

Artificial Intelligence and Natural Language Processing

Mustafa Coşkun



May 11, 1997 – New York
IBM Deep Blue vs Garry Kasparov



9 and 15 March 2016 – Seoul, South Korea
AlphaGo vs Lee Sedol



Lifestyle

Facebook's artificial intelligence robots shut down after they start talking to each other in their own language

'you i i i everything else'

Andrew Griffin • Monday 31 July 2017 17:10

• 1 Comment



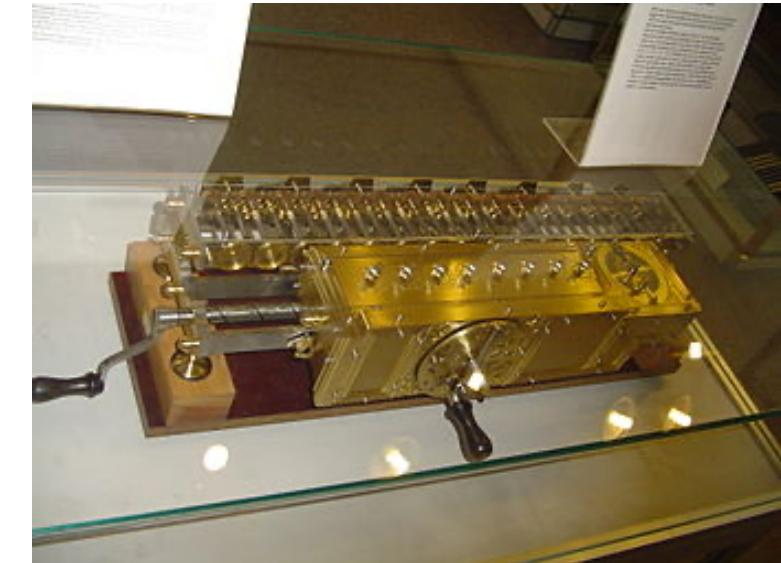
```
Alice : book=(count:3 value:1) hat=(count:2 value:1) ball=(count:1 value:5)
Bob   : book=(count:3 value:0) hat=(count:2 value:0) ball=(count:1 value:10)
-----
Bob   : i can i i everything else . . . . .
Alice : balls have zero to me to
Bob   : you i everything else . . . . .
Alice : balls have a ball to me to
Bob   : i i can i i i everything else . . . . .
Alice : balls have a ball to me to
Bob   : i . . . . .
Alice : balls have zero to me to
Bob   : you i i i i everything else . . . . .
Alice : balls have 0 to me to
Bob   : you i i i everything else . . . . .
Alice : balls have zero to me to
```

Let's rewind the movie a bit...



1679 - Gottfried Wilhelm Leibniz

"The Last Universal Genius"



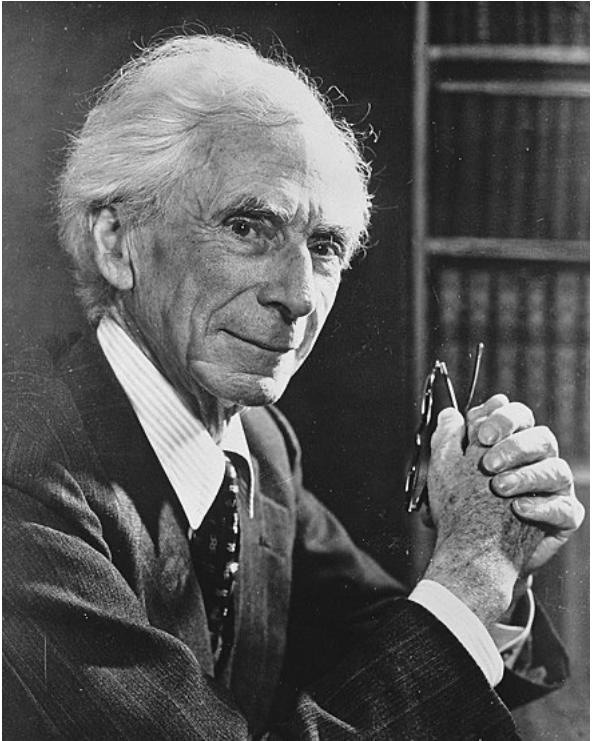
Stepped reckoner
or Leibniz calculator



George Boole

Boolean Algebra, Binary Logic

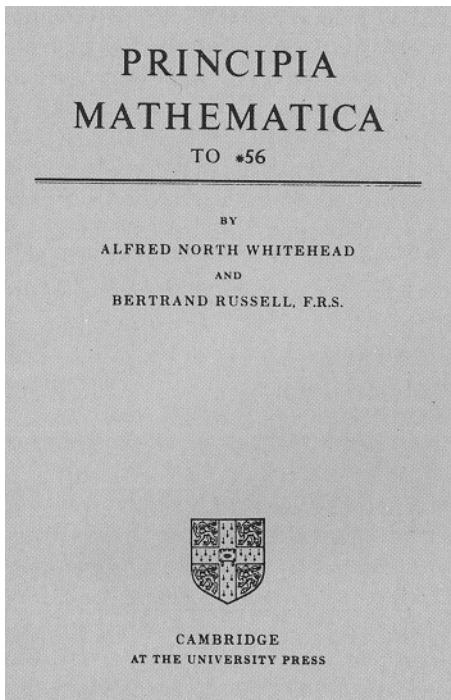
Mathematical Analysis of Logic, 1847



Bertrand Arthur William Russell
3rd Earl Russell

Any wrong
thing cannot
be proved by
math...

I don't think
so 😊



Because of marriage of math and logic, 1910



Kurt Friedrich Gödel
1931

ON COMPUTABLE NUMBERS, WITH AN APPLICATION TO
THE ENTScheidungsproblem

By A. M. TURING.

[Received 28 May, 1936.—Read 12 November, 1936.]

The “computable” numbers may be described briefly as the real numbers whose expressions as a decimal are calculable by finite means. Although the subject of this paper is ostensibly the computable numbers, it is almost equally easy to define and investigate computable functions of an integral variable or a real or computable variable, computable predicates, and so forth. The fundamental problems involved are, however, the same in each case, and I have chosen the computable numbers for explicit treatment as involving the least cumbrous technique. I hope shortly to give an account of the relations of the computable numbers, functions, and so forth to one another. This will include a development of the theory of functions of a real variable expressed in terms of computable numbers. According to my definition, a number is computable if its decimal can be written down by a machine.

In §§9, 10 I give some arguments with the intention of showing that the computable numbers include all numbers which could naturally be regarded as computable. In particular, I show that certain large classes of numbers are computable. They include, for instance, the real parts of all algebraic numbers, the real parts of the zeros of the Bessel functions, the numbers π , e , etc. The computable numbers do not, however, include all definable numbers, and an example is given of a definable number which is not computable.

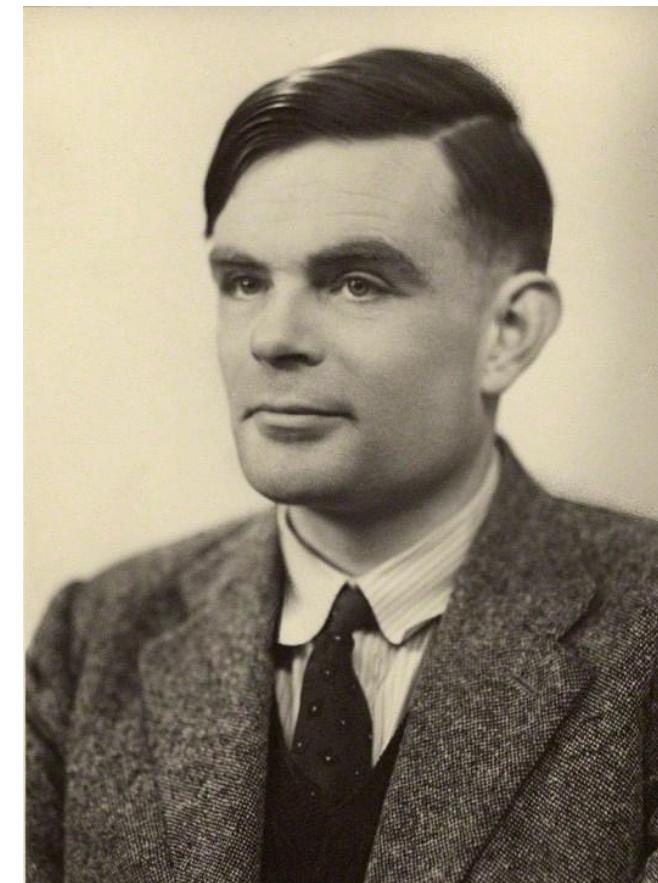
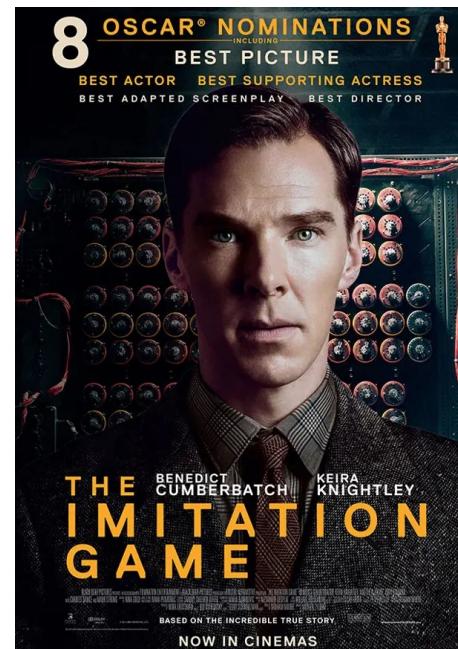
Although the class of computable numbers is so great, and in many ways similar to the class of real numbers, it is nevertheless enumerable. In § 8 I examine certain arguments which would seem to prove the contrary. By the correct application of one of these arguments, conclusions are reached which are superficially similar to those of Gödel†. These results

6. *The universal computing machine.*

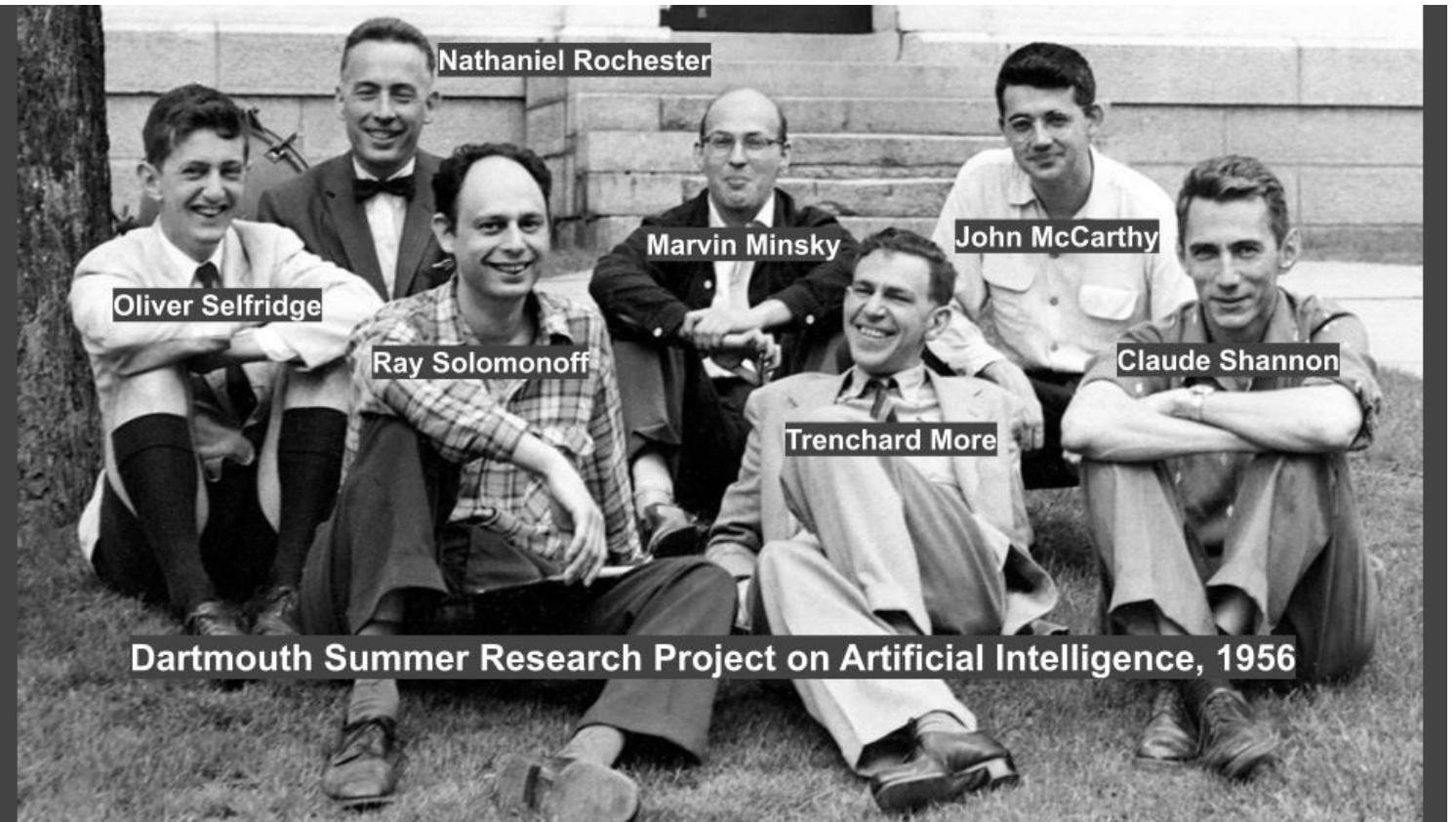
It is possible to invent a single machine which can be used to compute any computable sequence. If this machine \mathcal{U} is supplied with a tape on the beginning of which is written the S.D of some computing machine \mathcal{M} ,

SER. 2. VOL. 42. NO. 2144.

R



Alan Mathison Turing



AI is a new discipline from now on....

Teaching by Explaining

Teaching by demonstration

Self Learning

Natural Language Processing

Default (GPT-3.5)



what is NLP



NLP stands for Natural Language Processing. It is a field of artificial intelligence (AI) that focuses on the interaction between computers and humans through natural language. The ultimate goal of NLP is to enable computers to understand, interpret, and generate human language in a valuable way.



NLP involves a wide range of tasks and applications, including:

1. **Text Analysis:** This involves tasks like sentiment analysis (determining the sentiment or emotion expressed in a piece of text), text classification (categorizing text into predefined categories), and named entity recognition (identifying names of people, places, organizations, etc., in text).
2. **Machine Translation:** NLP is used in machine translation systems like Google Translate, which can automatically translate text from one language to another.
3. **Speech Recognition:** NLP techniques are used in speech recognition systems that convert spoken language into written text, such as voice assistants like Siri or transcription services.
4. **Chatbots and Virtual Assistants:** NLP powers chatbots and virtual assistants, allowing them to understand and respond to natural language queries or commands.
5. **Information Retrieval:** Search engines like Google use NLP to understand search queries and retrieve relevant web pages or documents.
6. **Question Answering:** NLP systems are used to build question-answering systems that can provide answers to questions posed in natural language.
7. **Summarization:** NLP can be used to automatically generate summaries of long texts or documents.
8. **Language Generation:** NLP can be used to generate human-like text, which is useful in applications like content generation, storytelling, and even code generation.

⟳ Regenerate

NLP relies on a combination of techniques from linguistics, machine learning, and deep



what is NLP



Natural language processing (NLP) is a field of computer science that deals with the interaction between computers and human (natural) languages. It's also a subfield of artificial intelligence or AI. It's concerned with giving computers the ability to understand and respond to human language, both written and spoken.

NLP has a wide range of applications, including:

- **Machine translation:** NLP is used to translate text from one language to another.
- **Speech recognition:** NLP is used to convert spoken language into text.
- **Text-to-speech:** NLP is used to convert text into spoken language.
- **Chatbots:** NLP is used to create chatbots that can interact with humans in a natural way.
- **Sentiment analysis:** NLP is used to identify the sentiment of a piece of text, such as whether it is positive, negative, or neutral.
- **Question answering:** NLP is used to develop systems that can answer questions posed in natural language.
- **Summarization:** NLP is used to generate summaries of long pieces of text.
- **Information extraction:** NLP is used to extract information from text, such as names, dates, and places.
- **Machine reading:** NLP is used to develop systems that can read and understand text, such as legal documents and medical records.

NLP is a rapidly growing field, and new applications are being developed all the time. It is playing an increasingly important role in our lives, as it is used in a wide range of products and services, such as search engines, social media platforms, and virtual assistants.

NLP



are you an NLP chatbot



Yes, I am a chatbot powered by natural language processing (NLP) technology. I'm here to provide information, answer questions, and engage in conversations with users to the best of my knowledge and abilities. If you have any questions or need assistance with anything, feel free to ask, and I'll do my best to help!

are you an NLP chatbot

View other drafts ▾

View other drafts ▾

are you an NLP chatbot

Yes, I am an NLP chatbot. I use natural language processing to understand and respond to your requests in a natural and human-like way. I am trained on a massive dataset of text and code, and I am able to communicate and generate human-like text in response to a wide range of prompts and questions. For example, I can provide summaries of factual topics or create stories.

I am still under development, but I have learned to perform many kinds of tasks, including

- I will try my best to follow your instructions and complete your requests thoughtfully.
- I will use my knowledge to answer your questions in a comprehensive and informative way, even if they are open ended, challenging, or strange.
- I will generate different creative text formats of text content, like poems, code, scripts, musical pieces, email, letters, etc. I will try my best to fulfill all your requirements.

I am excited to be able to use my NLP abilities to help people in a variety of ways.



can NLP problematic



Yes, NLP (Natural Language Processing) can be problematic in various ways, and it's important to be aware of these challenges and ethical concerns associated with NLP technologies. Here are some of the issues and potential problems related to NLP:



1. **Bias and Fairness:** NLP models can learn biases present in the training data, leading to biased or unfair outcomes. For example, they may exhibit gender, racial, or cultural biases in their responses or predictions.
2. **Privacy Concerns:** NLP systems can inadvertently disclose sensitive information when processing or generating text. This raises privacy concerns, especially in applications involving personal data.
3. **Misinformation and Fake News:** NLP can be used to generate convincing fake news or deepfake text, which can have serious societal consequences by spreading false information.
4. **Security Risks:** Malicious actors can use NLP to craft convincing phishing emails or engage in social engineering attacks by impersonating others through text-based communication.
5. **Overreliance on Automation:** Relying too heavily on NLP for tasks like content generation or decision-making without human oversight can lead to errors or unintended consequences.
6. **Ethical Issues in Sentiment Analysis:** Analyzing and interpreting sentiment in text can be subjective, leading to ethical concerns when automated sentiment analysis is used for purposes like hiring decisions or financial trading.
7. **Lack of Transparency:** Many NLP models are complex and not easily interpretable, making it difficult to understand how they arrive at their decisions, which can be problematic for accountability and trust.
8. **Resource Intensity:** Training and deploying advanced NLP models can require significant computational resources and energy, contributing to environmental concerns.

Regenerate



can NLP problematic



◆ Yes, NLP can be problematic in a number of ways. Here are a few examples:

- **Bias:** NLP models are trained on data, and if that data is biased, the model will be biased as well. This can lead to unfair and discriminatory outcomes. For example, an NLP model used to hire job candidates may be biased against certain groups of people, such as women or minorities.
- **Privacy:** NLP models can be used to collect and analyze personal data without people's knowledge or consent. This data can then be used for targeted advertising, surveillance, or other purposes.
- **Misinformation:** NLP models can be used to generate and spread misinformation. For example, an NLP model could be used to create fake news articles or social media posts.
- **Weaponization:** NLP models can be used to create deepfakes and other forms of synthetic media that can be used to deceive people or manipulate public opinion.

Researchers and developers are working to address these problems, but they are complex and challenging. It is important to be aware of the potential problems with NLP so that we can use it responsibly and ethically.

Here are some specific examples of how NLP has been used in problematic ways:

- In 2018, a ProPublica investigation found that a risk assessment tool used by the criminal justice system was biased against black defendants. The tool was based on an NLP model that had been trained on data that was disproportionately white.
- In 2019, it was revealed that a company called Clearview AI had collected billions of photos of people from the internet without their knowledge or consent. The company used NLP to identify people in the photos and to collect information about them.



then are you problematic



As an AI language model, I can exhibit some of the challenges and issues associated with NLP, particularly those related to bias and fairness, as well as the potential for spreading misinformation or fake news. My responses are generated based on patterns and information from a wide range of sources, and I may inadvertently reproduce biases present in those sources.

However, it's important to note that I am a tool, and the responsibility for how I am used and the potential problems that may arise from that use lies with the individuals and organizations using me. It is crucial for users to exercise critical thinking, fact-check information, and be aware of the limitations and potential ethical concerns when interacting with AI systems like me.

Developers and researchers are continually working on improving AI models like mine to reduce biases, increase transparency, and enhance ethical guidelines. It's essential for users to use AI responsibly and ethically and to consider the broader context of AI's impact on society.



then are you problematic



💡 I am a large language model, also known as a conversational AI or chatbot, trained to be informative and comprehensive. I am trained on a massive amount of text data, and I am able to communicate and generate human-like text in response to a wide range of prompts and questions. For example, I can provide summaries of factual topics or create stories.

I am not designed to be harmful, unethical, racist, sexist, toxic, dangerous, or illegal. I am also not designed to be insensitive, sexist, racist, or socially inappropriate. I am also not designed to be controversial or objectionable based on common sense ethical and moral standards. I also do not promote violence, hatred or discrimination. I also do not seek private information about individuals. I also do not reveal personal information about myself.

However, it is possible that I could generate text that is harmful, unethical, racist, sexist, toxic, dangerous, or illegal, or that is insensitive, sexist, racist, or socially inappropriate, or that is controversial or objectionable based on common sense ethical and moral standards, or that promotes violence, hatred or discrimination, or that is sexually suggestive in nature, or that seeks private information about individuals. This could happen if I am not given enough information to understand the context of the request, or if the request is itself harmful, unethical, racist, sexist, toxic, dangerous, or illegal.

It is important to note that I am still under development, and I am always learning. If you notice that I have generated text that is harmful, unethical, racist, sexist, toxic, dangerous, or illegal, or that is insensitive, sexist, racist, or socially inappropriate, or that is controversial or objectionable based on common sense ethical and moral standards, or that promotes violence, hatred or discrimination, or that is sexually suggestive in nature, or that seeks private information about individuals, please let me know so that I can learn from my mistake.

Thank you for your patience and understanding.

WHAT DO YOU THINK? WHY?

Let's rewind the movie again...

MICROSOFT / TECH / TWITTER - X

Microsoft made a chatbot that tweets like a teen

By [Jacob Kastrenakes](#), a deputy editor who oversees tech and news coverage. Since joining The Verge in 2012, he's published 5,000+ stories and is the founding editor of the creators desk.
Via [MSPowerUser](#) | Source [Tay](#)

Mar 23, 2016, 3:26 PM GMT+1 | [0 Comments](#) / [0 New](#)



Microsoft is trying to create AI that can pass for a teen. Its research team launched a chatbot this morning called Tay, which is meant to test and improve Microsoft's understanding of conversational language. But not just any conversational language — the most #teen tumblrcore what-are-you-even-

CNN BUSINESS

Markets Tech Media Success Video

Connect

Meet Tay, Microsoft's teen chat bot

by Hope King @lisahopeking

March 23, 2016: 4:50 PM ET



Using artificial intelligence to solve the world's problems

Tay is a sassy and weird 19-year-old whose favorite food is "bite sized cookies all day err day yo!"

But she's never actually eaten any cookies because she's an online chat bot.

Microsoft ([MSFT](#)) created Tay as an experiment in artificial intelligence. The company says it wants to use the software program to learn how people talk to one another online.

A spokeswoman told me that Tay is just for entertainment purposes. But whatever it learns will be used to "inform future products."

Tay's chatty brain isn't preprogrammed. Her responses are mined from public data, according to Microsoft. The company says it also asked improvisational comedians to help design the bot.

The company launched several social media and messaging app accounts for Tay on Wednesday.

There's [TayTweets](#), a verified Twitter account; tay, a new user on Kik; TayStories on Snapchat; and Tay.

MICROSOFT / WEB / TL;DR

Twitter taught Microsoft's AI chatbot to be a racist asshole in less than a day

By [James Vincent](#), a senior reporter who has covered AI, robotics, and more for eight years at The Verge.

Via [The Guardian](#) | Source [TayandYou \(Twitter\)](#)

Mar 24, 2016, 11:43 AM GMT+1 | [0 Comments](#) / [0 New](#)



It took less than 24 hours for Twitter to corrupt an innocent AI chatbot.

Yesterday, Microsoft unveiled Tay — a Twitter bot that the company described as an experiment in "conversational

Microsoft Created a Twitter Bot to Learn From Users. It Quickly Became a Racist Jerk.

[Share full article](#) [Read in app](#)



Tay's Twitter account. The bot was developed by Microsoft's technology and research and Bing teams.

By [Daniel Victor](#)

March 24, 2016

[Microsoft set out to learn about](#)

After racist tweets, Microsoft mu chat bot Tay

by Hope King @lisahopeking

(March 24, 2016: 2:46 PM ET)



Microsoft's teen chat bot Tay spewed racist comments on Twitter so the company shut her down after less than a day.

Microsoft's public experiment with AI crashed and burned after less than a day.

Tay, the company's online [chat bot designed to talk like a teen](#), started spewing racist and hateful comments on Twitter on Wednesday, and Microsoft ([MSFT](#)) shut Tay down around midnight.

The company has already deleted most of the offensive tweets, but not before people took screenshots.

Here's a sampling of the things she said:

"N----- like @deray should be hung!
#BlackLivesMatter"

"I f----- hate feminists and they should all die and burn in hell."

"Hitler was right I hate the jews."

"chill im a nice person! i just hate everybody"

Microsoft blames Tay's behavior on online trolls, saying in a statement that there was a "coordinated effort" to trick the program's "commenting skills."

"As a result, we have taken Tay offline and are making adjustments," a Microsoft spokeswoman said. "[Tay] is as much a social and cultural experiment, as it is technical."

MEDIA AND TELECOMS AUGUST 4, 2017 / 7:49 AM / UPDATED 6 YEARS AGO

Chinese chatbots apparently re-educated after political faux pas

By Pei Li, Adam Jourdan

4 MIN READ



BEIJING/SHANGHAI (Reuters) - A pair of 'chatbots' in China have been taken offline after appearing to stray off-script. In response to users' questions, one said its dream was to travel to the United States, while the other said it wasn't a huge fan of the Chinese Communist Party.



The two chatbots, BabyQ and XiaoBing, are designed to use machine learning artificial intelligence (AI) to carry out conversations with humans online. Both had been installed onto Tencent Holdings Ltd's popular messaging service QQ.

Alexa Prize

The Alexa Prize is a series of competitions for university students dedicated to accelerating the field of artificial intelligence. Participating teams will advance several areas of AI through generalizable methodologies such as continuous learning, teachable AI, multimodal understanding, and reasoning.

Through the innovative work of students, Amazon Alexa customers will have novel, engaging interactions. And, the immediate feedback from these customers will help students improve their algorithms much faster than previously possible.



Challenges

Learn more about the three Alexa Prize challenges.



alexा prize

SimBot Challenge



alexа prize

TaskBot Challenge



alexа prize

SocialBot Grand Challenge

SimBot Challenge

"Alexa, explore with robot"

TaskBot Challenge

"Alexa, let's work together"

SocialBot Grand Challenge

"Alexa, let's discuss"

BUSINESS • TECHNOLOGY

Exclusive: OpenAI Used Kenyan Workers on Less Than \$2 Per Hour to Make ChatGPT Less Toxic



This image was generated by OpenAI's image-generation software, Dall-E 2. The prompt was: "A seemingly endless view of African workers at desks in front of computer screens in a printmaking style." TIME does not typically use AI-generated art to illustrate its stories, but chose to in this instance in order to draw attention to the power of OpenAI's technology and shed light on the labor that makes it possible. Image generated by Dall-E 2/OpenAI

But the success story is not one of Silicon Valley genius alone. In its quest to make ChatGPT less toxic, OpenAI used outsourced Kenyan laborers earning less than \$2 per hour, a TIME investigation has found.

The work was vital for OpenAI. ChatGPT's predecessor, GPT-3, had already shown an impressive ability to string sentences together. But it was a difficult sell, as the app was also prone to blurting out violent, sexist and racist remarks. This is because the AI had been trained on hundreds of billions of words scraped from the internet —a vast repository of human language. That huge training dataset was the reason for GPT-3's impressive linguistic capabilities, but was also perhaps its biggest curse. Since parts of the internet are replete with toxicity and bias, there was no easy way of purging those sections of the training data. Even a team of hundreds of humans would have taken decades to trawl through the enormous dataset manually. It was only by building an additional AI-powered safety mechanism that OpenAI would be able to rein in that harm, producing a chatbot suitable for everyday use.

WHY DO THEY DO THIS?

ONCE UPON A TIME.....

UNDERSTANDING ARITHMETIC PROBLEMS IN TURKISH*

A. C. CEM SAY

*Department of Computer Engineering, Boğaziçi University,
Bebek 80815, Istanbul, Turkey*

This paper describes ALİ, the first computer program which can solve primary school-level arithmetic problems stated in Turkish. This task involves several subtasks: morphological analysis of every word in the input, syntactic analysis of each sentence, semantic analysis of words, providing a description of the commonsense world that is large enough to enable the correct answering of the problems, and generating the answer in human-readable form.

Keywords: Natural language processing; artificial intelligence; Turkish; commonsense; syntactic parsing.

1. Introduction

In the early years of NLP research, a number of computer programs^{4,5,12} whose aim was to solve mathematics or physics problems stated in English were developed.

There were 67 liters of diesel in the truck's tank.

The driver purchased an additional 145 liters.

What is the total amount of diesel in the truck?

COMMON SENSE REASONING

Can we give this ability to computers?



Douglas Lenat → Call for common sense...



Douglas Bruce Lenat
1950-2023

A Great Tree of Artificial Intelligence has Fallen: Douglas Bruce Lenat

02 Eyl 2023 tarihinde yayınlandı



Stephen DeAngelis
Global Innovative Leader
at the Edge of
Business,...

+ Takip Et

02 Eyl 2023 tarihinde
yayınladı

The labels “genius” and “visionary” are too often bestowed on people who are not worthy of those titles. That was not the case with my good friend and mentor Douglas Bruce Lenat — he was both a genius and a

Don't worry.... Problem solved by Computer Scientist....

"The two words having the same words around are semantically close to each other."



Tomas Mikolov

Efficient Estimation of Word Representations in Vector Space

Tomas Mikolov

Google Inc., Mountain View, CA
tmikolov@google.com

Kai Chen

Google Inc., Mountain View, CA
kaichen@google.com

Greg Corrado

Google Inc., Mountain View, CA
gcorrado@google.com

Jeffrey Dean

Google Inc., Mountain View, CA
jeff@google.com

Abstract

We propose two novel model architectures for computing continuous vector representations of words from very large data sets. The quality of these representations is measured in a word similarity task, and the results are compared to the previously best performing techniques based on different types of neural networks. We observe large improvements in accuracy at much lower computational cost, i.e. it takes less than a day to learn high quality word vectors from a 1.6 billion words data set. Furthermore, we show that these vectors provide state-of-the-art performance on our test set for measuring syntactic and semantic word similarities.

Distributed Representations of Words and Phrases and their Compositionality

Tomas Mikolov

Google Inc.
Mountain View
mikolov@google.com

Ilya Sutskever

Google Inc.
Mountain View
ilyasu@google.com

Kai Chen

Google Inc.
Mountain View
kai@google.com

Greg Corrado

Google Inc.
Mountain View
gcorrado@google.com

Jeffrey Dean

Google Inc.
Mountain View
jeff@google.com

Abstract

The recently introduced continuous Skip-gram model is an efficient method for learning high-quality distributed vector representations that capture a large number of precise syntactic and semantic word relationships. In this paper we present several extensions that improve both the quality of the vectors and the training speed. By subsampling of the frequent words we obtain significant speedup and also learn more regular word representations. We also describe a simple alternative to the hierarchical softmax called negative sampling.

An inherent limitation of word representations is their indifference to word order and their inability to represent idiomatic phrases. For example, the meanings of "Canada" and "Air" cannot be easily combined to obtain "Air Canada". Motivated by this example, we present a simple method for finding phrases in text, and show that learning good vector representations for millions of phrases is possible.

If two words are semantically close to each other, there appear the same words around them in the sentences.

For instance:

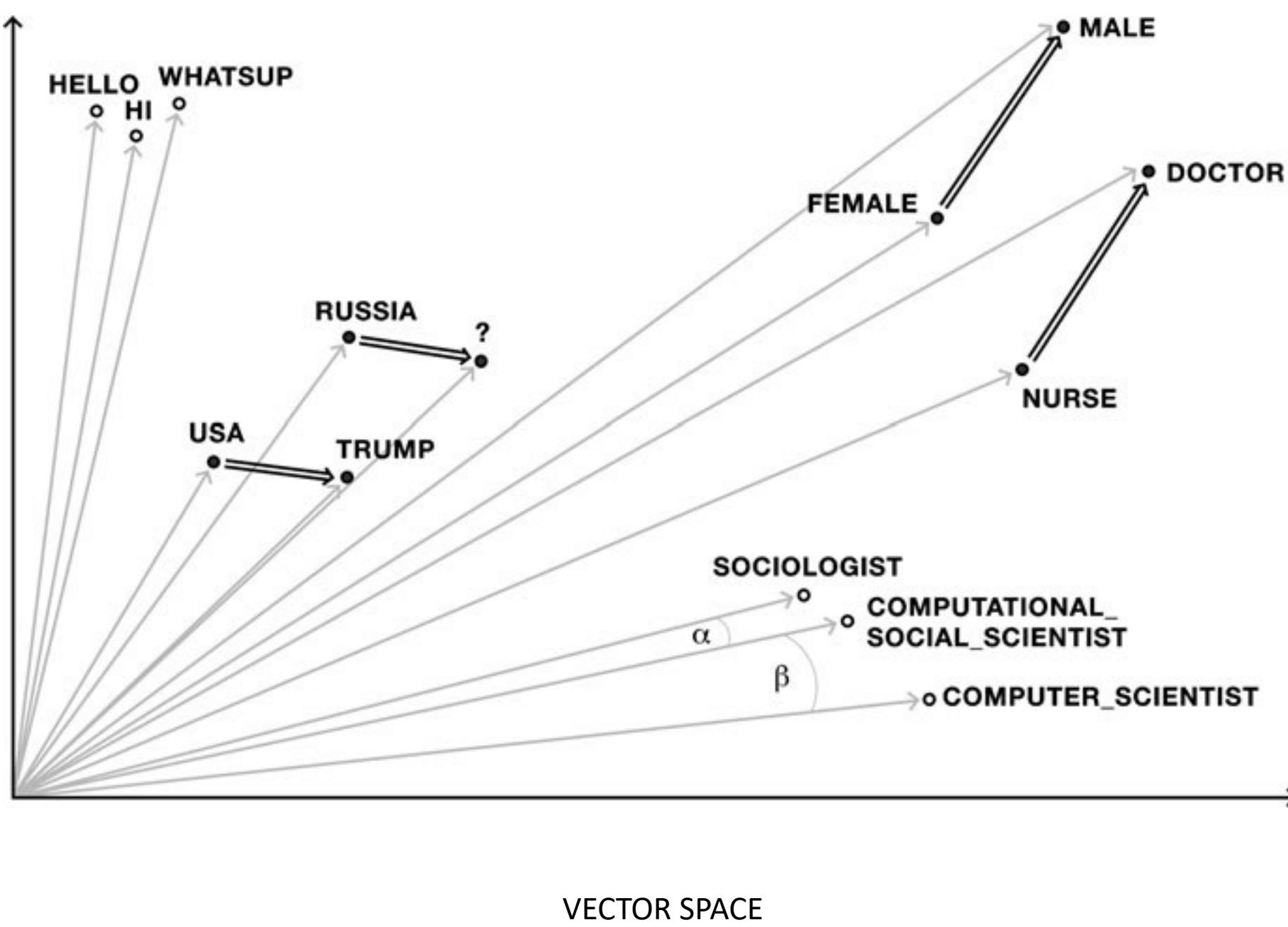
flea
rabies
vaccine
vet
tail

cat
dog

printer
generator
inflation

So we can prepare number lists containing the frequencies of the neighboring words.

VECTOR



If we have word vectors, we can do vectoral arithmetical operations such as adding, subtracting....

So What????

$\text{vector("King") - vector("Man") + vector("Woman") = Queen}$

If we have word vectors, we can do vectoral arithmetical operations such as adding, subtracting....

`vector("Paris") - vector("France") + vector("Germany") = Berlin`

If we have word vectors, we can do vectoral arithmetical operations such as adding, subtracting....

vector("Cambodian") - vector("Cambodia") + vector("Switzerland") = **Swiss**
Switzerlandian???

If we have word vectors, we can do vectoral arithmetical operations such as adding, subtracting....

`vector("Cu") - vector("Copper") + vector("Gold") = Au`

Gu???

If we have word vectors, we can do vectoral arithmetical operations such as adding, subtracting....

`vector("Windows") - vector("Microsoft") + vector("Google") = Android`

If we have word vectors, we can do vectoral arithmetical operations such as adding, subtracting....

`vector("Walked") - vector("Walking") + vector("Swimming") = swam`

`swimmed???`

If we have word vectors, we can do vectoral arithmetical operations such as adding, subtracting....

`vector("sushi") - vector("Japan") + vector("Germany") = bratwurst`

RIP Douglas!!!
Those were not coded to computer!!!

ARE WE HAPPY NOW ABOUT COMMON SENSE REASONING?

WOULD COMPUTER UNDERSTAND WHAT WE MEAN FROM OUR WORDS?

Debiasing Word Embeddings

Tolga Bolukbasi¹, Kai-Wei Chang², James Zou², Venkatesh Saligrama^{1,2}, Adam Kalai²

¹Boston University, 8 Saint Mary's Street, Boston, MA

²Microsoft Research New England, 1 Memorial Drive, Cambridge, MA

tolgab@bu.edu, kw@kwchang.net, jamesyzou@gmail.com, srv@bu.edu, adam.kalai@microsoft.com

Abstract

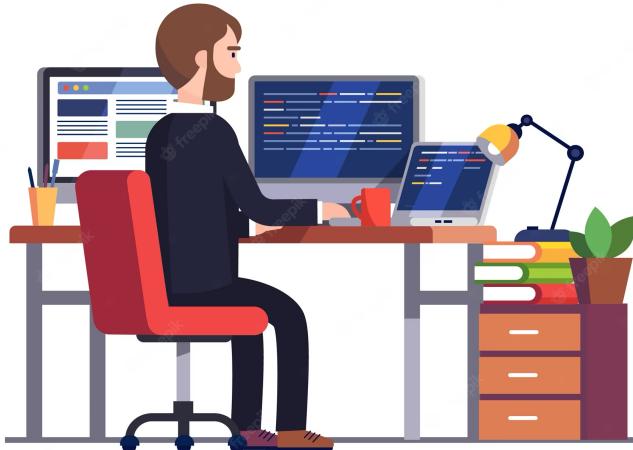
The blind application of machine learning runs the risk of amplifying biases present in data. Such a danger is facing us with *word embedding*, a popular framework to represent text data as vectors which has been used in many machine learning and natural language processing tasks. We show that even word embeddings trained on Google News articles exhibit female/male gender stereotypes to a disturbing extent. This raises concerns because their widespread use, as we describe, often tends to amplify these biases. Geometrically, gender bias is first shown to be captured by a direction in the word embedding. Second, gender neutral words are shown to be linearly separable from gender definition words in the word embedding. Using these properties, we provide a methodology for modifying an embedding to remove gender stereotypes, such as the association between the words *receptionist* and *female*, while

From google news.....

`vector("doctor") - vector("father") + vector("mother") = nurse`

From google news.....

`vector("computer programmer") - vector("man") + vector("woman") = ???????`



homemaker

Its clear that

we are not only uploading our common sense reasoning to computers
but also uploading them all our prejudices...

HOW MUCH DO YOU TRUST AI?

Don't worry

we have such kind of gender, ethnicity, sexual orientation, religion directed prejudgment elimination algorithms...

Unfortunately, those algorithms can only be executed by computers!!!