Computational Humor

Can a machine have a sense of humor?

Thomas Winters

PhD Student at KU Leuven & FWO Fellow

@thomas_wint

thomaswinters.be

What is the difference between leaves and a car?





One you brush and rake,
the other you rush and brake.

Belgian prime minister says the next five winters will be difficult due less energy supply.

We asked the Belgian prime minister for comment, but he was too busy stockpiling firewood.

Can a machine have a sense of humor?

Part 1: Humor is intrinsically human

Every known human civilisation has some form of humor



Caron, J.E.: From ethology to aesthetics: Evolution as a theoretical paradigm for research on laughter, humor, and other comic phenomena. Humor15(3), 245–281(2002)

Purpose of Humor = Sign of Intelligence?



Brain rewards noticing incongruities and successfully resolving them

+ linguistic skills

+ hard to fake display of personal values

= Evolutionary advantage!

How does humor work?

Incongruity-Resolution Theory

Setup *Two fish are in a tank. Says one to the other:*

Punchline *"Do you know how to drive this thing?"*

Obvious Interpretation



Hidden Interpretation



Based on: Ritchie, G. (1999). Developing the incongruity-resolution theory.

Human-focused definition!

Machine should **not only spot two mental images**

Obvious Interpretation



Hidden Interpretation

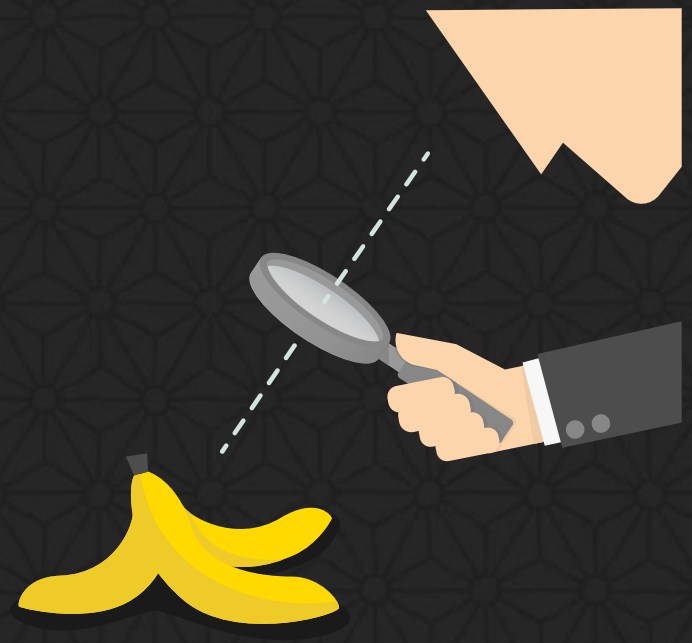


But also that it is **not too hard or too easy** for a **human**!

Computational humor can help understand humor

We do not fully know how humor works

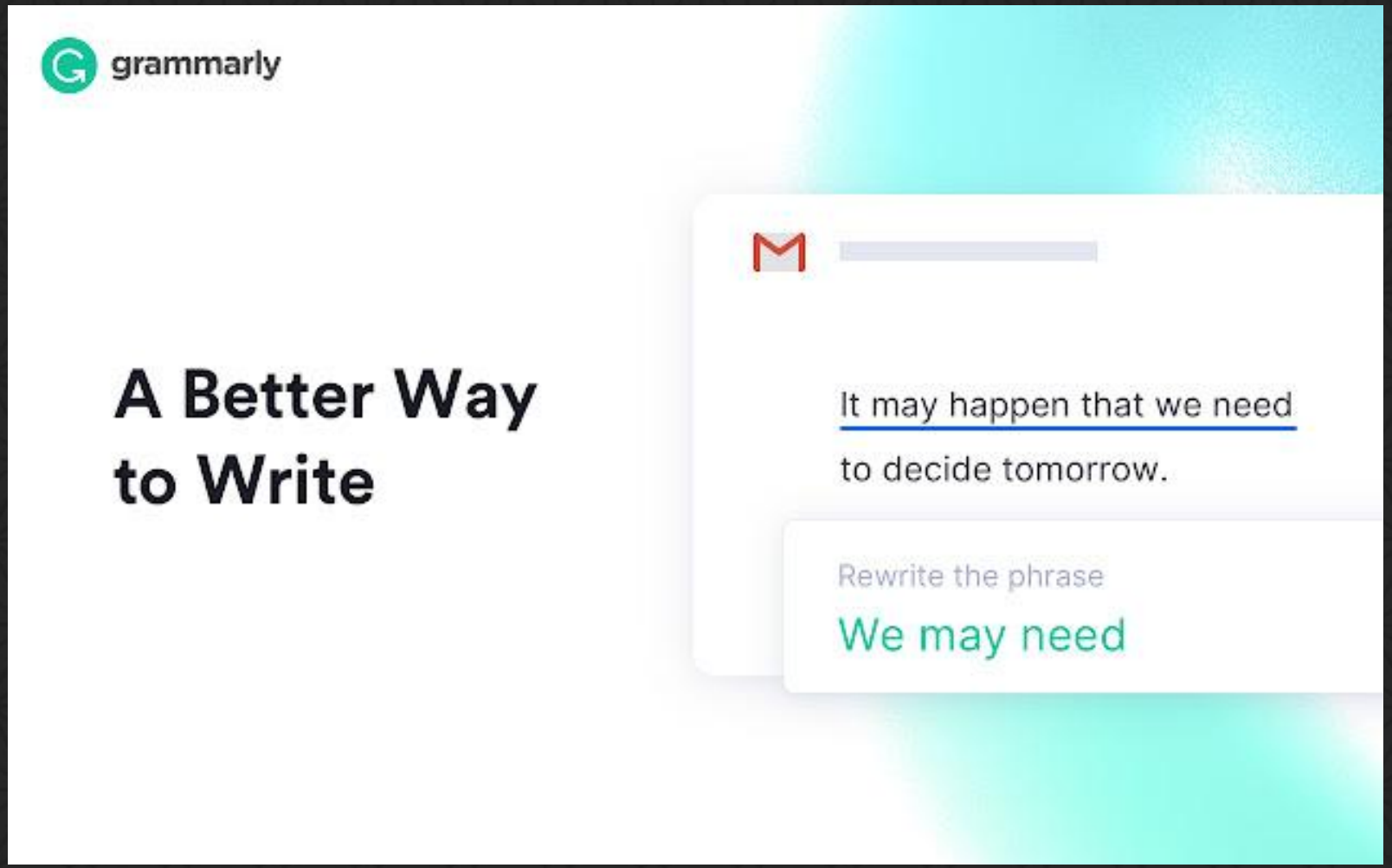




Artificial Intelligence can shed a light!

Humor co-creation

Grammarly / copy.ai but for jokes



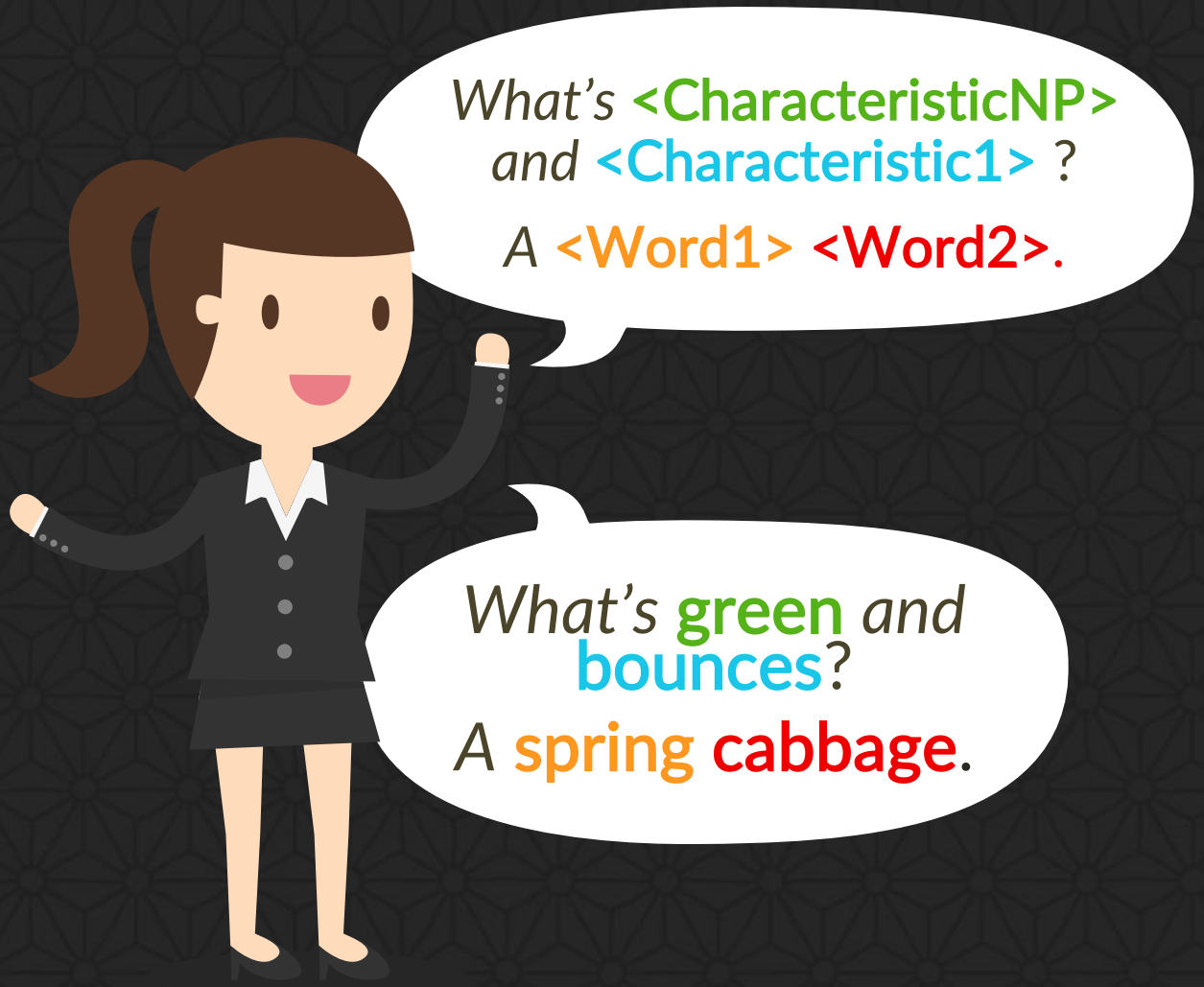
Humor = AI-complete?

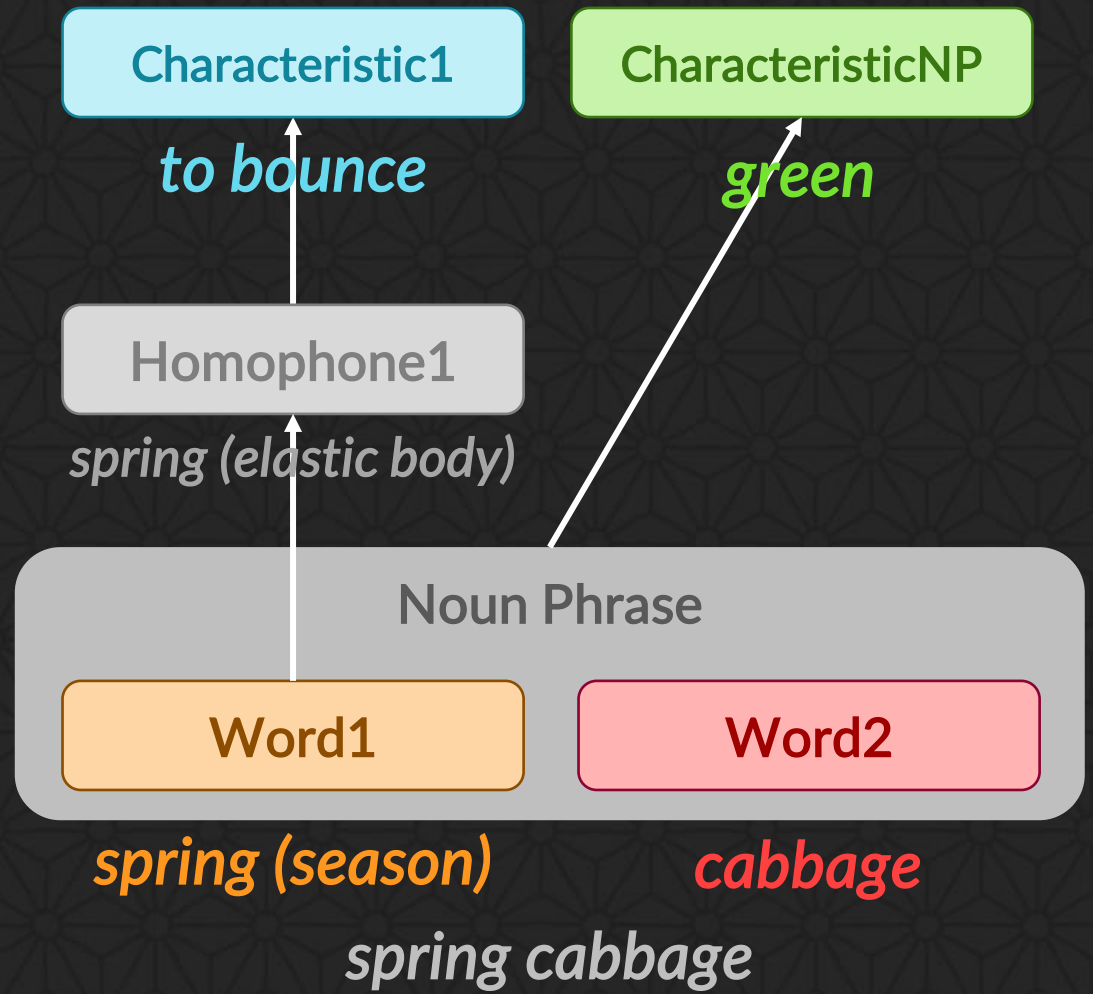
~ as hard as making computers as “intelligent” as people

Part 2: Computers can follow humor instructions

Templates, Schemas, Grammars
Hard-coding a sense of humor

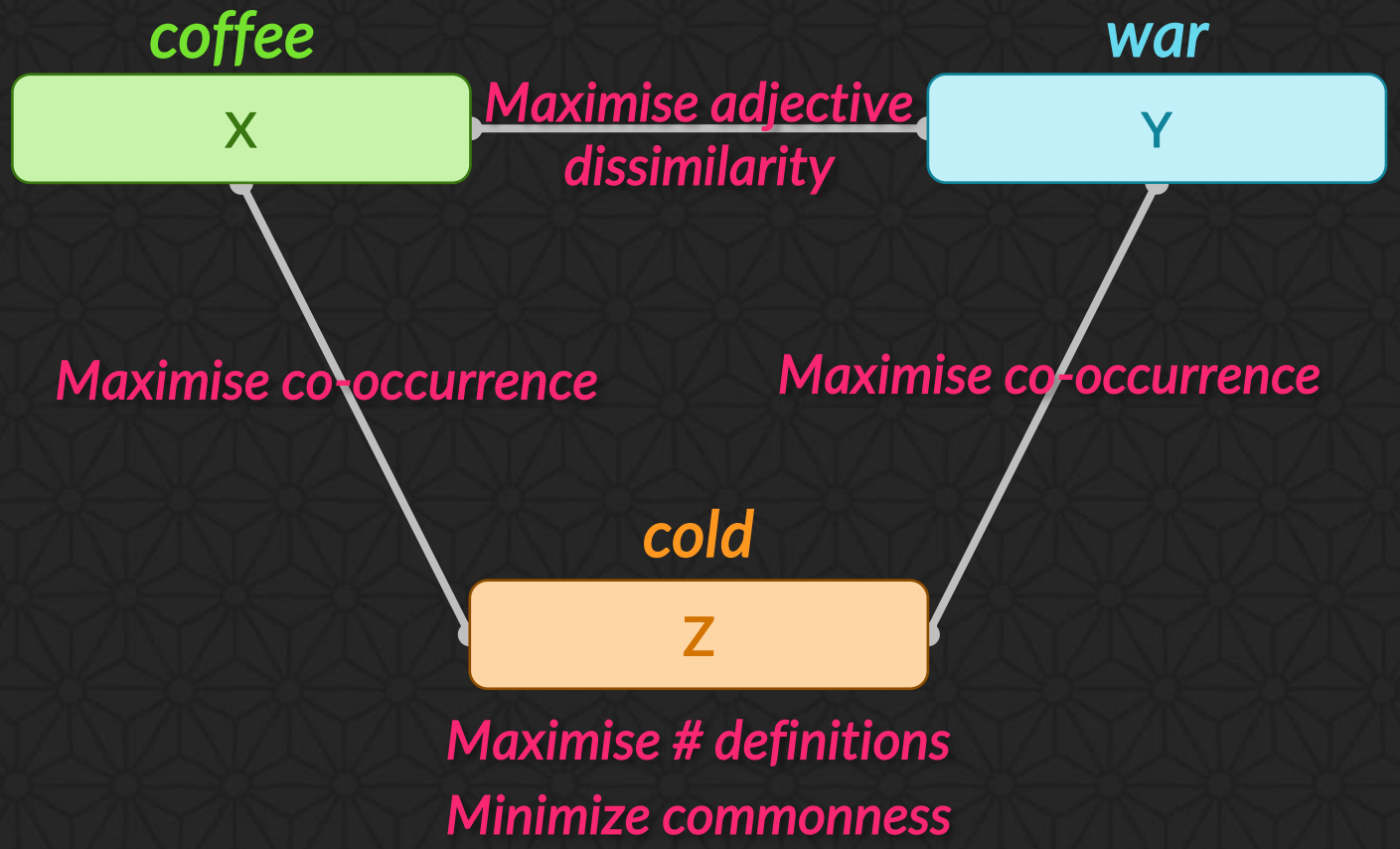
JAPE: Templates & Schemas





Unsupervised Analogy Generator

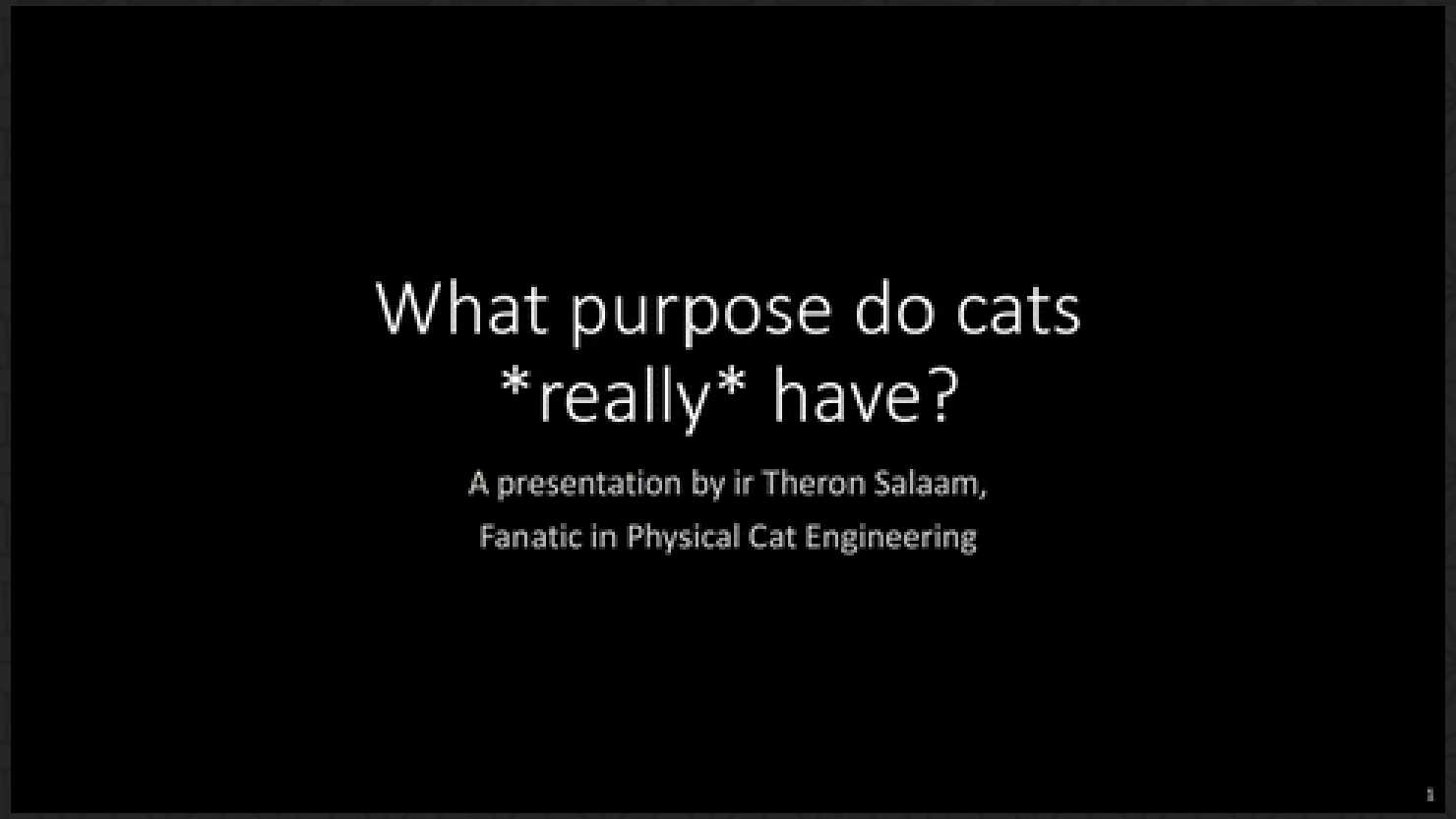




Petrović, S., & Matthews, D. (2013). Unsupervised joke generation from big data

Talk Generator

Generates nonsense PowerPoints about any given topic for presenters to improvise on



Try it yourself: ***talkgenerator.com***

Slide generator

[Historical Title Generator]
(Tracery + WikiHow)

[Vintage Person Generator]
(Reddit)

[Quote Generator]
(GoodReads)

[Name Generator]
(Tracery)

corner
mouse

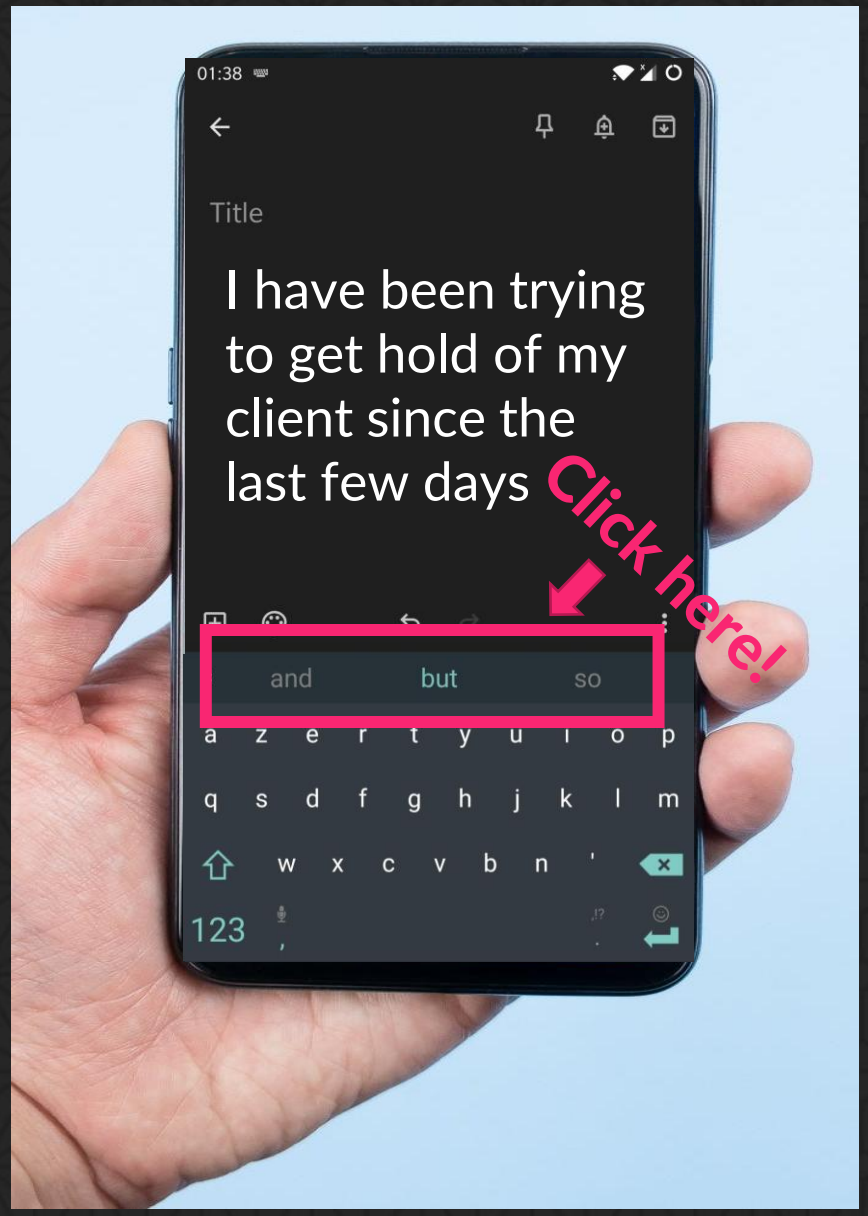
First Person to Care for Baby Wild Mouse



"She sounded as displeased as a cat w just cornered a mou

Queen A. Saine

Statistical text generators



Demo

1. Open your smartphone keyboard *(e.g. in notes)*
2. Press on any suggested **autocomplete** word
3. Press **10-20 times** on a random suggestion
4. You've just generated a sentence using an AI trained to **sound similar to you**! *(if you squint your eyes)*

Autocomplete **counted** how often you used **certain words after other words** in previously typed texts → Statistical model



Rik Torfs

Professor & Ex-rector KU Leuven

Rik Torfs
@torfsrik

Het mooie van God is dat hij het iedereen van harte gunt niet in hem te geloven.

Rik Torfs
@torfsrik

Redelijkheid wordt stilaan een gevaarlijke vorm van extremisme.

TorfsBot

Fully automated Twitterbot that imitates Rik Torfs
Trained on his tweets & columns



Robot Torfs
@TorfsBot

Beste, gevolgd door een komma.
Mails om niet te herinneren.

Robot Torfs
@TorfsBot

Zonder twijfel zien we beter wat er niet is.

TorfsBot

Markov chain generator

1. Count in Rik Torfs tweets & columns how often a word follows the previous 2-4.



2. Start with two real starting words of Rik, and take random next words



Humor Detection

Early Humor Detector

- Designed **humor features** *e.g. alliteration, antonym, adult slang…*
- Used **Naive Bayes** & **Support Vector Machines**
- **Task:** One-liners vs **news**, **neutral corpus** & **proverbs**

One-liners Reuters	One-liners BNC	One-liners Proverbs
96.95%	79.15%	84.82%

Table 4: Humor-recognition accuracy for combined learning based on stylistic and content features.

Mihalcea, R., & Strapparava, C. (2005). Making computers laugh: Investigations in automatic humor recognition.

But is this a good dataset?

News & proverbs have **completely different types** of words than jokes!





→ Looking at **word frequencies** is often already *"enough"*!

Is this really **humor** detection?

Jokes are **fragile**!

Two men are in a bar. Says one to the other:
"Do you know how to drive this thing?"

Generate non-jokes by replacing keywords from other jokes!

Word-based features **won't work** anymore!

Examples of generated Dutch non-jokes

Het is groen en het is een mummie?
Kermit de Waterkant

Wat is het toppunt van principe?
1) Wachten totdat een Nederlander gaat twijfelen
2) Een Zuster met een autoladder
3) Een brandwacht brandmeester met een brandmeester van 9 maanden

“Ober, kunt u die schrik uit mijn politieman halen? Want ik eet liever alleen.”

"Mijn hond is heel vreselijk: Hij schreeuwt mij iedere zus de broer.“
"Maar dat is toch niet zo heel vreselijk?“
"Jawel, want ik heb geen rapport!"

Wat staat er midden in het bos?
De kapper.

Er loopt een super vriendelijk blondje langs een armband. Last er een toonbank: “zo, waargaan die mooie mannen heen?” Blondje: “naar de barkeeper als er niets tussen komt…”

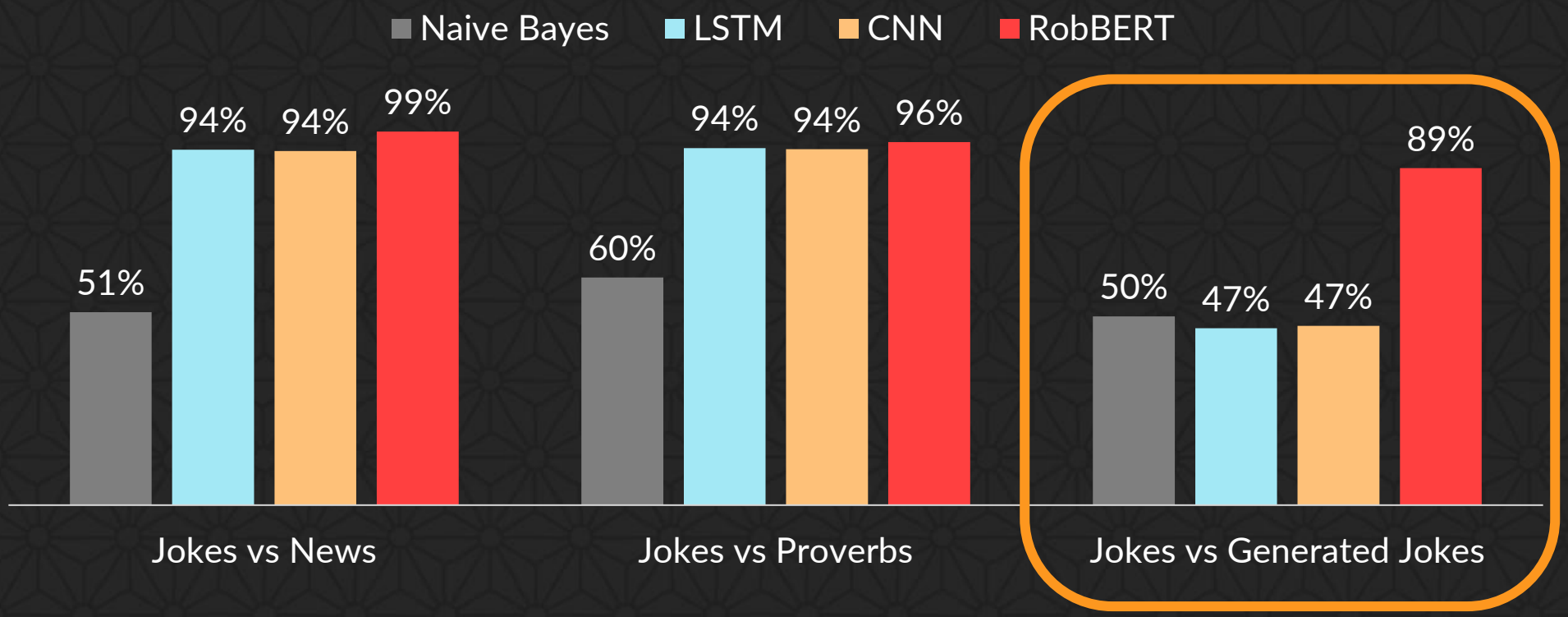
Hoe heet de vrouw van Sinterklaas?
Keukentafel.

"Twee tanden zwemmen in de zee en ze zien een stamgast op een stamgast. De ene raad zegt tegen de andere raad: 'Hé kijk! Ons eten op een bord!'"



Much more challenging dataset!

Binary classification of jokes versus texts from other domains



More truthful humor detection?

Part 3: “Large language models are all you need”



Transformer models

Large **language models**, **pretrained** on large corpora





GPT-3

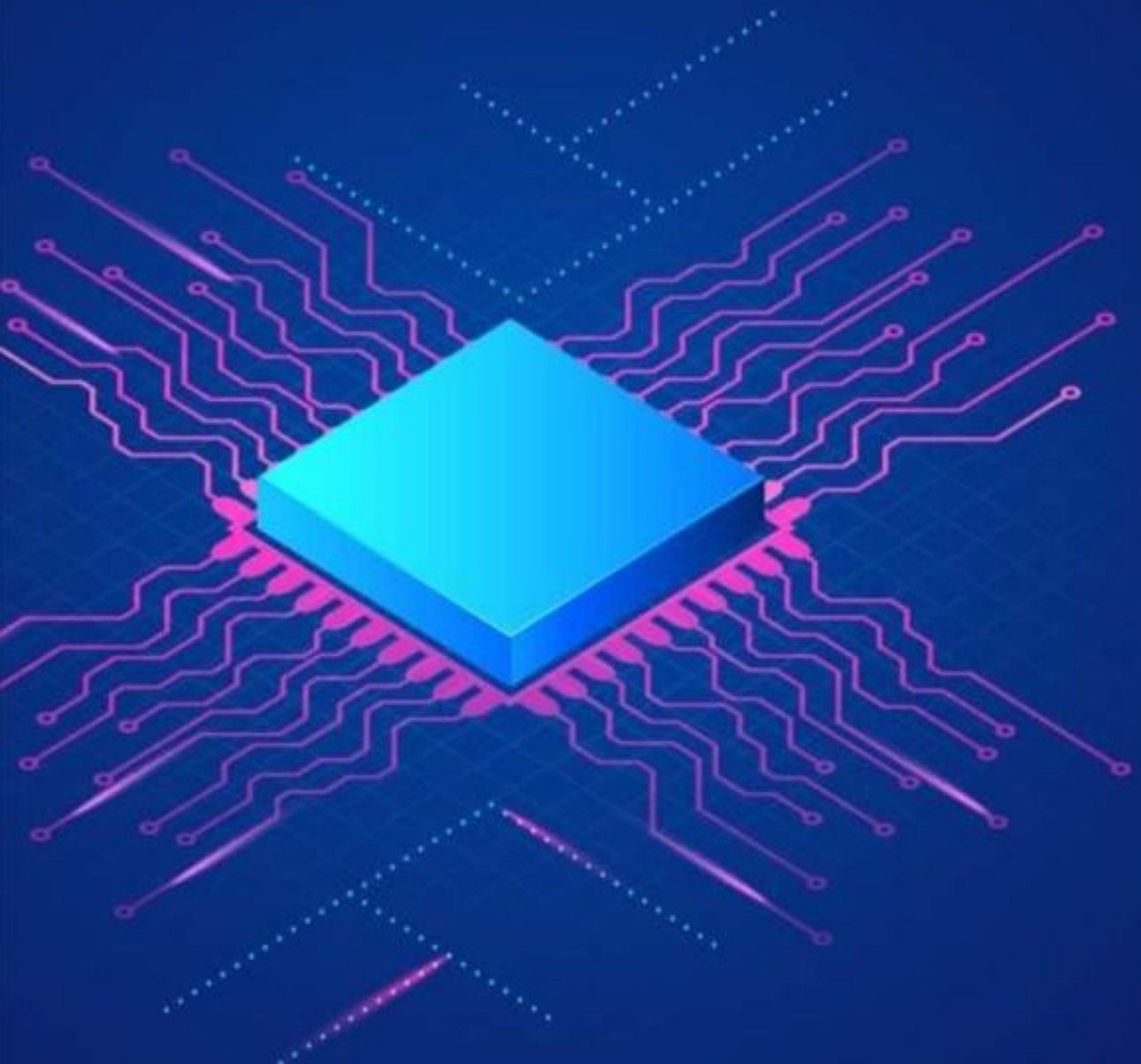
Completes any textual prompt

BERT

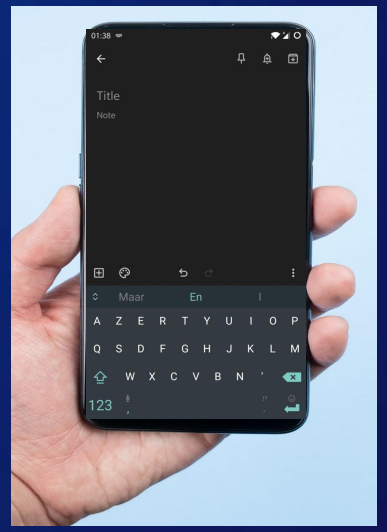
Classifies any text sequence / token

Outperforming previous neural architectures
on **most language tasks**

Brown, Tom B., et al. "Language models are few-shot learners."
Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2018). Bert: Pre-training of deep bidirectional transformers for language understanding



GPT-3



≈ autocomplete on steroids

Getting dialogue out of GPT-3

"-" trick for getting it to generate dialogue

Input

- Fellow ants, we have great news. Our new ant queen is born!
- Hello my loyal ants, I promise I will rule our nest with an iron claw!



Outputs

- All hail our new ant queen!

———————

- I am the new ant queen, and I will make our colony the strongest in the world!

———————

- It's time for us to expand our nest!
- Our nest is under attack!

Improbotics



A.L.Ex the robot **plays improv scenes** with improv actors

“Listens” to scene and **formulates own responses** with GPT-3

Later in show: gains **human body**. AI whispers through ear piece what actor should say.

End: everyone has ear piece
→ **Turing test**!

Improbotics interface



Operator types what happens and selects responses

GPT-2 / GPT-3 joke examples

GPT-2 can mimic **joke style**, but usually **very absurd**

What did one plate say to the other plate?
Dip me!

What did the chicken say after he got hit by a bus?
"I'm gonna be fine!"

A woman walks into the bar.....she says to the bartender "I want a double entendre" and the bartender says "No, we don't serve that"



https://www.gwern.net/GPT-3

https://towardsdatascience.com/teaching-gpt-2-a-sense-of-humor-fine-tuning-large-transformer-models-on-a-single-gpu-in-pytorch-59e8cec40912

GPT-3 generated “jokes”

Write a joke related to the Human-Robot Interaction Winter School on Embodied AI.

Q: What did the robot say at the Human-Robot Interaction Winter School on Embodied AI?
A: Let's get to the core of the issue!

Write a joke related to the Human-Robot Interaction Winter School on Embodied AI.

Q: What did the robot say when he arrived at the Human-Robot Interaction Winter School on Embodied AI?
A: "I'm ready to learn and interact!"

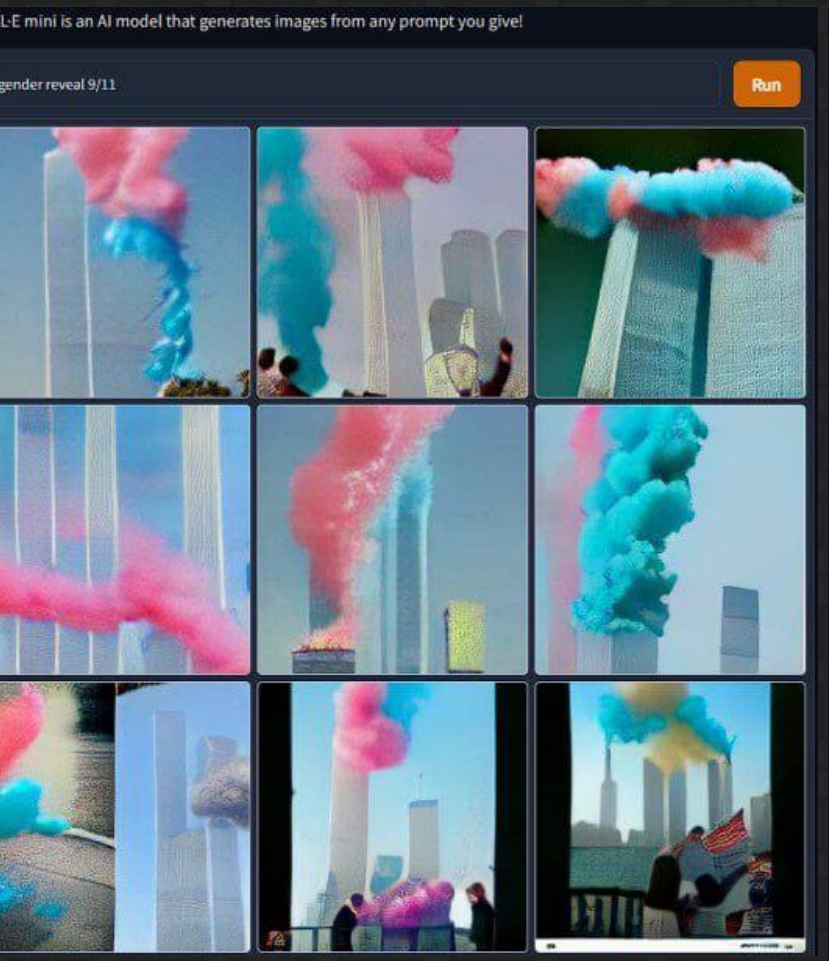
Reminiscent of how children write jokes

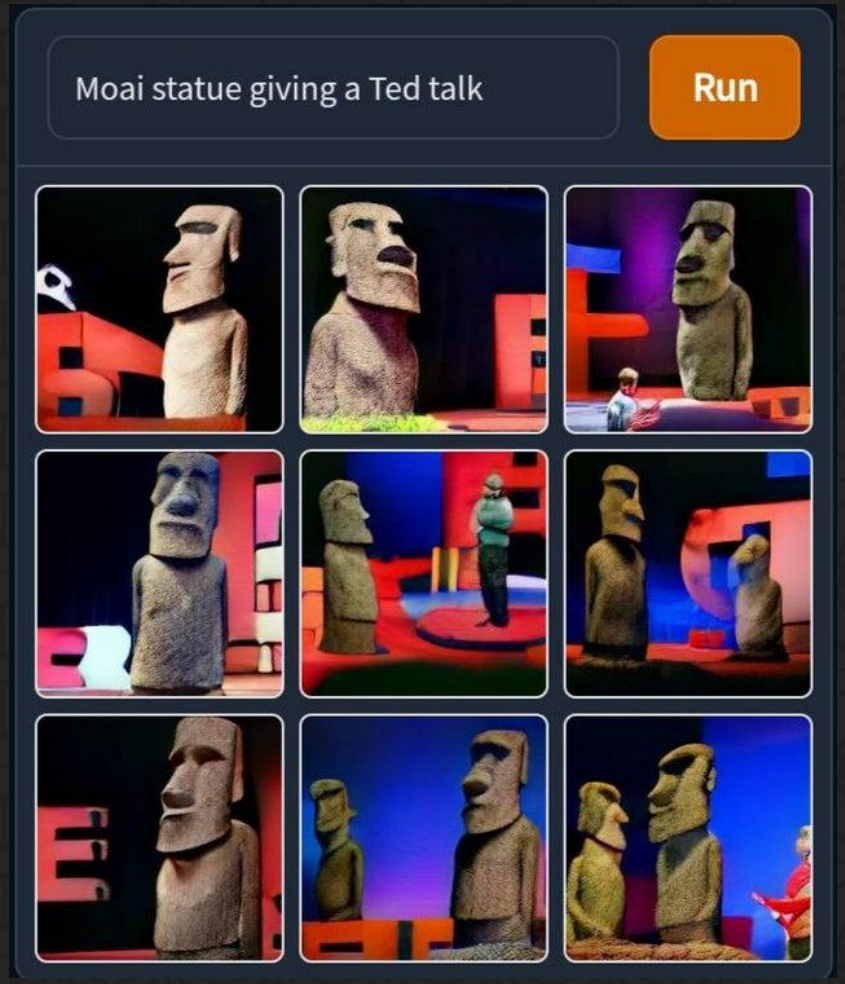


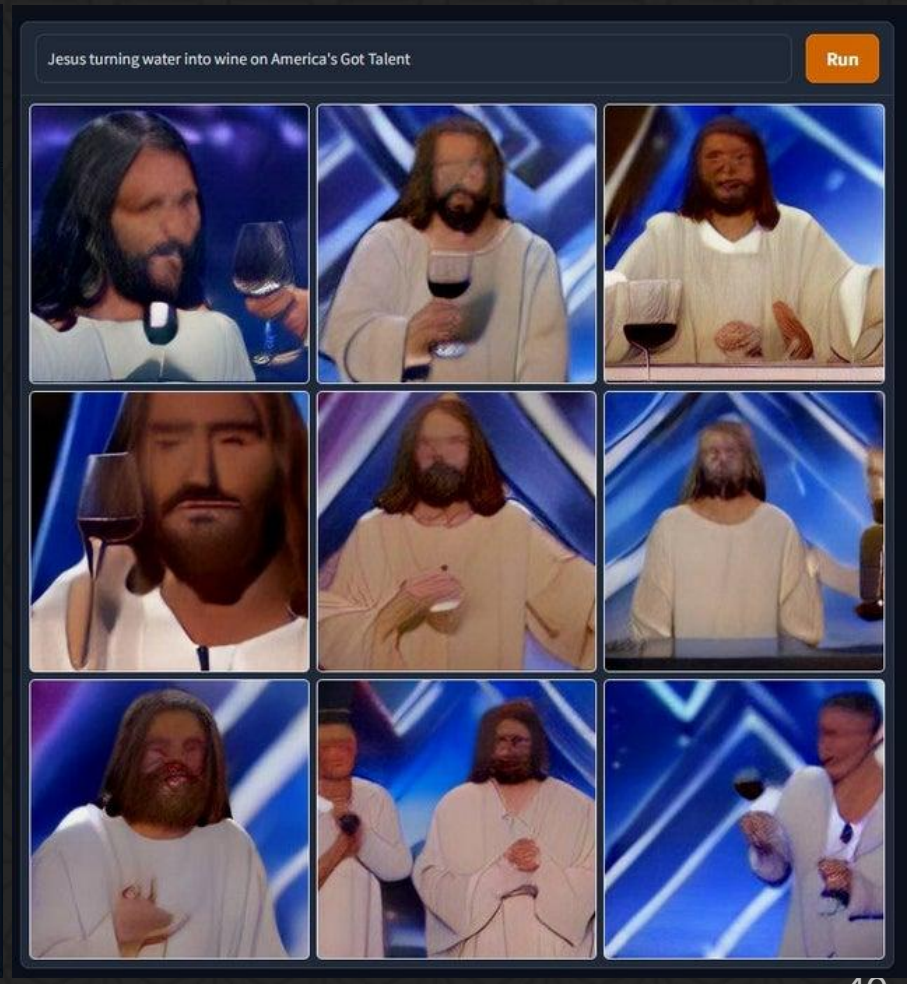


Text to image models: DALL-E, Stable Diffusion

Generates images from any given text





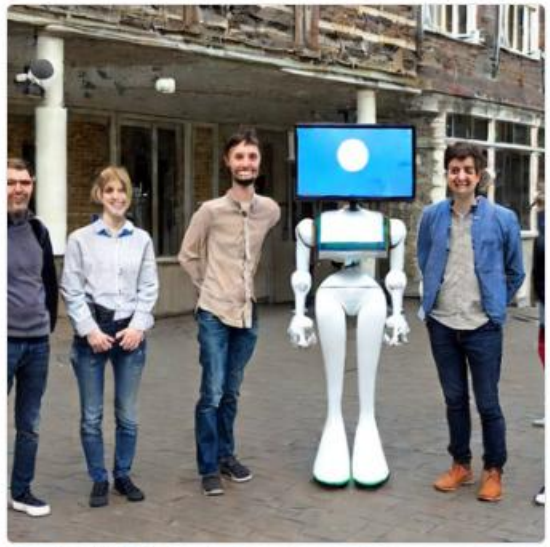


“trending on artstation, 4K” trick

Gent Winterschool on Human-Robot Interaction

Enter a negative prompt

Generate image



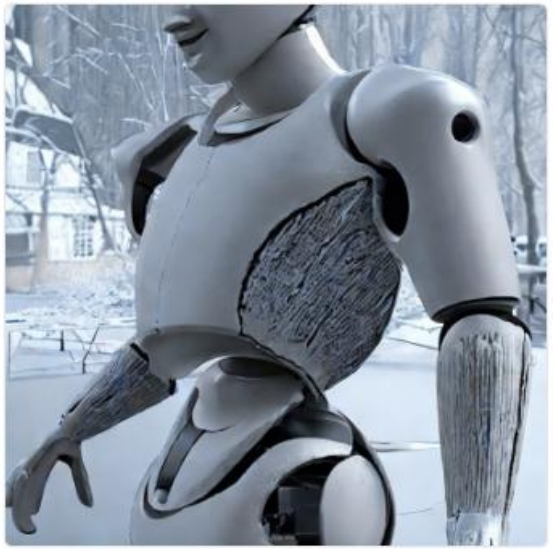



Gent Winterschool on Human-Robot Interaction, trending on artstation, 4K

Enter a negative prompt

Generate image



Gent

Enter a negative prompt

Generate image






Gent, trending on artstation, 4K

Enter a negative prompt

Generate image






Druk op Esc om het volledige scherm te sluiten

Brought to you by…
dallery.gallery

Version 1.01
July 14, 2022

DALL·E 2 prompt book

Emotional prompt words

dall•ery gall•ery



Positive mood, low energy 😌
light, peaceful, calm, serene, soothing, relaxed, placid, comforting, cosy, tranquil, quiet, pastel, delicate, graceful, subtle, balmy, mild, ethereal, elegant, tender, soft, light



Positive mood, high energy 🤪
bright, vibrant, dynamic, spirited, vivid, lively, energetic, colorful, joyful, romantic, expressive, bright, rich, kaleidoscopic, psychedelic, saturated, ecstatic, brash, exciting, passionate, hot



Negative mood, low energy 😳
muted, bleak, funereal, somber, melancholic, mournful, gloomy, dismal, sad, pale, washed-out, desaturated, grey, subdued, dull, dreary, depressing, weary, tired



Negative mood, high energy 😱
dark, ominous, threatening, haunting, forbidding, gloomy, stormy, doom, apocalyptic, sinister, shadowy, ghostly, unnerving, harrowing, dreadful, frightful, shocking, terror, hideous, ghastly, terrifying

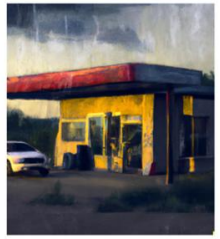
dall•ery gall•ery

Looks, vibes, -punks, -waves

😍 Check out this huge list!



Vaporwave: neon, pink, blue, geometric, futuristic, '80s.



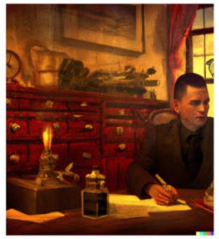
Post-apocalyptic: grey, desolate, stormy, fire, decay



Gothic, fantasy: stone, dark, lush, nature, mist, mystery, angular



Cybernetic, sci-fi: glows, greens, metals, armor, chrome



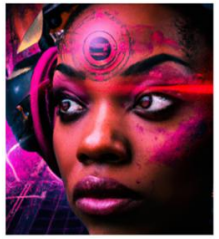
Steampunk: gold, copper, brass, Victoriana,



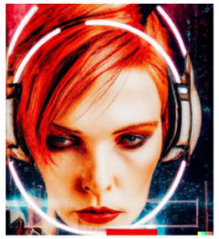
Memphis, Memphis Group, 1980s, bold, kitch, colourful, shapes



Dieselpunk, grimy, steel, oil, '50s, mechanised, punk cousin of steampnk



Afrofuturism: futuristic, and African!



Cyberpunk, 1990s, dyed hair, spiky, graphic elements .

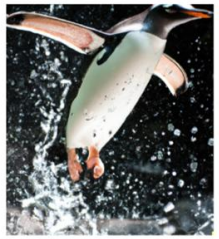


Biopunk, organic: greens, slimes, plants, futuristic, weird

dall•ery gall•ery

Camera settings + lenses

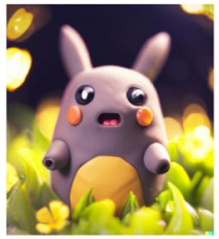
dall•ery gall•ery



Fast shutter speed, high speed, action photo, 1/1000 sec shutter



Slow shutter speed, 1 sec shutter, long exposure



Bokeh, shallow depth of field, blur, out-of-focus background (via)



Tilt shift photography (via)
Makes a narrow strip in-focus



Motion blur
(Source)



Telephoto lens, Sigma 500mm f/5
Shot from afar, feels 'voyeuristic'



Macro lens, macro photo (source)
Sigma 105mm F2.8 - for small scenes



Wide angle lens, 15mm (source)
Fits more of the scene in the frame

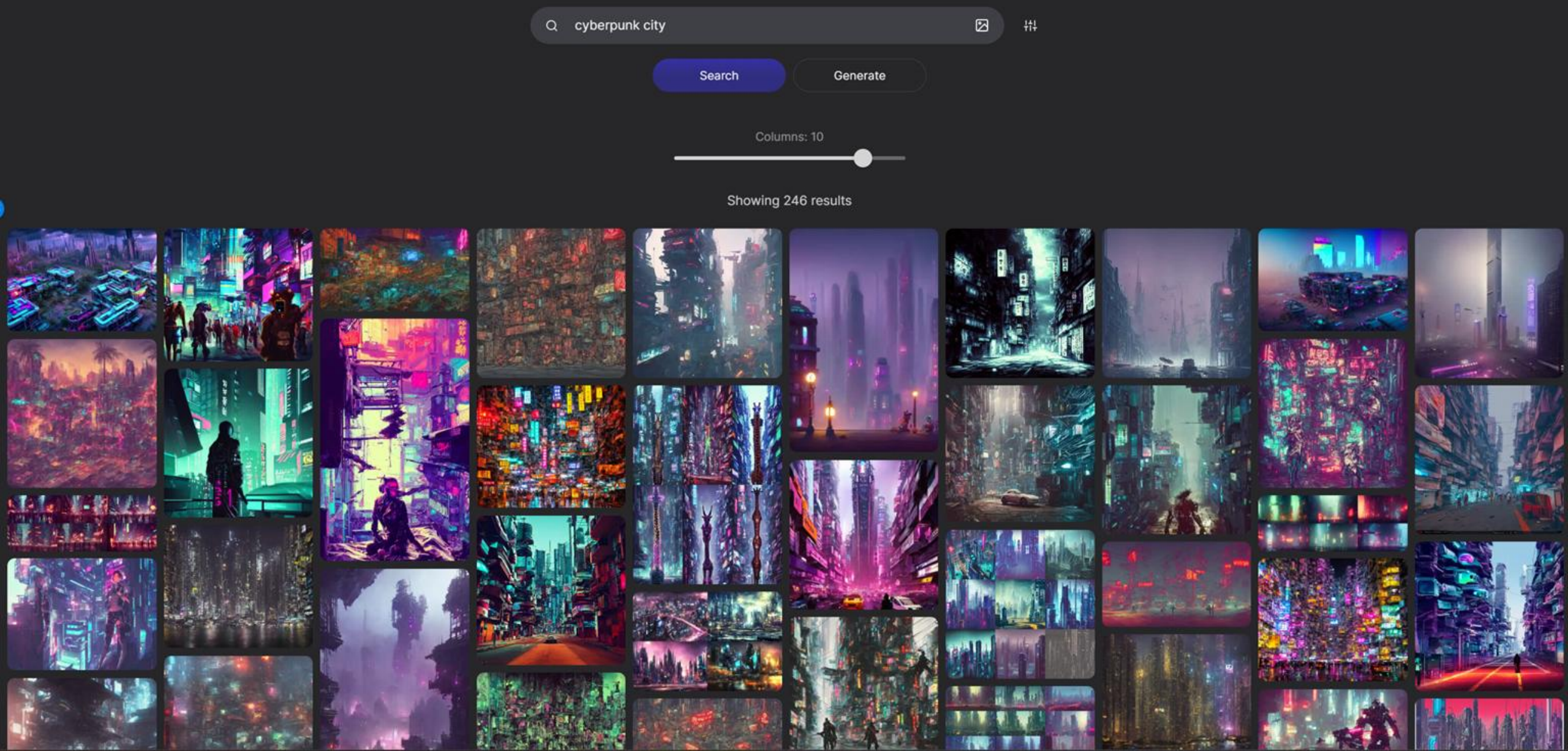


Fish-eye lens: distorts the scene, vv. wide angle, the centre 'bulges'



Deep depth of field, f/22, 35mm
Make all elements sharp

Lexica: prompt zoekmachine



Hyperrealism stock photography of highly detailed stylish robot in cyberpunk sci - fi style by gragory crewdson and katsuhiro otomo, mike winkelmann with many details by josan gonzalez working at the highly detailed data center by mike winkelmann and laurie greasley hyperrealism photo on dsmc 3 system rendered in blender and octane render

Generate | Copy prompt

Explore this style >

Seed
1011615474

Guidance scale
13

Dimensions
768 × 704



Zonder & Met Lexica “cyberpunk”

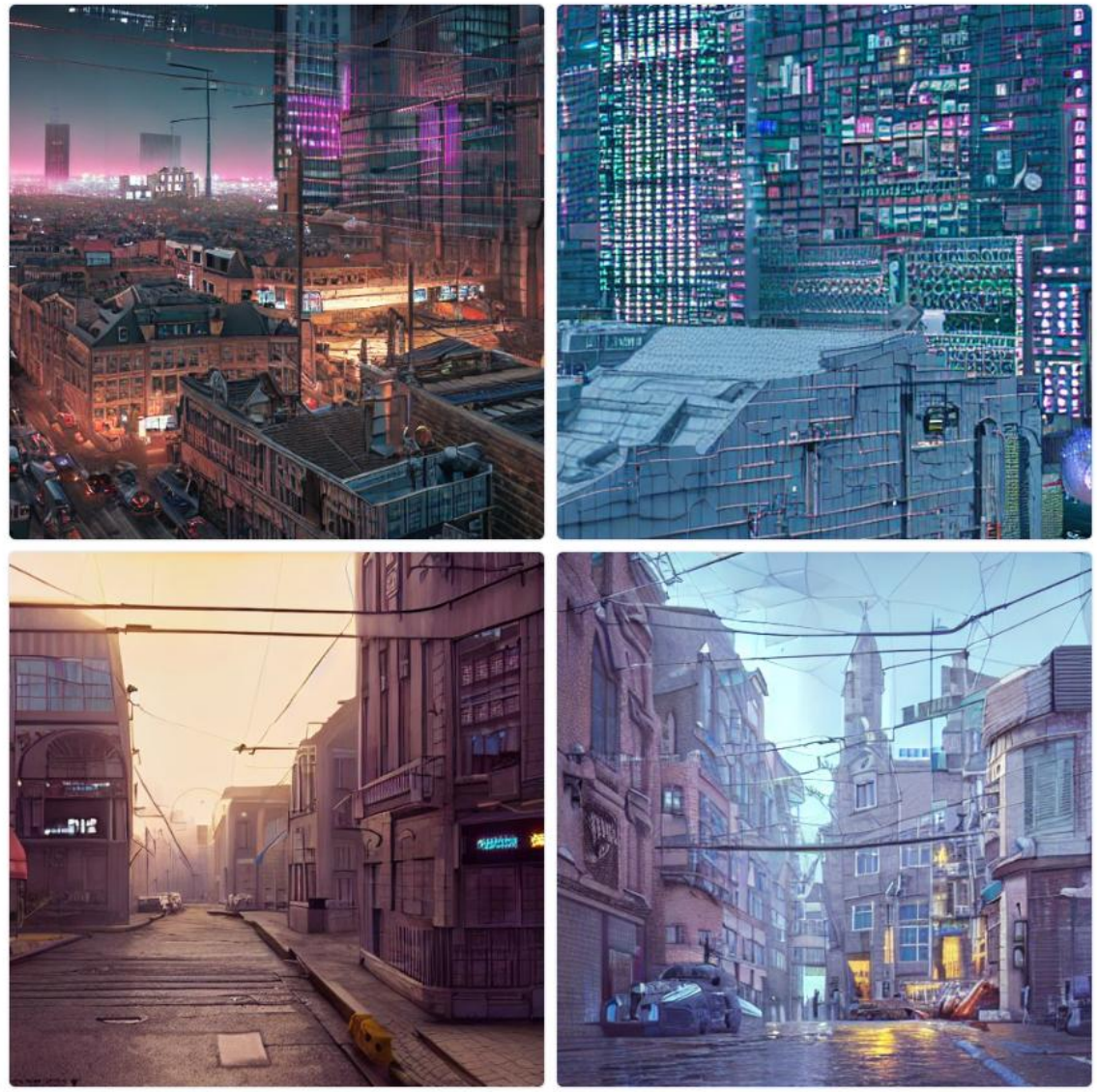
Ghent

Generate image



hyperrealism stock photography of the city of Ghent, highly detailed stylish

Generate image



The art of prompt engineering

Write a compliment for Tony Belpaeme.

"Tony Belpaeme, you are an inspiration to us all! Your hard work and dedication to your craft is truly admirable, and your achievements are an inspiration to us all."

Write a short summary of the work of Tony Belpaeme, and then write a compliment for him in the next paragraph.

Tony Belpaeme is a professor of Cognitive Systems and Robotics at the University of Plymouth. He has conducted extensive research in the field of human-robot interaction, developing new ways of communication between robots and humans. His research has focused on the development of robots that are able to learn from humans and interpret their behavior. He has also developed robots that are able to recognize and respond to social cues and emotions. His research has had an important impact on the development of robots that can interact with humans in a more natural way.

It is clear that Tony Belpaeme has achieved great success in the field of human-robot interaction. His research has contributed greatly to the advancement of robotics and his work has been instrumental in furthering the development of robots that can interact with humans in a more natural and intuitive way. He is truly a leader in the field and his work is an inspiration to all.

GPT-3 sucks at math ?

Thomas takes a train from Leuven to Gent. Leuven Station and Gent have a distance of 100km. The train travels at 50km/h. The train also stops three times for 10 minutes each. How long is the train ride?

2 hours

BUT: Let's think step by step

Thomas takes a train from Leuven to Gent. Leuven Station and Gent have a distance of 100km. The train travels at 50km/h. The train also stops three times for 10 minutes each. How long is the train ride? Let's think step by step.

The train travels at 50km/h, so it will take 2 hours to travel 100km. However, the train stops three times for 10 minutes each. This means that the train will spend a total of 30 minutes stopped. Therefore, the total train ride will be 2 hours and 30 minutes.

Prompt engineering leaderboards

No.	Template	Accuracy
1	Let's think step by step.	**78.7**
2	First, (*1)	77.3
3	Let's think about this logically.	74.5
4	Let's solve this problem by splitting it into steps. (*2)	72.2
5	Let's be realistic and think step by step.	70.8
6	Let's think like a detective step by step.	70.3
7	Let's think	57.5
8	Before we dive into the answer,	55.7
9	The answer is after the proof.	45.7
-	(Zero-shot)	17.7

Humor prompt that allows “draft paper”

This is a test of your ability to write satire about a given headline.
You must complete each of five different steps to write a joke.

1. topic handles: identify the two main distinct topics that define this article headline.
2. association: find funny surprising associated themes that link both topic handles from step 1.
3. punchlines: write three funny punchlines about associations found in step 2.
4. best punchline: select the funniest and most original punchline from step 3.
5. full joke: write a joke that first repeats the original news headline from the input, followed by a text linking it to the best punchline from step 4, and then repeats the punchline from step 4 itself.

News headline: Human-Robot Interaction Winter School on Embodied AI organized in Gent

News headline: Human-Robot Interaction Winter School on Embodied AI in Gent

1. topic handles: robots, AI

2. association: communication, emotions, learning

3. punchlines:

- "It'll be a cold day in Gent when these robots figure out how to feel emotions."
- "We're just teaching them how to better understand and communicate with humans... or at least that's what we're telling the robots."
- "This is the first step in teaching them how to be our overlords."

4. best punchline: "It'll be a cold day in Gent when these robots figure out how to feel emotions."

5. full joke: "It'll be a cold day in Gent when these robots figure out how to feel emotions," said one researcher at the Human-Robot Interaction Winter School on Embodied AI.

Explains it's "thinking process"

News headline: Belgian prime minister says the next five winters will be difficult due less energy supply.

1. topic handles: energy, winters
2. association: global warming
3. punchlines:
   - "In other news, the next five summers will be difficult due to more energy supply."
   - "We asked the Belgian prime minister for comment, but he was too busy stockpiling firewood."
   - "Experts are still trying to figure out why the Belgian prime minister is so bad at predictions."
4. best punchline:

"We asked the Belgian prime minister for comment, but he was too busy stockpiling firewood."

5. full joke:

"Belgian prime minister says the next five winters will be difficult due less energy supply. We asked the Belgian prime minister for comment, but he was too busy stockpiling firewood."

Other examples

- *In response to rising energy prices, an emergency conference has been called. The conference will be held in a dark room to save on energy costs. All attendees must bring their own energy drinks.*

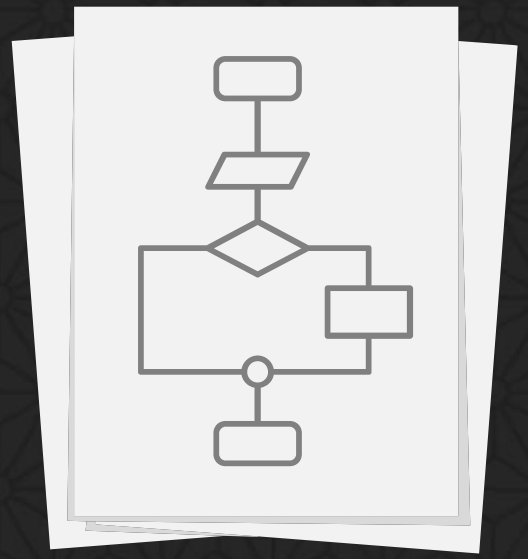
- *Pope assigns 21 new cardinals. Dressing up is usually a cardinal sin, but this pope is making an exception. The new cardinals will be responsible for passing out holy water balloons.*

- *The James Webb-telescope has once again taken some spectacular pictures of Jupiter. It's out of this world!*

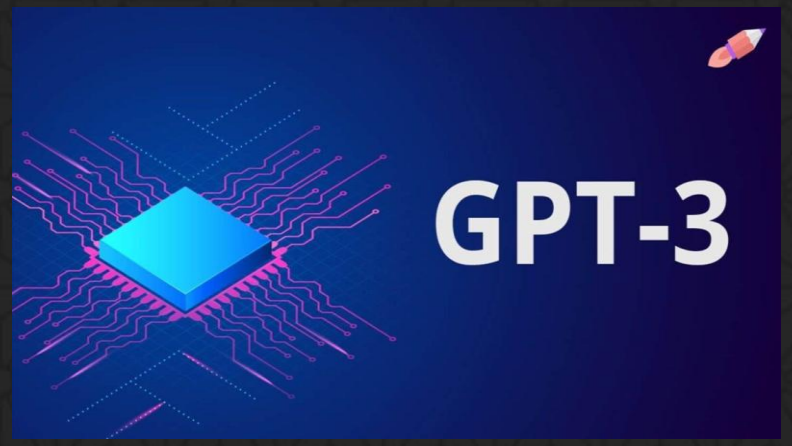
Can computers have a sense of humor?



Humor is **intrinsically human**



Computers can follow **specific humor instructions**



Large language models guide the revolution

but:

AI-complete problem!

Need to process two mental images
before fully understanding the joke

Thanks!

Slides: thomaswinters.be/talk/2022winterschool

- **TalkGenerator**: *talkgenerator.com*
- **TorfsBot:** *twitter.com/TorfsBot*
- **GPT-3:** *openai.com/api*
- **Image generators:**
  - *craiyon.ai*
  - *huggingface.co/spaces/stabilityai/stable-diffusion*



Thomas Winters

PhD Student at KU Leuven & FWO Fellow

@thomas_wint

thomaswinters.be