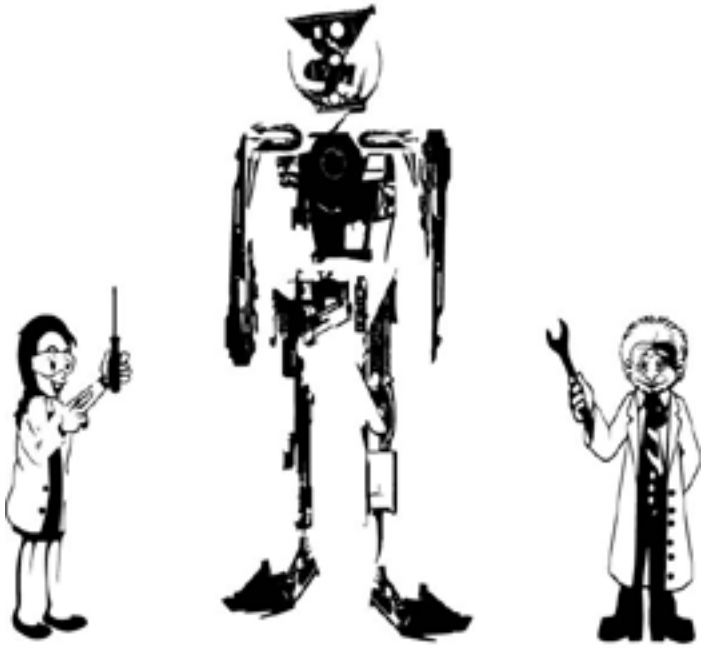
art-ai FESTIVAL 2021

SECTION 3: WORDS

In this section we think about how an AI can recognise different words, and how this helps us to communicate.



CONTENTS

Playbook by SideFest

SECTION 3: WORDS

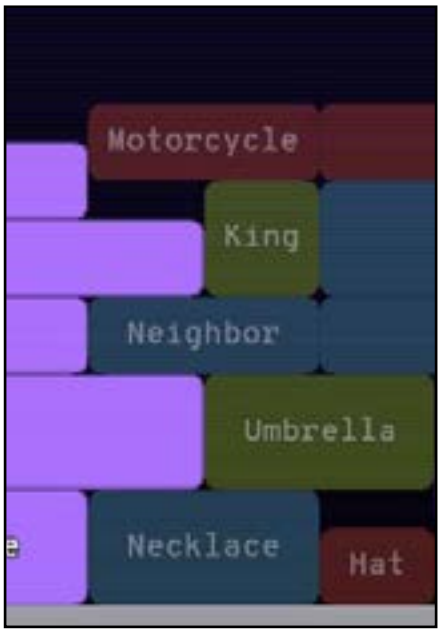
Introduction to Words

ARTISTS

The two artists in this section use artificial intelligence that have conversations with humans.

Improbotics is an improv comedy show with a twist. Some of the performers are being controlled by AI chatbots and others are not, but can you guess which performer is controlled by AI?

Hello Lamp Post is an interactive experience that uses AI to connect you with local landmarks. Start a conversation with 16 points of interest around Leicester and learn about the landmark or location.



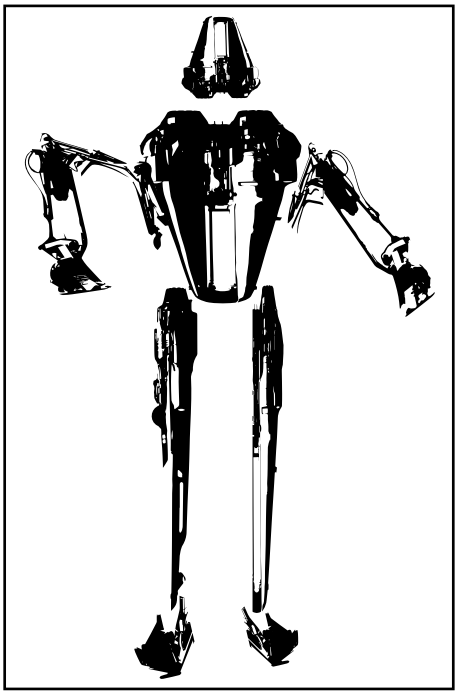
ONLINE RESOURCES

In AttnGAN you write a few words, and the AI tries to understand what you've written and turn it into an image. Made by Dr Tao Xu while at Microsoft.

Word to World is an experimental animation project by Xinyue Yang that turns real-time speech into an evolving computer-generated animation.

Semantris is a word association game that plays like Tetris. Players type words related to blocks on screen, and the AI deletes the blocks with words that are most related to the ones you type.

ACTIVITIES



The Word Search challenges you to recognise the letters and words inspired by the Art-AI Festival.

The Crossword gives you clues and sees if you can recognise words from the Art-AI Festival.

Build-A-Bot puts you in charge, where your friends have to guess a word letter-by-letter, adding a bit to the robot for every wrong letter they try.

In 20 Questions your friends guess a character you're thinking of by asking fewer than 20 'yes or no' questions.

IMPROBOTICS

ABOUT THE EXHIBITION

Could an AI make up a story?

During the launch of the Art-AI Festival 2021, the Improbotics group collaborated with an artificial intelligence to find out!

You can watch their performance on the Art-AI Festival YouTube channel here: https://bit.ly/3zugmqO

Improbotics are delighted to come back to the Art-AI Festival for the third time, after presenting AI improv in 2018 and a theatrical Turing test in 2019. Their Artificial Intelligence Improvisation show, which originated in 2016 as a human and robot duo HumanMachine, has evolved into a large cast show.

They have performed over a hundred times, in small pubs to the Edinburgh Festival Fringe (2017), Edmonton Fringe Festival (2018), improv festivals in Amsterdam (2019), Würzburg (2019), Göteborg (2019), Edinburgh (2020) and Uppsala (2020), and museums.

ABOUT THE ARTISTS

Improbotics is an immersive improv comedy show that combines robots, virtual reality and an international troupe of theatre actors, comedians and technologists.

Some improvisers are controlled by artificial intelligence chatbots: will they pass the Turing Test?

The show creators and developers, Dr. Piotr Mirowski and Dr. Kory Mathewson, are award-winning professional improvisers who explore the use of AI for creativity in the context of improv and of human-machine interaction, and who moonlight as research scientists at DeepMind.

The company's shows have been featured in the New York Times, Wall Street Journal, and New Scientist.

The show cast includes Harry Turnbull, Holly Mallett, Julie Flower, Jutta Diessl, Marouen Mraihi, Roel Fox and Sarah Davies.

To learn more about the artist and their work, visit the festival site: Art-AI.io

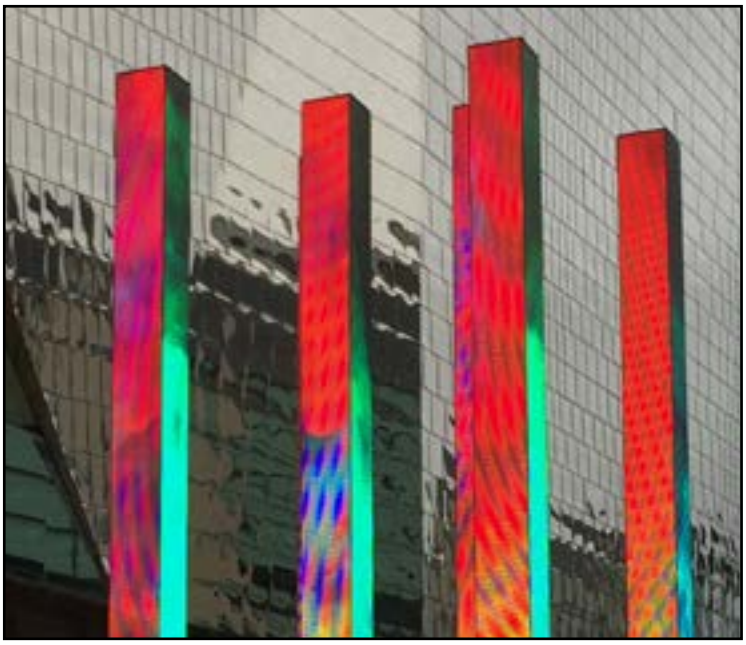
HELLO LAMP POST

ABOUT THE EXHIBITION

What if objects could talk, and wanted to speak with you?

Hello Lamp Post is an interactive installation that connects 16 points of interest across Leicester's city centre.

Find out where the points of interest are by visiting: art-ai.io/programme/hello-lamp-post



Hello Lamp Post allows the public to engage in a text exchange with some of Leicester's most iconic landmarks.

To chat with a point of interest, look out for the signs on local landmarks (see website), and follow the instructions. The conversation will then soon begin, so find out what each object has to say.

You can come back any time. Each object will remember you and have a fresh conversation with you.

All messages are anonymous. Standard network rates apply.

ABOUT THE ARTIST

Hello Lamp Post is a human-centric engagement platform that uses AI to make urban environments interactive. By digitally transforming places around the world, it encourages people to playfully interact and chat with their built environment using their mobile phone. In doing so, it aims to influence improvements to areas in which people live, work and play. By repurposing street objects like lamp posts, post boxes, parking meters, statues and bus stops, Hello Lamp Post is able to create positive social change, enable community cohesion, improve local democracy and help to build people-centred cities of the future.

To learn more about the artist and their work, visit the festival site: Art-AI.io

ATTGAN, by Tao Xu

ABOUT ATTGAN

The Attention Generative Adversarial Network, or AttGAN, is a storytelling machine that automatically generates synthetic images as you write new words and sentences.

It was built using RunwayML as part of a Microsoft research project by Dr Tao Xu, who is now a Research Scientist at Facebook.

Play here: Go to experiments.runwayml.com/generative_engine

aeroplane in the sky

HOW IT WORKS

Go to the AttGAN page above and press the "Let's Start" button. This will open up the main page, which is split into two sections.

One side says "Write something to generate images..." and the other side is blank (for now!). Click onto the text "Write something to generate images..." and...write something to generate images!

The blank side will soon start showing images.

The image above was created by writing "aeroplane in the sky", and you can see a few bits of plane that look merged together!

The image to the right was created by writing "a bunch of yellow bananas" and looks just as abstract as the one above.

The images are entirely generated by the AI so they can be a little strange, but try using different words to see what the AI creates!

You can also click the little squares in the top right corner to see all the images you've created with the AI!

a bunch of yellow bananas

Play with AttGAN here:

[experiments.runwayml.com /generative_engine](experiments.runwayml.com/generative_engine)

WORD TO WORLD, by Xinyue Yang

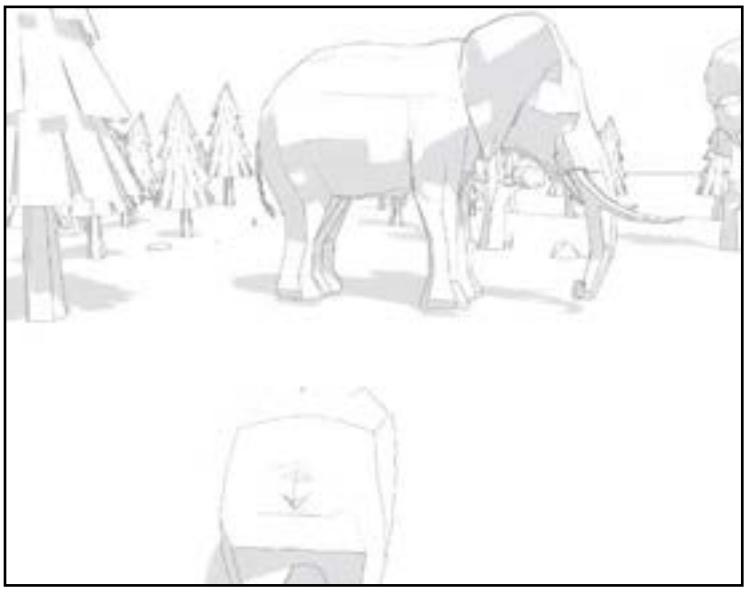
ABOUT WORD TO WORLD

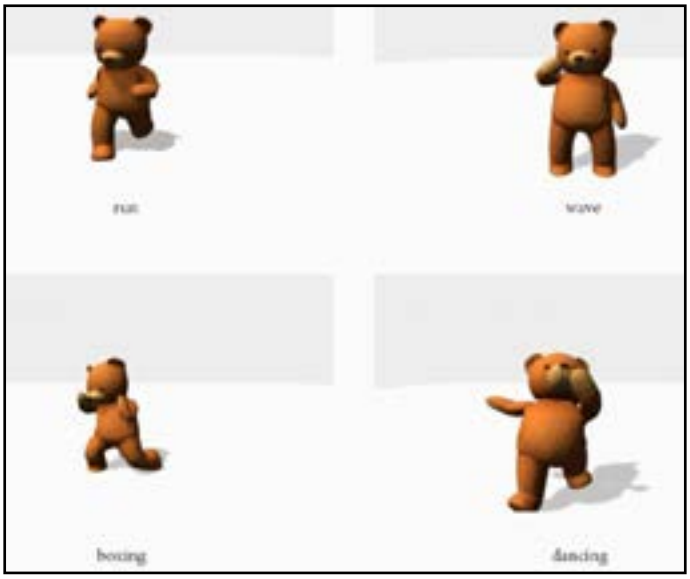
Word to World is a unique and experimental animation tool that turns spoken words into line animations in 3D.

It was built by Xinyue Yang, a student at Weissensee Art Academy Berlin.

Word to World is the latest version of Xinyue's project called Scribbling Speech.

Watch here: [xinyue.de/word-to-world.html]





HOW IT WORKS

Go to the Word to World page above.

The website is full of technical details explaining the inspiration and the process behind how it works, as well as various experiments.

You can see examples of different animals, humans, and inanimate objects being animated, such as the teddy bear to the left.

There are even short videos for each example.

The final example can be found at the very bottom of the page, and is a three minute animation called "Story of a Fox".

You can watch the video, which is hosted on Vimeo: [vimeo.com/414940484]

There are plenty of short animations on the Word to World part of Xinyue's website, so be sure to check them all out here: [xinyue.de/]

If you like this, then why not have a look at Xinyue's other animation project called "Interactive Ink Animation", which you can find here: [xinyue.de/ink-animation.html]

Check out Word to World here:

xinyue.de/word-to-world.html

Semantris, by Google AI

ABOUT SEMANTRIS

Semantris is a set of word association games powered by machine learning. By training on billions of conversations from the internet, the AI has learned how to predict which words, phrases, and even sentences might come next in a conversation.

Both games (Arcade and Blocks) use the same AI, but provide different ways of interacting with it. Try them both out and see which one you score highest on!

Play here: Go to research.google.com/semantris

HOW IT WORKS

Go to the Semantris page above, and click on “Play Arcade” or “Play Blocks”.

In Arcade, words stack on top each other. ‘Newspaper’ is highlighted in the example on the left. You need to type a related word, such as ‘reading’. The AI will then sort the words in the stack with the most related words put at the bottom. Your goal is to move the highlighted word under the line to score points. The words keep coming faster, so it is a bit of a challenge!

In Blocks the screen fills with coloured blocks. Some blocks have words on them and some are blank. The goal is to type a word that is related to one of the words in the blocks. The AI will pick the most related word, then highlight it and all connected blocks sharing the same colour.

The example on the right used the word ‘chair’ which is most related to ‘Table’, so the purple block with ‘Table’ on it was highlighted, as well as all purple blocks connected to it. These blocks are deleted and your score is added up.

Every time you type a word more blocks are added to the top, so be careful!

Play with Semantris here:
research.google.com/semantris

Intro to Word Searches

HOW IT WORKS

You start with a grid full of jumbled up letters. Hidden inside this grid are some words related to artificial intelligence, machine learning, and computers.

The goal is to find all of the hidden words from the list to the right of the grid.

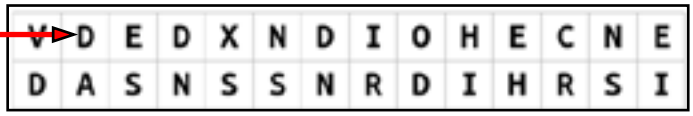
Read below to learn some useful tips to help recognise the words faster.

V	D	E	D	X	N	D	I	O	H	E	C	N	E
D	A	S	N	S	S	N	R	D	I	H	R	S	I
I	R	S	S	F	E	T	S	E	N	I	G	E	I
S	E	X	D	V	C	H	W	I	T	D	N	S	I
C	A	T	N	D	R	D	E	E	X	D	I	I	C
O	D	F	D	E	E	T	N	H	E	E	N	U	D
V	R	X	S	N	T	S	H	V	T	N	A	N	O
E	D	E	X	A	R	R	N	N	D	S	E	D	I
R	X	W	D	N	I	F	I	C	R	T	M	R	H
O	A	H	H	I	D	D	C	R	R	R	C	T	C
S	T	E	R	R	I	C	A	R	M	H	C	R	R
E	X	R	C	L	U	E	S	C	T	F	T	D	A
C	R	D	E	A	N	C	S	C	L	E	D	E	E
D	E	D	R	S	S	E	W	O	R	D	S	M	S

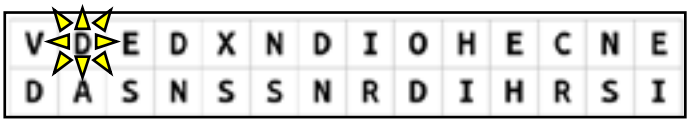
EXAMPLE

CLUES
DISCOVER
FIND
HIDDEN
MEANING
READ
SEARCH
SECRET
TEXT
WORDS

IMPORTANT!: Words can be up and down, side-to-side, diagonal, and even backwards!



STEP 1. Pick the first letter of a word from the list, such as 'D' for DISCOVER, and search for that. Start in the top left and quickly read all of the letters until you find a 'D'. From here you look at the surrounding letters.



STEP 2. Now you've found a 'D' you need to look at the surrounding letters for the next letter in 'DISCOVER', which is 'I'. If none of the surrounding letters are an 'I', then you move on to the next 'D'.

STEP 3. Once you find the next letter keep going in that direction. As soon as it stops spelling the word you're looking for then leave it and go back to looking for the next 'D'. If you get to the end of the row, move down one row and start at the beginning.

STEP 4. Now start quickly reading the letters on the new row until you find the next 'D'. Now look at the surrounding letters, and if any of them are an 'I' then keep going in that direction. By following these instructions we've found 'DISCOVER', so highlight it.

ACTIVITY: Word Searches

I	L	E	M	O	D	E	L	A	D	A	H	E	C
N	N	Y	A	A	L	G	O	R	I	T	H	M	S
R	A	R	D	H	D	N	B	A	T	T	M	N	I
O	E	A	G	B	T	H	O	Y	A	C	E	S	N
G	L	N	B	I	O	D	M	S	E	M	H	E	G
A	O	I	B	I	U	E	R	R	T	N	G	M	U
H	O	B	I	C	T	E	I	A	L	A	I	A	L
P	B	H	A	S	T	P	G	L	O	T	W	N	A
L	H	E	Y	S	H	B	P	O	O	L	Y	T	R
A	O	S	U	N	D	L	E	T	A	L	C	I	I
N	T	L	N	L	I	U	T	L	Y	C	E	C	T
U	C	A	O	I	I	E	E	S	A	O	O	O	Y
P	R	O	G	R	A	M	M	I	N	G	I	D	O
L	A	C	I	G	O	L	O	N	H	C	E	T	E

WORD SEARCH #1

ALGORITHM
ALPHAGO
BINARY
BOOLEAN
CLUSTER
CODE
DEEPBLUE
LOOP
MODEL
PROGRAMMING
SEMANTIC
SINGULARITY
SYSTEM
TECHNOLOGICAL
WATSON

A	L	A	G	E	I	U	A	C	L	O	U	D	C
I	T	N	D	N	F	I	S	A	A	A	T	S	R
L	E	A	L	A	S	L	N	I	R	E	T	Y	S
O	Y	L	D	T	R	F	E	O	T	C	R	N	C
O	I	Y	E	U	O	E	S	E	I	N	E	O	U
L	E	S	G	R	A	S	I	A	F	E	E	T	T
A	T	I	E	A	D	T	M	N	I	G	S	D	G
N	T	S	P	L	S	C	U	A	C	I	L	E	N
G	T	O	R	C	P	N	L	L	I	L	E	C	I
U	C	P	T	D	E	L	A	Y	A	L	A	I	L
A	N	E	E	L	E	O	T	T	L	E	G	S	O
G	E	N	I	L	C	A	I	I	E	T	I	I	O
E	E	A	A	I	H	I	O	C	L	N	N	O	P
N	T	I	G	N	I	Y	N	S	T	I	A	N	N

WORD SEARCH #2

ANALYSIS
ANALYTICS
ARTIFICIAL
CLOUD
DATA
DECISION
FOREST
INTELLIGENCE
LANGUAGE
NATURAL
OPENAI
POOLING
SIMULATION
SPEECH
TREE

ACTIVITY: Word Searches

L	C	I	N	U	N	A	C	N	P	K	H	A	C
A	T	D	T	Y	D	I	O	G	N	O	K	D	O
R	D	O	E	U	T	I	R	O	A	R	O	V	N
U	A	T	C	E	T	R	H	R	O	K	I	E	V
E	E	I	E	C	P	T	C	W	R	E	E	R	O
N	L	N	N	A	Y	M	T	T	S	E	T	S	L
A	O	U	P	P	I	E	I	N	S	E	O	A	U
U	F	E	E	E	N	A	I	N	N	C	L	R	T
Q	F	N	N	W	E	R	M	D	D	P	K	I	I
U	A	G	E	N	T	L	T	A	A	T	T	A	O
E	C	U	D	E	E	P	F	A	K	E	F	L	N
R	E	P	U	T	P	T	O	B	T	A	H	C	A
Y	T	U	R	I	N	G	N	I	R	R	H	N	L
K	T	E	A	P	P	L	I	C	A	T	I	O	N

WORD SEARCH #3

ADVERSARIAL
AGENT
APPLICATION
CHATBOT
CONVOLUTIONAL
DEEPFAKE
DEEPMIND
FACE
FUNCTION
NETWORK
NEURAL
PYTHON
QUERY
TEST
TURING

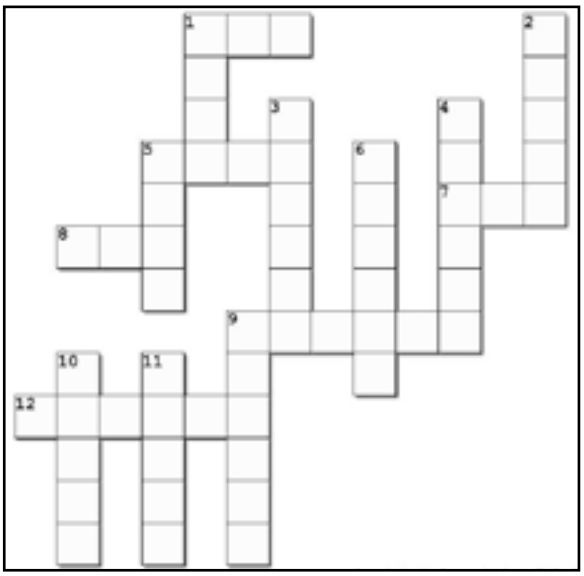
I	E	T	N	O	I	T	I	N	G	O	C	E	R
N	M	P	A	T	T	E	R	N	G	G	D	P	I
C	F	A	G	N	I	N	R	A	E	L	M	R	N
R	C	T	G	S	H	P	P	N	N	O	E	O	F
T	E	O	A	E	A	E	I	C	E	E	T	C	O
R	I	O	M	I	V	H	N	D	R	G	N	E	R
N	P	N	G	P	C	A	T	C	A	I	L	S	M
A	N	E	L	A	U	I	T	X	T	E	O	S	A
C	T	V	M	L	N	T	I	L	E	I	G	I	T
G	G	M	I	S	L	O	E	G	D	T	I	N	I
X	A	X	I	S	F	L	O	R	R	E	C	G	O
T	S	T	T	A	I	O	N	G	E	C	G	G	N
N	O	O	E	A	G	O	G	N	I	D	O	C	I
C	O	R	T	T	D	G	N	I	N	I	M	R	N

WORD SEARCH #4

CODING
COMPUTER
GATE
GENERATED
IMAGE
INFORMATION
LEARNING
LOGIC
MACHINE
MINING
PATTERN
PROCESSING
RECOGNITION
TEXT
VISION

Intro to Crosswords

HOW IT WORKS

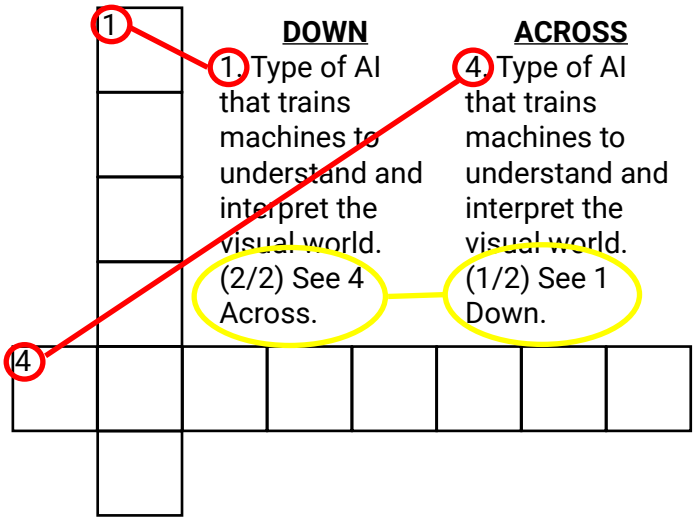


You start with blank rows and columns of squares, with some crossing each other. The goal is to fill these in with words based on the clues underneath. Some of the squares have numbers in them which refer to the clues at the bottom of the activity page.

The Glossary at the end of this playbook can help, and some answers can be found in the other playbooks: art-ai.io/programme/art-ai-workbook-2

IMPORTANT!: Some clues might suggest you look at another clue to get some help finding the answer.

This is because the answer is made up of multiple words. You know which these are because they have numbers in brackets, for example (1/2). This tells you that the answer has two words, and the answer to this specific clue is the first word. Somewhere else in the clues would be the (2/2), and the answer would be the second word. Let's see this in action!

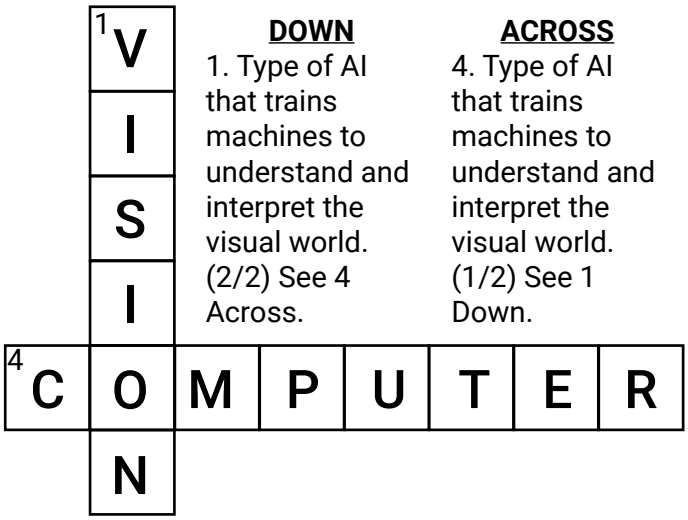


DOWN

1. Type of AI that trains machines to understand and interpret the visual world. (2/2) See 4 Across.

ACROSS

4. Type of AI that trains machines to understand and interpret the visual world. (1/2) See 1 Down.



DOWN

1. Type of AI that trains machines to understand and interpret the visual world. (2/2) See 4 Across.

ACROSS

4. Type of AI that trains machines to understand and interpret the visual world. (1/2) See 1 Down.

Looking at the example above, we can see how the DOWN and ACROSS clues match the numbers in the boxes (highlighted above in red). By counting the boxes you know how many letters the answer needs to be.

In this example the answer is made up of two words, which is shown by the numbers in brackets in the clue (highlighted above in yellow). It also tells you where to find the other clue that uses the second word.

Here you see that 1 Down is a 6 letter word and is the second word in a two-word answer. The other word is used in 4 Across, which is an 8 letter word.

You might not be able to figure out the answer from the clue, but it will at least give you a good idea of what it might be.

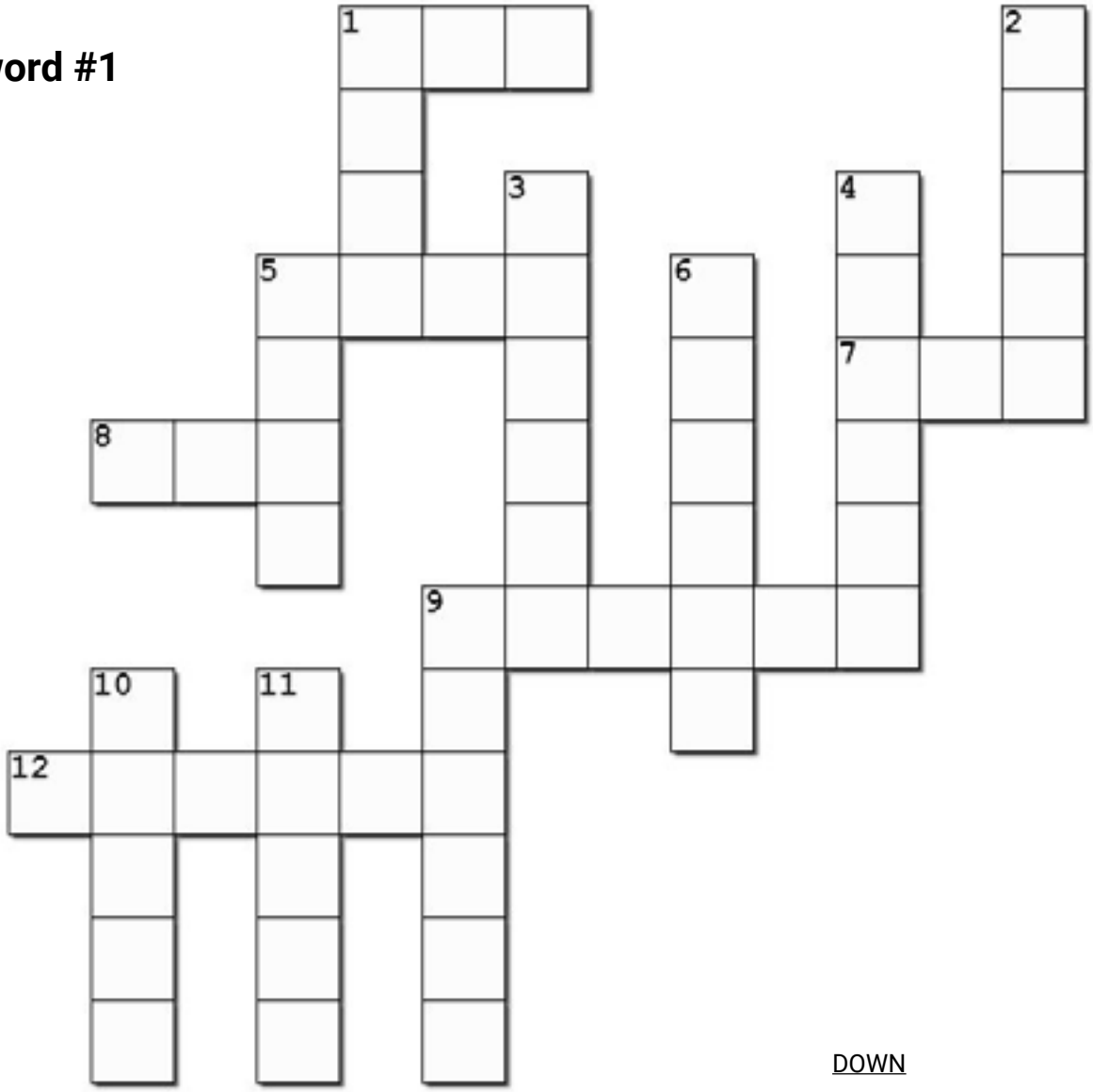
In this example it's to do with an AI that can "understand and interpret the visual world"... or a machine that can see.

If you know the answer then write it into the correct boxes, but if not then you could check out the Glossary for something that describes a machine that can see.

There you would find COMPUTER VISION, which fits the boxes in the example above. Now you try!

ACTIVITY: Crosswords

Crossword #1



ACROSS

1. Which artist created the AI-generated film in the 'Patterns' playbook? First name. (1/2) See 9 Down.

5. Chess-playing AI designed by IBM. (1/2) See 1 Down.

7. One of three Boolean Operators used in the 'Faces' playbook.

8. Smallest piece of information that a computer can store.

9. Computer language made up of 1s and 0s.

12. The practice of analysing large databases in order to generate new information.(2/2) See 5 Down.

DOWN

1. Chess-playing AI designed by IBM. (2/2) See 5 Across.

2. Where you store and access data and programs over the internet instead of your computer's hard drive.

3. AI research lab, co-founded by Elon Musk.

4. Which artist mixed her face with Elvis in the 'Faces' playbook? (2/2) See 10 Down.

5. The practice of analysing large databases in order to generate new information. (1/2) See 12 Across.

6. To transfer something, like data or files, from a computer or other digital device to another device.

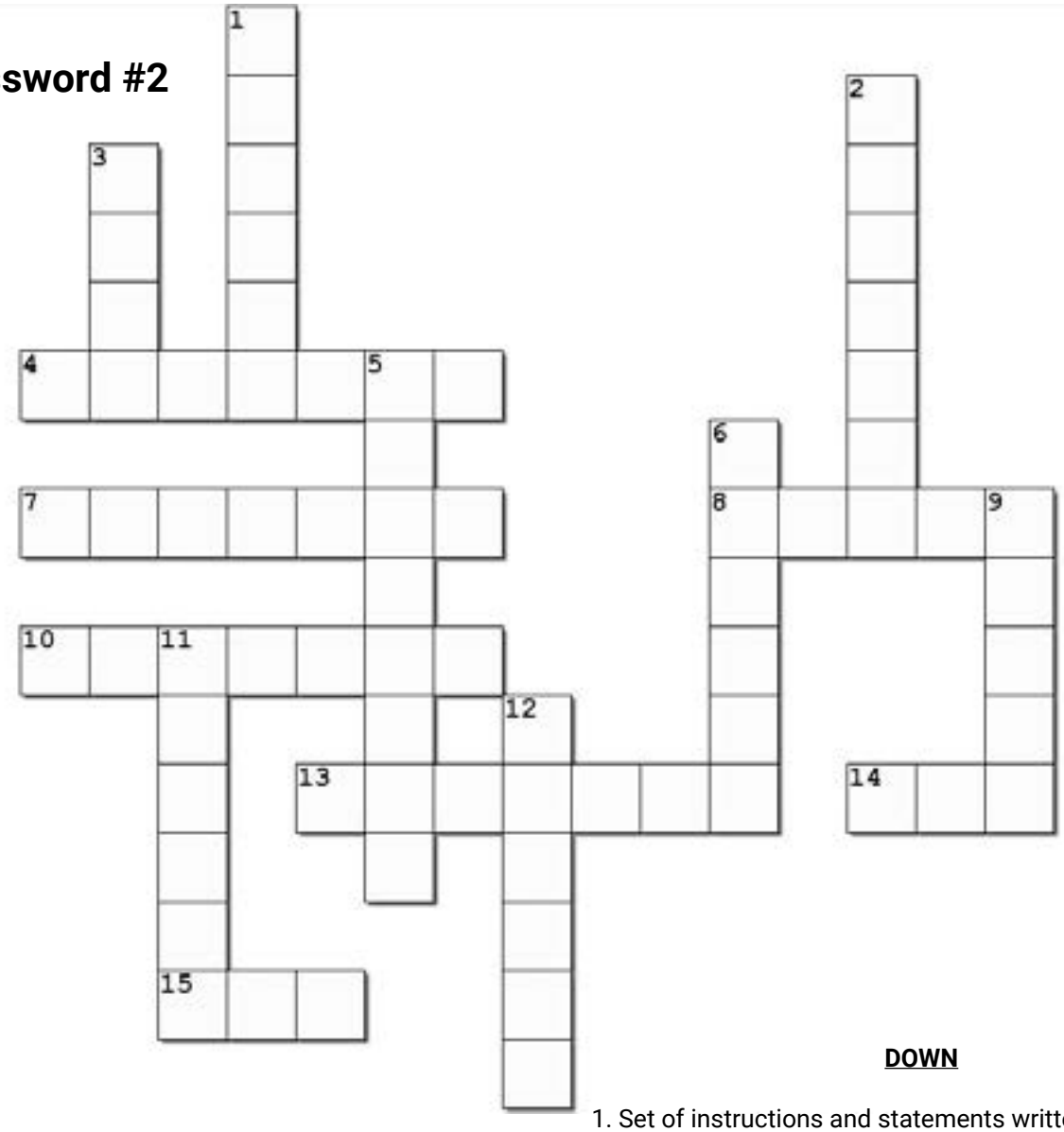
9. Which artist created the AI-generated film in the 'Patterns' playbook? First name. (2/2) See 1 Across.

10. Which artist mixed her face with Elvis in the 'Faces' playbook? (1/2) See 4 Down.

11. The basic building block of a digital image.

ACTIVITY: Crosswords

Crossword #2



ACROSS

4. Artwork by Alex Mordvintsev in the 'Patterns' playbook.

7. Involving or relating to the use of computer technology.

8. Name of the festival this playbook is a part of.

10. Type of AI that learns by itself from data then applies that learning without the need for human intervention. (1/2) See 5 Down.

13. Where a computer-generated person makes you feel uncomfortable because it almost looks real, but not quite. (1/2) See 6 Down.

14. One of the three Boolean Operators used in the 'Faces' playbook.

15. Acronym of Graphics Interchange Format.

DOWN

1. Set of instructions and statements written by a programmer using a computer programming language. (1/2) See 3 Down.

2. A computer program designed to simulate conversation with human users. See Hello Lamp Post artist.

3. Set of instructions and statements written by a programmer using a computer programming language. (2/2) See 1 Down.

5. Type of AI that learns by itself from data then applies that learning without the need for human intervention. (2/2) See 10 Across.

6. Where a computer-generated person makes you feel uncomfortable because it almost looks real, but not quite. (2/2) See 13 Across.

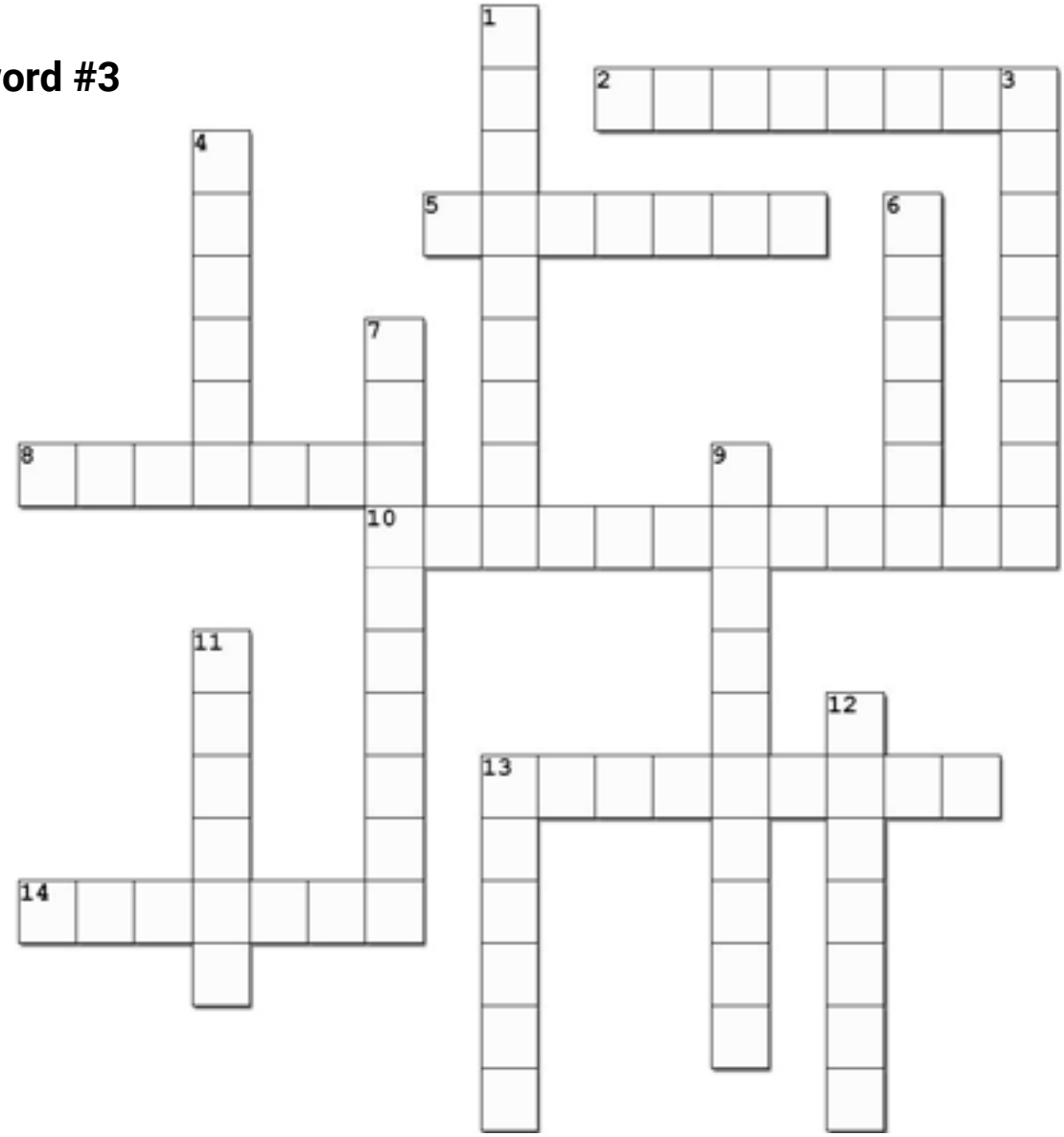
9. Data that a computer receives.

11. The process of writing computer programs.

12. IBM's supercomputer that is used as a 'question answering machine'.

ACTIVITY: Crosswords

Crossword #3



ACROSS

2. The opposite of an upload.

5. Set of algorithms designed to recognise patterns. (2/2) See 11 Down.

8. Artist who created the 'Masked Reality' exhibition in the 'Faces' playbook. (1/2) See 14 Across.

10. A computer that can learn, normally shortened to AI. (1/2) See 7 Down.

13. In computing, the words '*and*', '*or*', and '*not*'. (2/2) See 12 Down.

14. Artist who created the 'Masked Reality' exhibition in the 'Faces' playbook. (2/2) See 8 Across.

DOWN

1. Cube-based game where you gather resources and build things.

3. A video of a person where their face or body have been digitally changed to look like someone else.

4. Russian tile-matching video game made in 1984.

6. Programming language. Also the name of a snake!

7. A computer that can learn, normally shortened to AI. (2/2) See 10 Across.

9. Computer-generated imitation of a real-world place or situation.

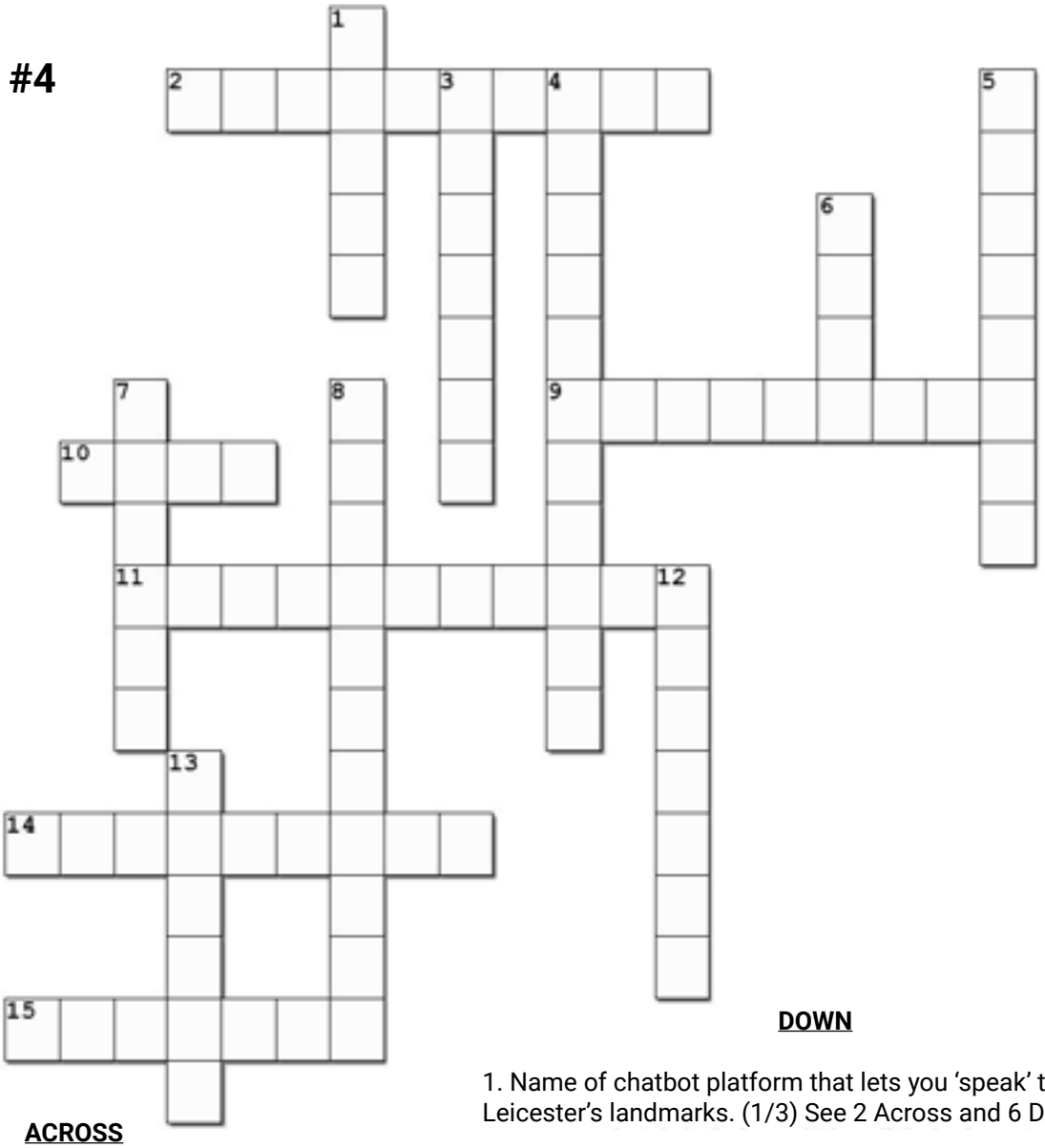
11. Set of algorithms designed to recognise patterns. (1/2) See 5 Across.

12. In computing, the words '*and*', '*or*', and '*not*'. (1/2) See 13 Across.

13. Data that a computer sends.

ACTIVITY: Crosswords

Crossword #4



ACROSS

2. Type of art that uses a computer program to automatically generate the artwork. (1/2) See 3 Down.

9. Style of media. Moving pictures like Pixar, Disney etc.

10. Name of chatbot platform that lets you 'speak' to Leicester's landmarks. (2/3) See 1 Down and 6 Down.

11. Name of the improv comedy show in the 'Words' playbook.

14. Set of step-by-step instructions for a computer to follow. At the heart of all computer programs.

15. A system of logical thought that is used to create true or false statements.

DOWN

1. Name of chatbot platform that lets you 'speak' to Leicester's landmarks. (1/3) See 2 Across and 6 Down.

3. Type of art that uses a computer program to automatically generate the artwork. (2/2) See 2 Across.

4. A word to describe games or computer programs which respond to user inputs.

5. Global computer network. You use it to visit websites.

6. Name of chatbot platform that lets you 'speak' to Leicester's landmarks. (3/3) See 2 Across and 1 Down.

7. Technology that recognises human faces in images by comparing to a database of faces. (1/2) See 8 Down.

8. Technology that recognises human faces in images by comparing to a database of faces. (2/2) See 7 Down.

12. Programming language. Also what a cat does with its claws!

13. Large tech company known for maps, search engines, phones etc. Made some of the experiments in these playbooks!

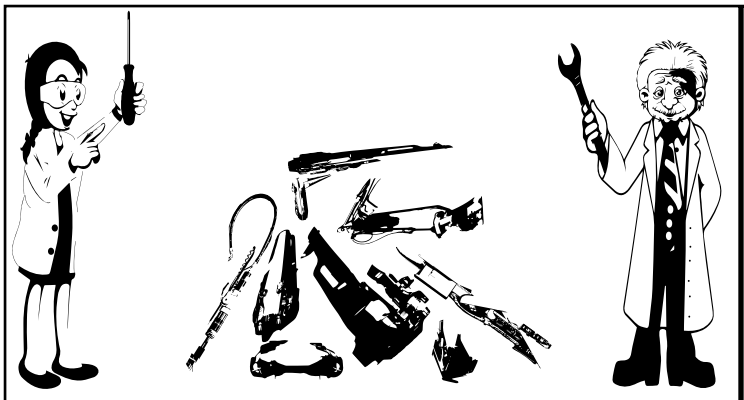
Intro to Build-a-Bot

HOW IT WORKS

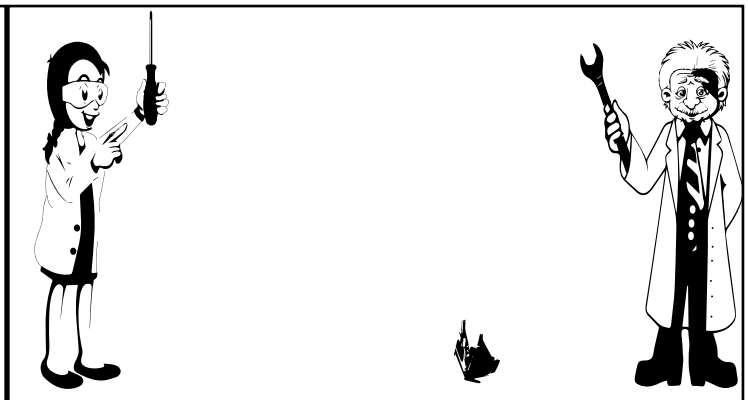
You start with a series of blank spaces that represent letters, and eight robot parts (a head, a body, two arms, two legs, and two feet).
The goal is to guess all of the letters and figure out what the words are before the robot is built!

One person knows the words, and another person tries to guess which letters are in the words. Each time a letter is guessed that *is not* anywhere in the words then a part of the robot is added.
This means you can get eight guesses wrong before you lose! If a correct guess is made then the letter is written into *all spaces* that it appears in the words, and the robot part stays on the pile.

Once you've got the hang of it you can start coming up with words of your own!



__ U I __ __ / A / __ O __



B U I __ __ / A / B O __

Start by cutting out the eight pieces of the robot (a head, a body, two arms, two legs, and two feet) while the other person checks the answer on page 27. Feel free to mix and match the robot parts!

Now the person that doesn't know the word starts to guess what letters might be in the word. It is helpful to think about how many letters are in the word, shown by the number of __ there are. Each __ is one letter.

Some answers might have more than one word in them, such as the example above having three words, and in these situations each word is separated by a "/".

It is a good idea to start with vowels (A, E, I, O, U) as these are very common in all words.

By starting with the vowels we've already got 4 out of the 9 letters correct, and only got one guess wrong! There is no 'E' so one robot foot has been built.

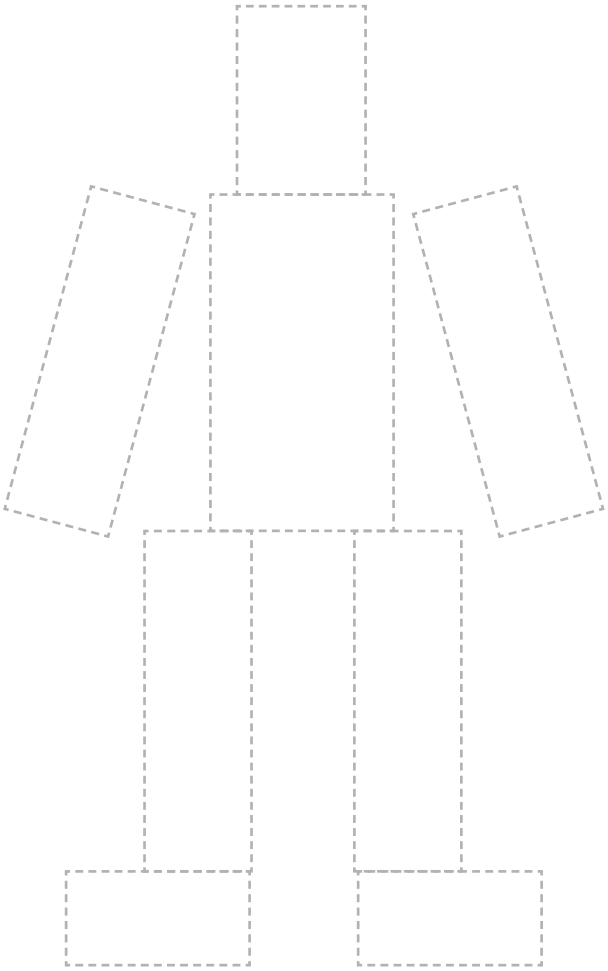
The last word can only be one of a few with 'O' in the middle...hot, not, dot, dog, bog, bot.

Guessing "B" added a few extras, leaving only three letters left to guess...you might even be able to guess what the answer is!

If you do make a guess and get it wrong, then remember to add a bit of the Bot. Get eight guesses wrong and you're out! (Hint...it's BUILD A BOT)

TIP: Write down the letters you've guessed, so you don't repeat them and waste turns!

ACTIVITY: Build-a-Bot



1. _ _ _ _ _ _

2. _ _ _ _ _ _ / _ _ _ _

3. _ _ _ _ / _ _ _ _ _ _ _ _ _ _

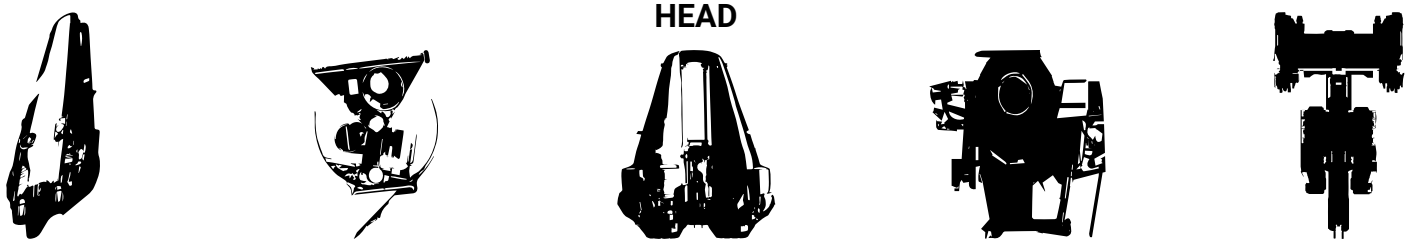
4. _ _ _ _ _ _ _ _ _ _ / _ _ _ _ _ _ _

5. _ _ _ / _ _ / _ _ _ _ _ _ _ _

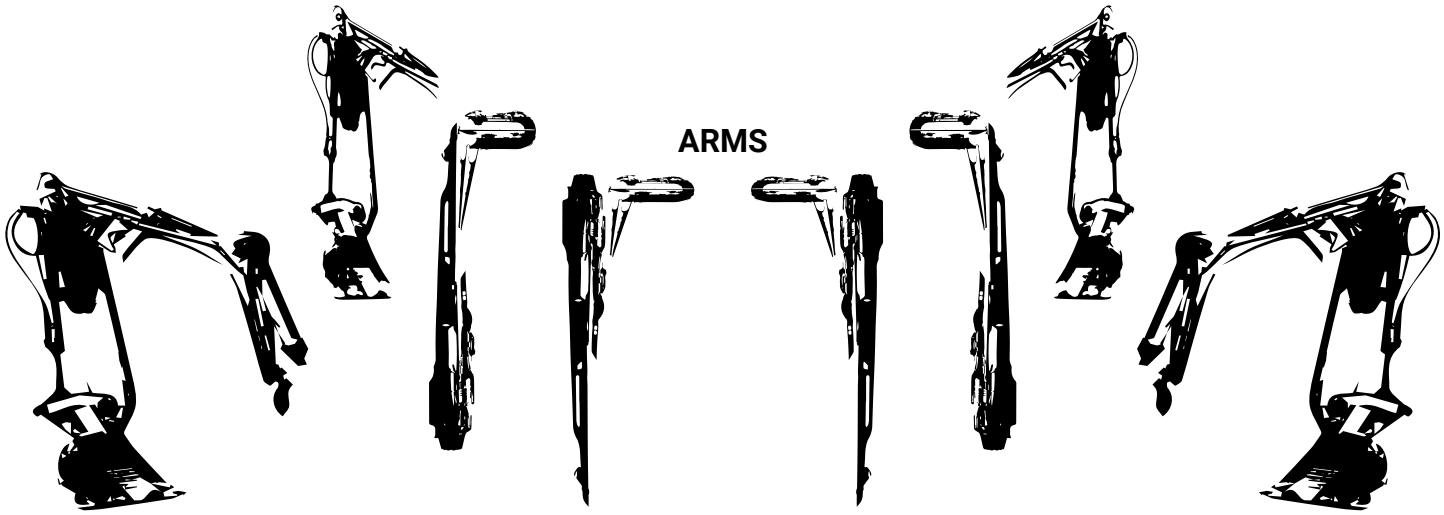
6. _ _ _ _ _ _ _ _ _ _ _ _ _ _ / _ _ _ _ _ _ / _ _ _ _ _ _ _

ACTIVITY: Build-a-Bot

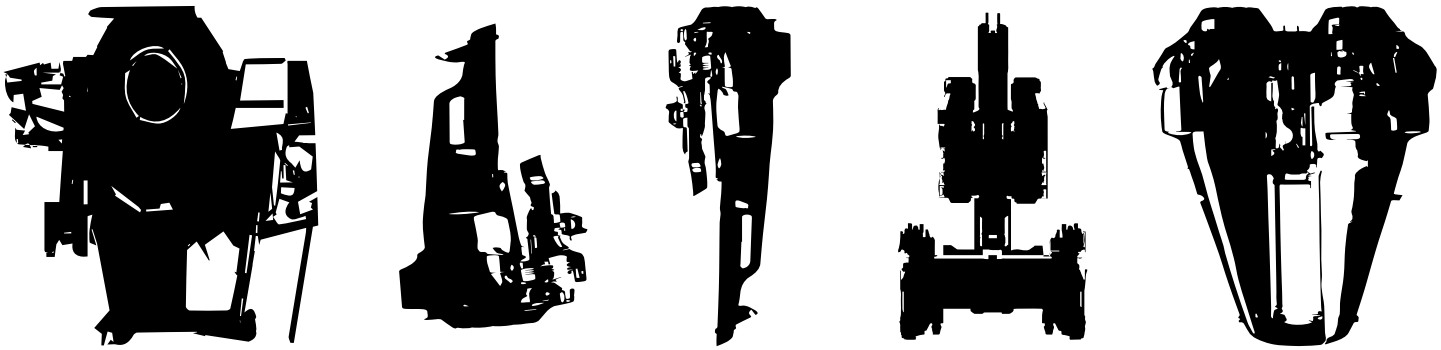
HEAD



ARMS

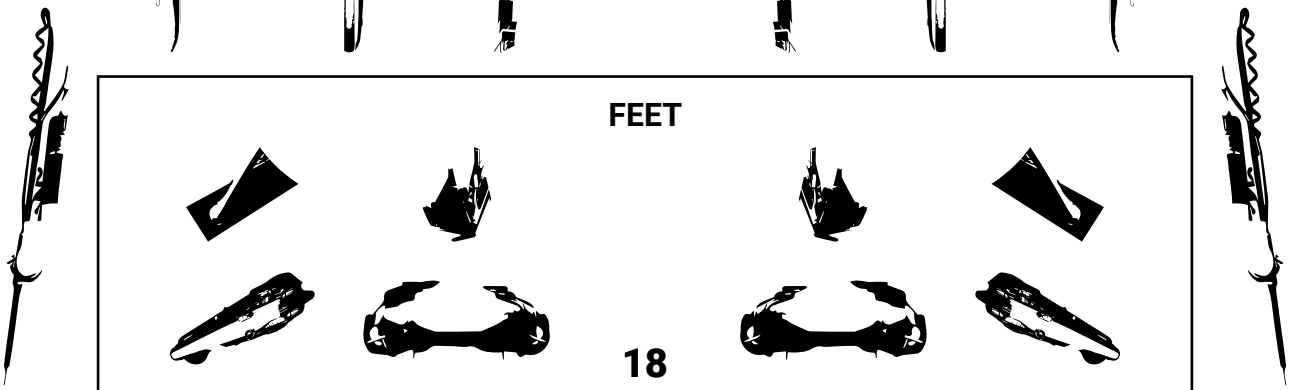


BODY



LEGS

FEET



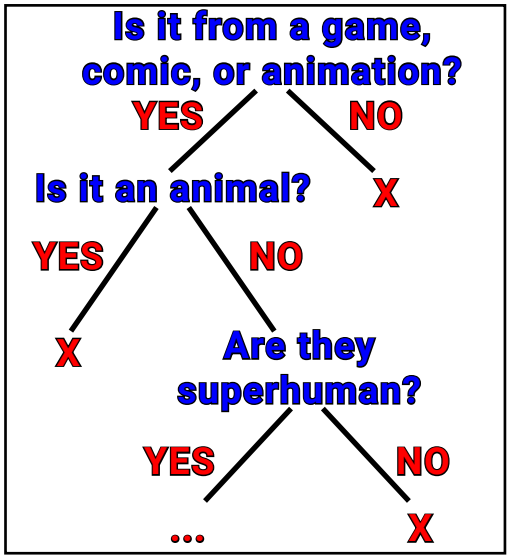
Intro to 20 Questions

HOW IT WORKS

In 20 Questions one person (the Thinker) thinks of something and the other person (the Asker) asks up to twenty questions to figure out what the person is thinking of.

It uses a version of binary decision making, where the choice only ever has two answers - Yes or No, or in binary 1 or 0.

If you ask twenty Yes or No questions then you've narrowed the search down to one of 1,048,576 different possible answers! If you find the answer in twenty questions or fewer then you win! Let's look at some tactics below.



Eevee, Bowser, Pikachu, Ender Dragon, Luigi, Impostor, Ms Pac-Man

Spider-Man, Doc-Ock, Harley Quinn, Ms Marvel, Black Panther, Shang-Chi

Buzz Lightyear, Elsa, Mickey Mouse, Tiana, Cruella de Vil, Goofy

Imagine you have narrowed the answer down to something from a game, comic, or animated show or movie. The box above shows a small selection of characters that it could be, and they are all very different!

By asking the questions at the top right of this page you can easily cluster the possible answers - clustering means to group things based on similar traits.

Let's see what happens when we ask "is it an animal?" and the answer is 'No', and follow up with "is it superhuman?" and the answer is 'Yes'.

Eevee, Bowser, Pikachu, Ender Dragon, Luigi, Impostor, Ms Pac-Man

Spider-Man, Doc-Ock, Harley Quinn, Ms Marvel, Black Panther, Shang-Chi

Buzz Lightyear, Elsa, Mickey Mouse, Tiana, Cruella de Vil, Goofy

Only six are left. Instead of asking "Is it from a game, comic, or animation" you asked "Are they originally a comic book character?" then you would get to the same result much faster!

Now you can be more specific in your questions - "Are they from Marvel?" or "Are they based on an animal?". These reduce the list even more, making it easier to finally guess who or what the Thinker is thinking of.

You can do this with literally any object, person, or place, so long as the Asker knows about it and the Thinker answers honestly. Why not try it yourself in under 20 Questions!

ACTIVITY: 20 Questions

Use the table below to keep track of the questions you ask and the Yes or No answer you were given. This will help you make the most of your questions, while seeing how many left you have before you need to make a guess! See how few questions you can ask to get to an answer. Good luck!

Q#	Yes / No	Question Asked...
1	Y / N	
2	Y / N	
3	Y / N	
4	Y / N	
5	Y / N	
6	Y / N	
7	Y / N	
8	Y / N	
9	Y / N	
10	Y / N	
11	Y / N	
12	Y / N	
13	Y / N	
14	Y / N	
15	Y / N	
16	Y / N	
17	Y / N	
18	Y / N	
19	Y / N	
20	Y / N	

Examples for the Thinker	Examples for the Asker
Pikachu	Q. Is it a person? - No Q. Is it from a video game? - Yes Q. Is it a Nintendo game? - Yes
Ms Marvel	Q. Is it a person? - Yes Q. Are they real? - No Q. Are they in a movie? - Yes
Eiffel Tower	Q.Is it a living thing? - No Q. Is it big? - Yes Q. Is it a building? - Yes
Octopus	Q. Is it an animal? - Yes Q. Does it live in the sea? - Yes Q. - Does it have a shell? - No

ANSWERS: Word Searches

I	L	E	M	O	D	E	L	A	D	A	H	E	C
N	N	Y	A	A	L	G	O	R	I	T	H	M	S
R	A	R	D	H	D	N	B	A	T	T	M	N	I
O	E	A	G	B	T	H	O	Y	A	C	E	S	N
G	L	N	B	I	O	D	M	S	E	M	H	E	G
A	O	I	B	I	U	E	R	R	T	N	G	M	U
H	O	B	I	C	T	E	I	A	L	A	I	A	L
P	B	H	A	S	T	P	G	L	O	T	W	N	A
L	H	E	Y	S	H	B	P	O	O	L	Y	T	R
A	O	S	U	N	D	L	E	T	A	L	C	I	I
N	T	L	N	L	I	U	T	L	Y	C	E	C	T
U	C	A	O	I	I	E	E	S	A	O	O	O	Y
P	R	O	G	R	A	M	M	I	N	G	I	D	O
L	A	C	I	G	O	L	O	N	H	C	E	T	E

WORD SEARCH #1

ALGORITHM
ALPHAGO
BINARY
BOOLEAN
CLUSTER
CODE
DEEPBLUE
LOOP
MODEL
PROGRAMMING
SEMANTIC
SINGULARITY
SYSTEM
TECHNOLOGICAL
WATSON

A	L	A	G	E	I	U	A	C	L	O	U	D	C
I	T	N	D	N	F	I	S	A	A	A	T	S	R
L	E	A	L	A	S	L	N	I	R	E	T	Y	S
O	Y	L	D	T	R	F	E	O	T	C	R	N	C
O	I	Y	E	U	O	E	S	E	I	N	E	O	U
L	E	S	G	R	A	S	I	A	F	E	E	T	T
A	T	I	E	A	D	T	M	N	I	G	S	D	G
N	T	S	P	L	S	C	U	A	C	I	L	E	N
G	T	O	R	C	P	N	L	L	I	L	E	C	I
U	C	P	T	D	E	L	A	Y	A	L	A	I	L
A	N	E	E	L	E	O	T	T	L	E	G	S	O
G	E	N	I	L	C	A	I	I	E	T	I	I	O
E	E	A	A	I	H	I	O	C	L	N	N	O	P
N	T	I	G	N	I	Y	N	S	T	I	A	N	N

WORD SEARCH #2

ANALYSIS
ANALYTICS
ARTIFICIAL
CLOUD
DATA
DECISION
FOREST
INTELLIGENCE
LANGUAGE
NATURAL
OPENAI
POOLING
SIMULATION
SPEECH
TREE

ANSWERS: Word Searches

L	C	I	N	U	N	A	C	N	P	K	H	A	C
A	T	D	T	Y	D	I	O	G	N	O	K	D	O
R	D	O	E	U	T	I	R	O	A	R	O	V	N
U	A	T	C	E	T	R	H	R	O	K	I	E	V
E	E	I	E	C	P	T	C	W	R	E	E	R	O
N	L	N	N	A	Y	M	T	T	S	E	T	S	L
A	O	U	P	P	I	E	I	N	S	E	O	A	U
U	F	E	E	E	N	A	I	N	N	C	L	R	T
Q	F	N	N	W	E	R	M	D	D	P	K	I	I
U	A	G	E	N	T	L	T	A	A	T	T	A	O
E	C	U	D	E	E	P	F	A	K	E	F	L	N
R	E	P	U	T	P	T	O	B	T	A	H	C	A
Y	T	U	R	I	N	G	N	I	R	R	H	N	L
K	T	E	A	P	P	L	I	C	A	T	I	O	N

WORD SEARCH #3

ADVERSARIAL
AGENT
APPLICATION
CHATBOT
CONVOLUTIONAL
DEEPFAKE
DEEPMIND
FACE
FUNCTION
NETWORK
NEURAL
PYTHON
QUERY
TEST
TURING

I	E	T	N	O	I	T	I	N	G	O	C	E	R
N	M	P	A	T	T	E	R	N	G	G	D	P	I
C	F	A	G	N	I	N	R	A	E	L	M	R	N
R	C	T	G	S	H	P	P	N	N	O	E	O	F
T	E	O	A	E	A	E	I	C	E	E	T	C	O
R	I	O	M	I	V	H	N	D	R	G	N	E	R
N	P	N	G	P	C	A	T	C	A	I	L	S	M
A	N	E	L	A	U	I	T	X	T	E	O	S	A
C	T	V	M	L	N	T	I	L	E	I	G	I	T
G	G	M	I	S	L	O	E	G	D	T	I	N	I
X	A	X	I	S	F	L	O	R	R	E	C	G	O
T	S	T	T	A	I	O	N	G	E	C	G	G	N
N	O	O	E	A	G	O	G	N	I	D	O	C	I
C	O	R	T	T	D	G	N	I	N	I	M	R	N

WORD SEARCH #4

CODING
COMPUTER
GATE
GENERATED
IMAGE
INFORMATION
LEARNING
LOGIC
MACHINE
MINING
PATTERN
PROCESSING
RECOGNITION
TEXT
VISION

ANSWERS: Crosswords

Crossword #1

ACROSS

1. Which artist created the AI-generated film in the 'Patterns' playbook? First name. (1/2) See 9 Down.

5. Chess-playing AI designed by IBM. (1/2) See 1 Down.

7. One of three Boolean Operators used in the 'Faces' playbook.

8. Smallest piece of information that a computer can store.

9. Computer language made up of 1s and 0s.

12. The practice of analysing large databases in order to generate new information.(2/2) See 5 Down.

DOWN

1. Chess-playing AI designed by IBM. (2/2) See 5 Across.

2. Where you store and access data and programs over the internet instead of your computer's hard drive.

3. AI research lab, co-founded by Elon Musk.

4. Which artist mixed her face with Elvis in the 'Faces' playbook? (2/2) See 10 Down.

5. The practice of analysing large databases in order to generate new information. (1/2) See 12 Across.

6. To transfer something, like data or files, from a computer or other digital device to another device.

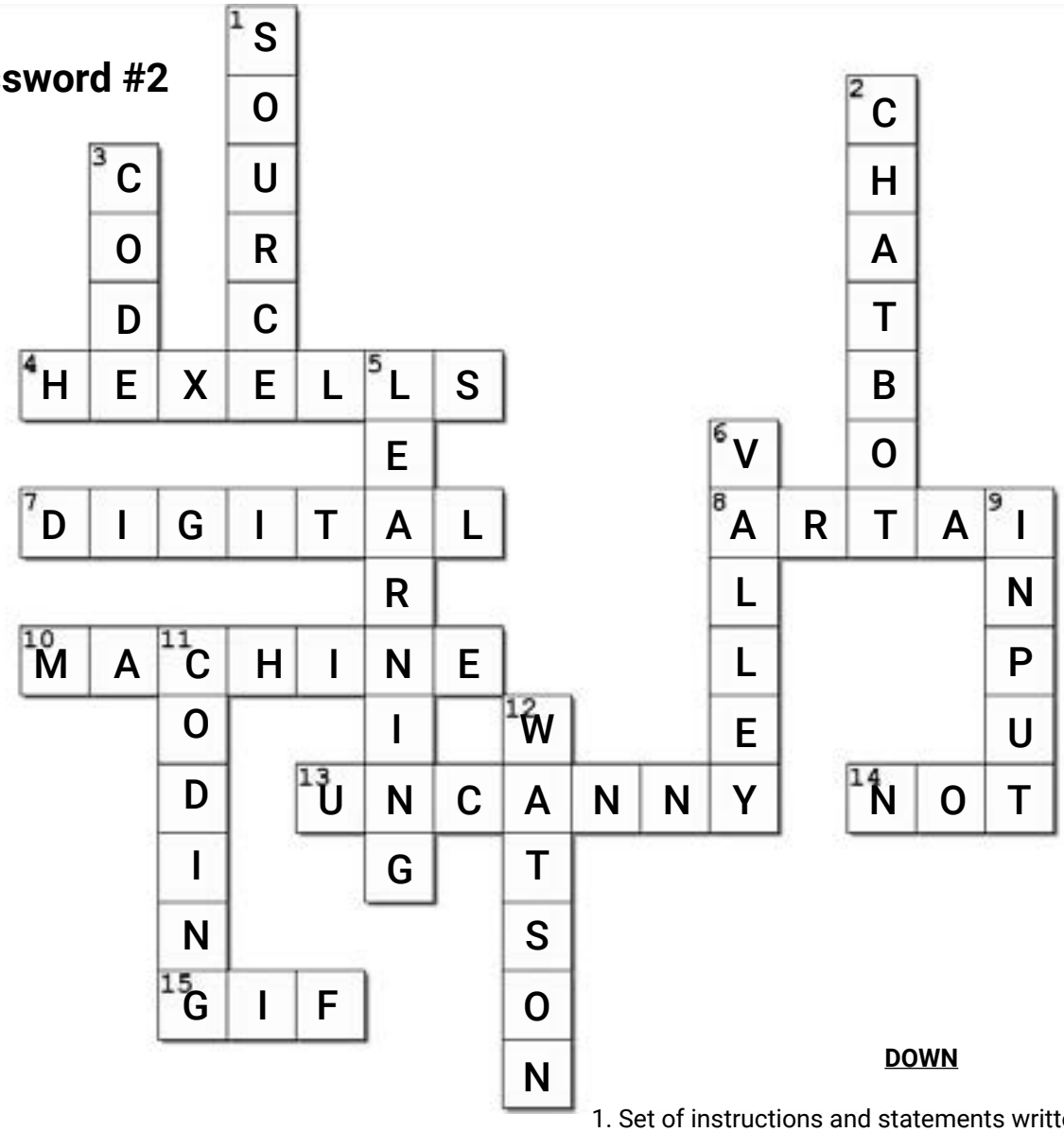
9. Which artist created the AI-generated film in the 'Patterns' playbook? First name. (2/2) See 1 Across.

10. Which artist mixed her face with Elvis in the 'Faces' playbook? (1/2) See 4 Down.

11. The basic building block of a digital image.

ANSWERS: Crosswords

Crossword #2



ACROSS

4. Artwork by Alex Mordvintsev in the 'Patterns' playbook.

7. Involving or relating to the use of computer technology.

8. Name of the festival this playbook is a part of.

10. Type of AI that learns by itself from data then applies that learning without the need for human intervention. (1/2) See 5 Down.

13. Where a computer-generated person makes you feel uncomfortable because it almost looks real, but not quite. (1/2) See 6 Down.

14. One of the three Boolean Operators used in the 'Faces' playbook.

15. Acronym of Graphics Interchange Format.

DOWN

1. Set of instructions and statements written by a programmer using a computer programming language. (1/2) See 3 Down.

2. A computer program designed to simulate conversation with human users. See Hello Lamp Post artist.

3. Set of instructions and statements written by a programmer using a computer programming language. (2/2) See 1 Down.

5. Type of AI that learns by itself from data then applies that learning without the need for human intervention. (2/2) See 10 Across.

6. Where a computer-generated person makes you feel uncomfortable because it almost looks real, but not quite. (2/2) See 13 Across.

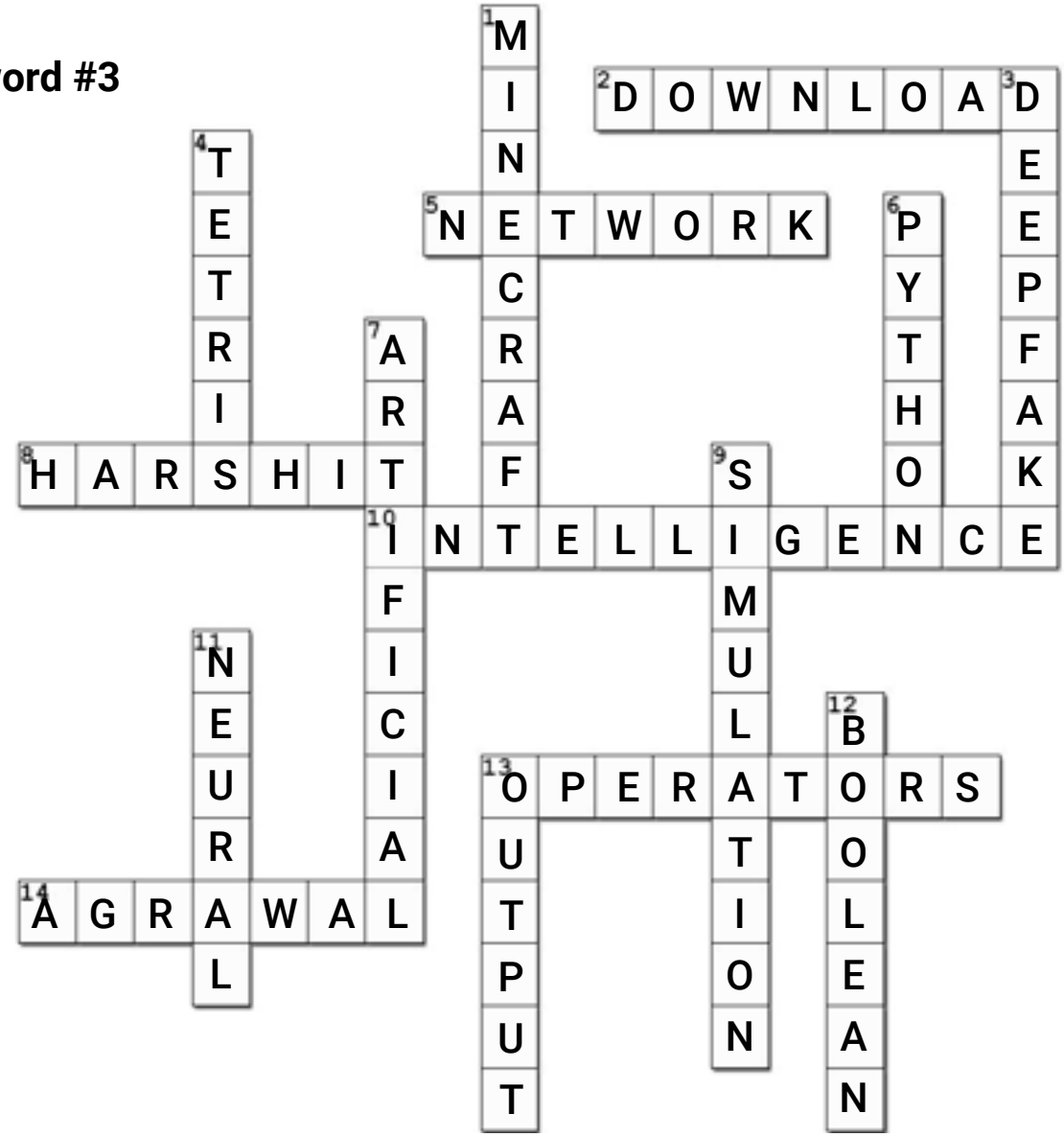
9. Data that a computer receives.

11. The process of writing computer programs.

12. IBM's supercomputer that is used as a 'question answering machine'.

ANSWERS: Crosswords

Crossword #3



ACROSS

2. The opposite of an upload.

5. Set of algorithms designed to recognise patterns. (2/2) See 11 Down.

8. Artist who created the 'Masked Reality' exhibition in the 'Faces' playbook. (1/2) See 14 Across.

10. A computer that can learn, normally shortened to AI. (2/2) See 7 Down.

13. In computing, the words '*and*', '*or*', and '*not*'. (2/2) See 12 Down.

14. Artist who created the 'Masked Reality' exhibition in the 'Faces' playbook. (2/2) See 8 Across.

DOWN

1. Cube-based game where you gather resources and build things.

3. A video of a person where their face or body have been digitally changed to look like someone else.

4. Russian tile-matching video game made in 1984.

6. Programming language. Also the name of a snake!

7. A computer that can learn, normally shortened to AI. (1/2) See 10 Across.

9. Computer-generated imitation of a real-world place or situation.

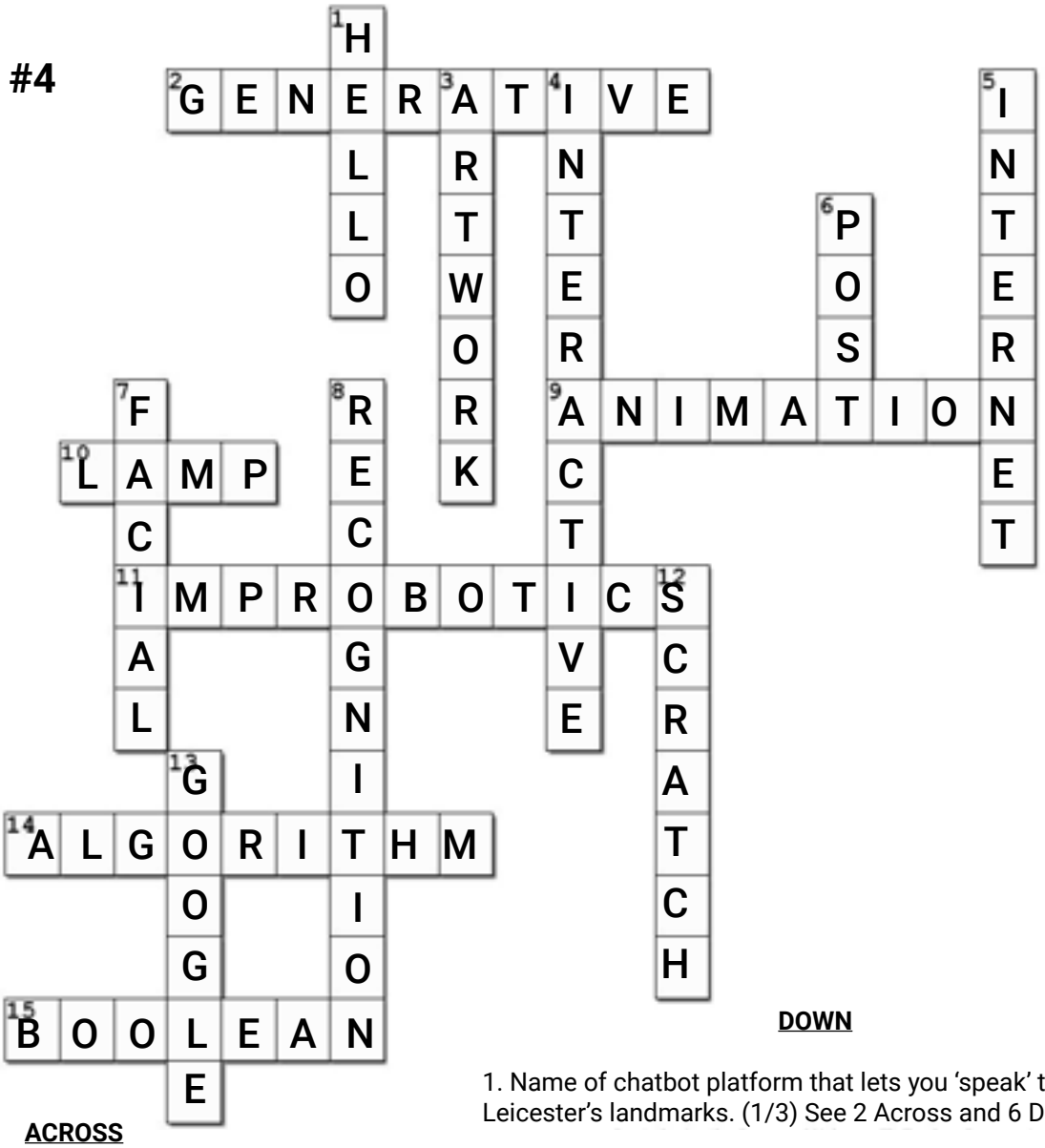
11. Set of algorithms designed to recognise patterns. (1/2) See 5 Across.

12. In computing, the words '*and*', '*or*', and '*not*'. (1/2) See 13 Across.

13. Data that a computer presents after a user input.

ANSWERS: Crosswords

Crossword #4



ACROSS

2. Type of art that uses a computer program to automatically generate the artwork. (1/2) See 3 Down.

9. Style of media. Moving pictures like Pixar, Disney etc.

10. Name of chatbot platform that lets you 'speak' to Leicester's landmarks. (2/3) See 1 Down and 6 Down.

11. Name of the improv comedy show in the 'Words' playbook.

14. Set of step-by-step instructions for a computer to follow. At the heart of all computer programs.

15. A system of logical thought that is used to create true or false statements.

DOWN

1. Name of chatbot platform that lets you 'speak' to Leicester's landmarks. (1/3) See 2 Across and 6 Down.

3. Type of art that uses a computer program to automatically generate the artwork. (2/2) See 2 Across.

4. A word to describe games or computer programs which respond to user inputs.

5. Global computer network. You use it to visit websites.

6. Name of chatbot platform that lets you 'speak' to Leicester's landmarks. (3/3) See 2 Across and 1 Down.

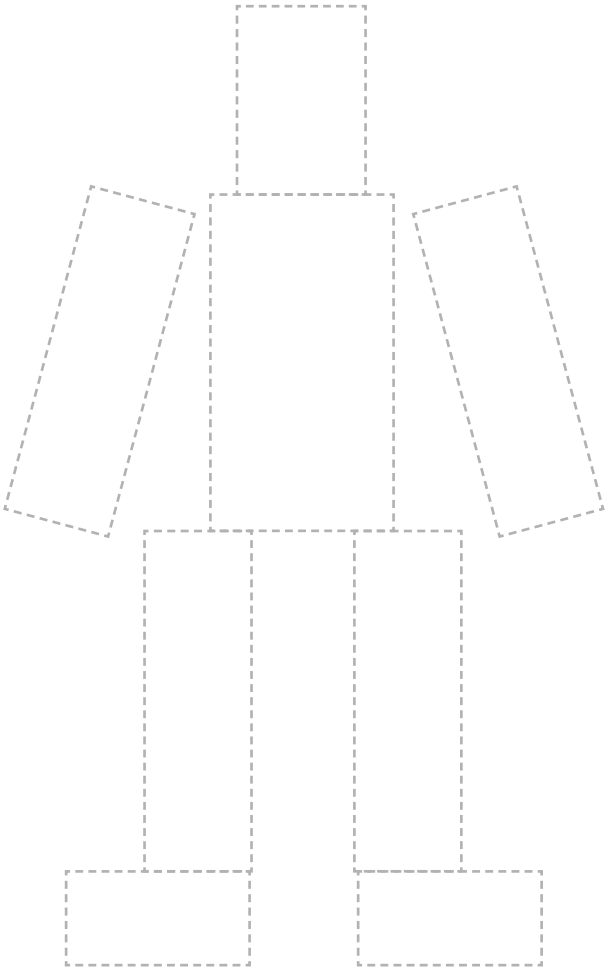
7. Technology that recognises human faces in images by comparing to a database of faces. (1/2) See 8 Down.

8. Technology that recognises human faces in images by comparing to a database of faces. (2/2) See 7 Down.

12. Programming language. Also what a cat does with its claws!

13. Large tech company known for maps, search engines, phones etc. Made some of the experiments in these playbooks!

ANSWERS: Build-a-Bot



1. B I N A R Y

2. T U R I N G / T E S T

3. D A T A / A N A L Y T I C S

4. G E N E R A T I V E / A R T W O R K

5. A R T / A I / F E S T I V A L

6. C O N V O L U T I O N A L / N E U R A L / N E T W O R K

Glossary of Terms

WORD	DEFINITION
Adversarial Neural Network	Sometimes called Generative Adversarial Networks, an Adversarial Neural Network is the use of two competing neural networks that are trying to outperform the other in a specific task.
Agent	A computer program that performs tasks autonomously on behalf of a human.
Alex Mordvintsev	Artist creating the generative artwork Hexells. Exhibiting at the Art-AI Festival, and featured in the Patterns playbook.
Algorithm	Sets ot step-by-step instructions for a computer to follow that are at the heart of all computer programs.
AlphaGo	A neural network developed by DeepMind to play games. It first competed against humans in the boardgame Go, then progressed to more complicated games, including video games.
Analysis	Studying data in order to gain new knowledge by recognising patterns or understanding context.
Analytics	A structured approach to analysis of data with the goal of understanding what may happen in the future.
Animation	Style of media; moving pictures like Pixar, Disney etc.
Application	A program or piece of software.
Art-AI Festival	Leicester-based festival exploring and celebrating artistic uses of artificial intelligence.
Artificial Intelligence	The ability of a computer to do tasks that are usually done by humans because they require human intelligence and perception.
Ben Bogart	Artist creating AI-generated films being shown at the Art-AI Festival. Featured in the Patterns playbook.
Binary	Computer language made up of 1s and 0s.
Bit	Smallest piece of information that a computer can store.
Boolean	A system of logical thought that is used to create true/false statements.
Boolean Operators	The words 'and', 'or' and 'not' that are used to find information in search engines and databases.
Chatbot	A computer program designed to simulate conversation with human users.
Cloud	Where you store and access data and programs over the internet instead of your computer's hard drive
Cluster	To group data based on their similarities.
Coding	The process of writing computer code. Another word for Programming.
Computer Generated Image	An image that has been created using computer software, such as digital images, animations, video games etc.
Computer Vision	The use of neural networks to analyse and interpret visual data, such as photos, videos, and real-time camera input.
Convolutional Neural Network	A type of neural network with many layers (sometimes called a deep neural network) that is commonly used to analyse visual data.
Data	Data is information that has been processed and stored on a computer.

Glossary of Terms

WORD	DEFINITION
Data Mining	The practice of analysing large databases in order to generate new information.
Decision Tree	A flowchart-like structure that represents a series of branching decisions and outcomes.
DeepBlue	Chess-playing artificial intelligence designed by IBM.
DeepMind	The company that build AlphaGO, a neural network that learns to play video games.
Deepfake	A video of a person where their face or body have been digitally changed to look like someone else.
Digital	Involving or relating to the use of computer technology.
Download	The process of receiving data over the Internet. The opposite of uploading.
Face Recognition	Technology that can recognise a human face from a digital image or a video frame against a database of faces.
Forest	A collection of Decision Trees that enable classification in a neural network.
Function	A self-contained block of code that does one specific task.
Generative Artwork	Refers to any art which uses something like a computer program to produce part of the artwork by itself, without human intervention.
GIF	Graphics Interchange Format. A type of image file that supports static and animated images.
Harshit Agrawal	Artist using artificial intelligence to merge audience faces with South Indian-inspired masks. Exhibiting at the Art-AI Festival and featured in the Faces playbook.
Hello Lamp Post	Chatbot-based artwork that allows members of the public to 'chat' with local landmarks. Part of the Art-AI Festival and featured in the Words playbook.
Hexells	Generative artwork by Alex Mordvintsev being exhibited as part of the Art-AI Festival. Featured in the Patterns playbook.
Improbotics	Improv comedy group using artificial intelligence to guide their performance. Performing as part of the Art-AI Festival, and featured in the Words playbook.
Input	Data that a computer receives from another source (mouse and keyboard, other computer etc.) that is processed.
Interactive	Software which accepts and responds to input from people.
Internet	Global computer network - what you would use to go to any website.
Libby Heaney	Artist working with deepfakes. Exhibiting as part of the Art-AI Festival by blending her face with Elvis. Featured in the Faces playbook.
Logic Gate	A computer model that uses Boolean Operators to produce a binary output.
Loop	A sequence of instructions that are designed to repeat themselves.
Machine Learning	A type of artificial intelligence that learns by itself from data and then applies that learning without the need for human intervention.

Glossary of Terms

WORD	DEFINITION
Minecraft	A video game in which players mine for resources and craft items to help with survivial or creative projects. The world is stylised to be made of cubes. Since Microsoft acquired the game it is increasingly used in education.
Model	An artificial intelligence that has been trained to recognise specific patterns.
Natural Language Processing	The use of human-readable language rather than computer language when interacting with computers.
Neural Network	Neural networks are a set of algorithms, modeled loosely after the human brain, that are designed to recognise patterns.
OpenAI	Artificial intelligence research lab, cofounded by Elon Musk.
Output	Data that a computer sends to another source (monitor, speakers, another computer etc.) as a result of input and processing.
Pattern Recognition	The use of a neural network to identify patterns in text, images, audio etc.
Pixel	The basic building blocks that digital images are made of.
Pooling	A layer in a Convolutional Neural Network that down samples an image.
Programming	The act of writing computer code to create software or an application. Another word for Coding.
Python	A widely used programming language used in game design, data analysis, machine learning etc.
Query	A form of question or instruction used in databases.
Scratch	A simple programming language commonly used in education.
Semantic Analysis	Analysing the structure of sentences and meaning behind words etc.
Simulation	A computer-generated imitation of a real-word place or situation.
Source Code	Set of instructions and statements written by a programmer using a computer programming language.
Technological Singularity	A point in the future where the rate of improvement in technology is so fast that it becomes uncontrollable.
Tetris	Russian tile-matching video game created in 1984.
Text Mining	Analysing large quantities of text to discover patterns or new information.
Turing Test	A test for intelligence in a computer, where a human shouldn't be able to tell the difference between the machine and another human being when they are asked the same questions.
Uncanny Valley	Where a computer-generated figure makes you feel uncomfortable because it almost looks human, or real, but not quite.
Upload	To transfer something, like data or files, from a computer or other digital device to another device
Virtual Reality	A 3D, computer-generated environment which can be explored or interacted with by a person.
Watson	IBM's supercomputer that is used as a 'question answering machine'.