

Classify data

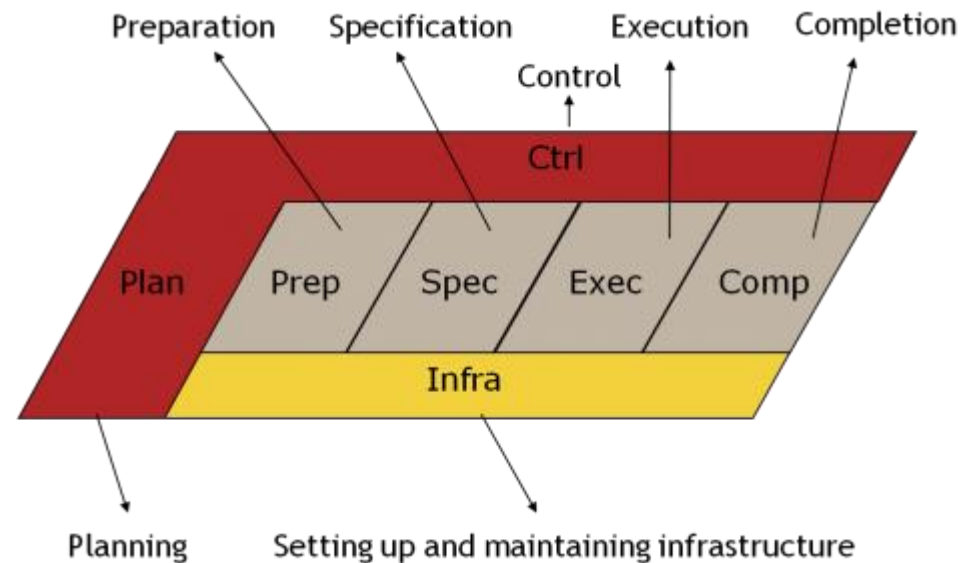
And much more ...



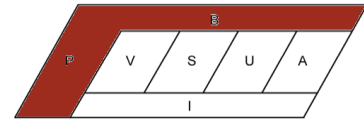
What can an AI do?

An AI will not be able to do everything right away, but it will be able to take on certain tasks or carry out tasks that were not possible.

TMap:



What can an AI do?

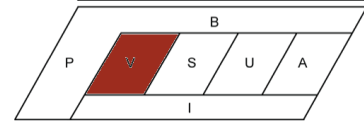


Plan:

Product risk analysis: With sufficient input the AI can indicate which areas give more or less attention

Estimates: similar projects from the past

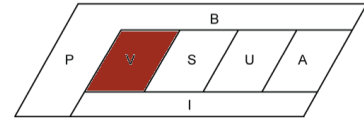
What can an AI do?



Preparation:

- Review documentation
- Select / generate test data
- find the exception situations in the existing data
- data personas: good anonymous representatives

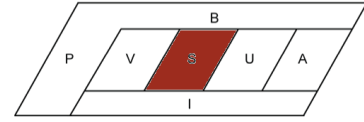
What can an AI do?



Text description	This bird is red and brown in color, with a stubby beak	The bird is short and stubby with yellow on its body	A bird with a medium orange bill white body gray wings and webbed feet	This small black bird has a short, slightly curved bill and long legs	A small bird with varying shades of brown with white under the eyes	A small yellow bird with a black crown and a short black pointed beak	This small bird has a white breast, light grey head, and black wings and tail
64x64 GAN-INT-CLS [22]							
128x128 GAWWN [20]							
256x256 StackGAN							

Figure 3. Example results by our proposed StackGAN, GAWWN [20], and GAN-INT-CLS [22] conditioned on text descriptions from CUB test set. GAWWN and GAN-INT-CLS generate 16 images for each text description, respectively. We select the best one for each of them to compare with our StackGAN.

What can an AI do?

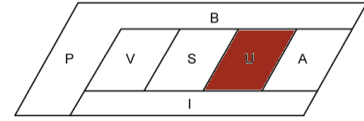


Specification:

- Text analysis in requirement or design
- Design test cases



What can an AI do?

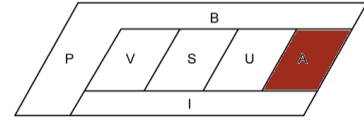


Execution:

- Perform simple checks automatically
- An AI buddy for test execution
- Indicate areas of interest on the screen



What can an AI do?

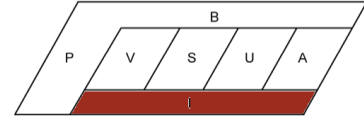


Completion:

- Chatbot for the de-briefing during exploratory testing
- Collection and structuring of reports that are delivered via speech or text.



What can an AI do?



Setting up and maintaining infrastructure:

- An AI Test Assistant

What can an AI do?

Others:

- Process test basis and generate test cases
- Search for causes of findings
- Regression Test Updates

During development:

- Review of the code by an AI for checking
- UBlsoft: Commit Assistant, Facebook: Infer.

What can an AI do?

Examples of AI in tools:

- **Retest.de** regression testing for applications
- **Test.ai** regression testing for mobile apps
- **Appletools** regression on Visual / GUI testing for websites
- **Mabl** web crawler, also tries new test cases on websites
- **Testar** learns applications (desktop, web, apps) and looks for errors

What is the role of the tester?

Does the AI make testers unnecessary?

AI helps with tasks or takes them over

AI / automation shifts the role of the tester:

Test execution, test analysis, coordination, management, specialisms.

Good, cheap, fast: a new technique must improve the sum of these to be useful.

What is the role of the tester?

- Steer what is being watched during testing
- Collect all results and translate this into a conclusion and advice
- Convince the client
- Adjusting the expectations when re-executing test scenarios
- Making the robot more efficient by supervised learning ('what should you do') and giving data ('which data work best')
- Value for the customer / user.

Summary and questions

AI is becoming more powerful and can help us better recognize objects and discover test paths.

In addition to the execution, the test robot can help with a large number of supporting test processes.

The tester is increasingly becoming a quality consultant.

