

2024 – 2025



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Ali nas bodo namesto zdravnikov kmalu zdravili inteligentni roboti?

Dejan Dinevski

PRAVNO OBVESTILO:

Na vseh dogodkih projekta oooZnanost! poteka snemanje in fotografiranje za namen promocije in poročanja o dogodkih. Če vstopite na lokacijo (spletnega) dogodka, boste lahko posneti in fotografirani. Z vstopom na to lokacijo, dajete dovoljenje organizatorjem in Evropski komisiji, da vas lahko snemajo, fotografirajo, zvočno snemajo in uporabijo vaše posnetke po lastni presoji. Obiskovalci zato ne boste uveljavljali nobene odgovornosti proti organizatorjem in Evropski komisiji v zvezi z zgoraj navedenim.

V kolikor se z zgoraj navedenim ne strinjate, vljudno prosimo, da s tem seznanite organizatorje na: ern@um.si. E-sporočilu obvezno priložite visokokakovostni skan fotografije z osebnega dokumenta, da vas lahko organizator izloči iz vseh posnetkov in fotografij skupaj z navedbo, na kateri lokaciji in katerega dne bi lahko bili posneti s strani organizatorjev. Pooblaščen oseba za varstvo podatkov Univerze v Mariboru je izr. prof. dr. Miha Dvojmoč (dpo@um.si).

Jeopardy! Pros vs. Watson

By KATY STEINMETZ Tuesday, Feb. 15, 2011

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SETH WENIG / AP



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Although one might suspect that the 70-year-old Alex Trebek — who performs his hosting duties with almost mechanical perfection and looks eternally 50 — is some sort of Canadian robot, *Jeopardy!*'s first official machine went on air this week. An IBM supercomputer, which goes by the name of Watson (after the IBM founder), is taking on the show's most epic champions in the nerdiest battle of the millennium. The kick is that this isn't just about a computer having answers stored up like as many flash cards; it's about the machine being able to understand human language and logically retrieve answers, *Homo sapien*-style. But that's not the only reason the computer is super: its hardware is reportedly the size of 10 refrigerators, and it can perform 80 trillion operations per second. (It's hard to know quite what that means, but it sure sounds impressive.) Ken Jennings, the longest-running champ, and Brad Rutter, the champion who took home the most green, didn't fare so well in a practice round last month. But with a \$1 million prize and the dignity of the human race now on the line, one might note that practice rounds don't count.

Although one might suspect that the 70-year-old Alex Trebek — who performs his hosting duties with almost mechanical perfection and looks eternally 50 — is some sort of Canadian robot, *Jeopardy!*'s first official machine went on air this week. An IBM supercomputer, which goes by the name of Watson (after the IBM founder), is taking on the show's most epic champions in the nerdiest battle of the millennium. The kick is that this isn't just about a computer having answers stored up like as many flash cards; it's about the machine being able to



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Next for *Jeopardy!* Winner: Dr. Watson, I Presume?

By MICHELLE CASTILLO Thursday, Feb. 17, 2011

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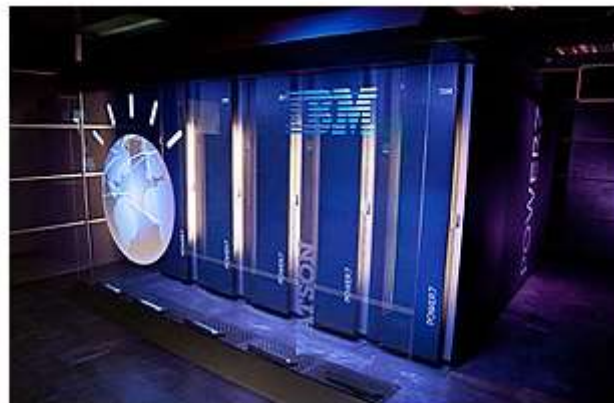
Top 10 Man vs. Machine Moments

Photos



Jeopardy! Host Alex Trebek

Video



IBM's 'Watson' computing system. Ben Hider / Getty Images

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After conquering puny humans Ken Jennings and Brad Rutter and winning a total of \$77,147 over three days and two full games on *Jeopardy!*, IBM's know-it-all new supercomputer is going to med school. On Wednesday, IBM, along with Nuance Communications Inc. and the Columbia University and University of Maryland medical schools, announced that they are

TIME TIME na Facebooku

Všeč mi je

TIME "All of Libya is against Gaddafi."

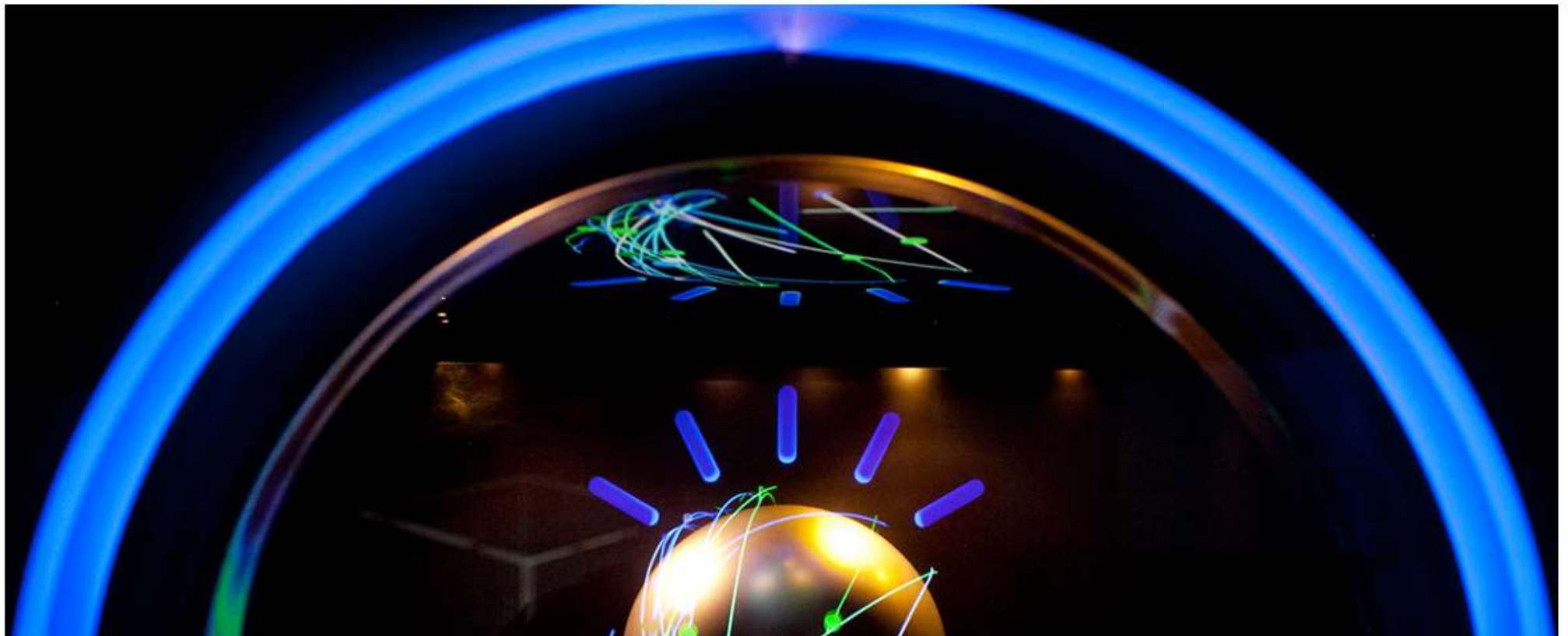
 **Liberated from Gaddafi, Eastern Libya Looks to the Future**

237,960 ljudem je všeč TIME.

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 Tahir	 Clinton			

SHORT SHARP SCIENCE 18 October 2016

Dr House goes digital as IBM's Watson diagnoses rare diseases





Robot Intelligence

Artificial Intelligence is Leading a Revolution in Medicine

IN BRIEF

The success of this work will help healthcare professionals diagnose more accurately and efficiently, and it will allow for more diagnostic care in areas with limited healthcare services and providers.

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WRITTEN BY

Karla Lant



@KarlaLant Website

September 15, 2016

#AI #artificial intelligence
#medicine

A NEW UNION

In early August, IBM announced that it will acquire Merge Healthcare Inc., a company that sells systems that help medical professionals access and store medical images. This move is a critical step in IBM's plan to put AI to work medically by training its Watson software to identify maladies like heart disease and cancer.



IBM Crafts a Role for Artificial Intelligence in Medicine

Deal for Merge Healthcare is step toward training IBM's Watson software to identify cancer, heart disease



Aug. 11, 2015 12:04 a.m. ET

[IBM](#) is moving from helping hospitals run smoothly to lending a hand in the examination room.


International Business Machines Corp.'s planned acquisition of [Merge Healthcare](#) Inc., which sells systems that help doctors store and access medical images, is a crucial step in its plan to put artificial intelligence to use in medicine. IBM announced the \$700 million deal last week.

Merge's crown jewels are 30 billion images, including X-rays, computerized tomography, and magnetic-resonance-imaging scans, that IBM intends to use to "train" its Watson software to identify ailments such as cancer and heart disease. The resulting services, it hopes, will help doctors diagnose and treat patients more effectively and efficiently.


Training such software requires huge numbers of images. Merge's 30 billion MRIs are only a start for IBM. "The way these machine-learning engines work, the more you feed them the smarter they get," IBM's Mr. Kelly said.

Artificial Intelligence

In Just 4 Hours, Google's AI Mastered All The Chess Knowledge in History

by Science Alert on December 7, 2017  10593

Peter Dockrill

 Creative Commons

Robot Intelligence

An AI Just Defeated Human Fighter Pilots in An Air Combat Simulator

IN BRIEF

Air combat veterans proved to be no match for an artificial intelligence developed by Psibernetix. ALPHA has proven to be “the most aggressive, responsive, dynamic and credible AI seen to date.”

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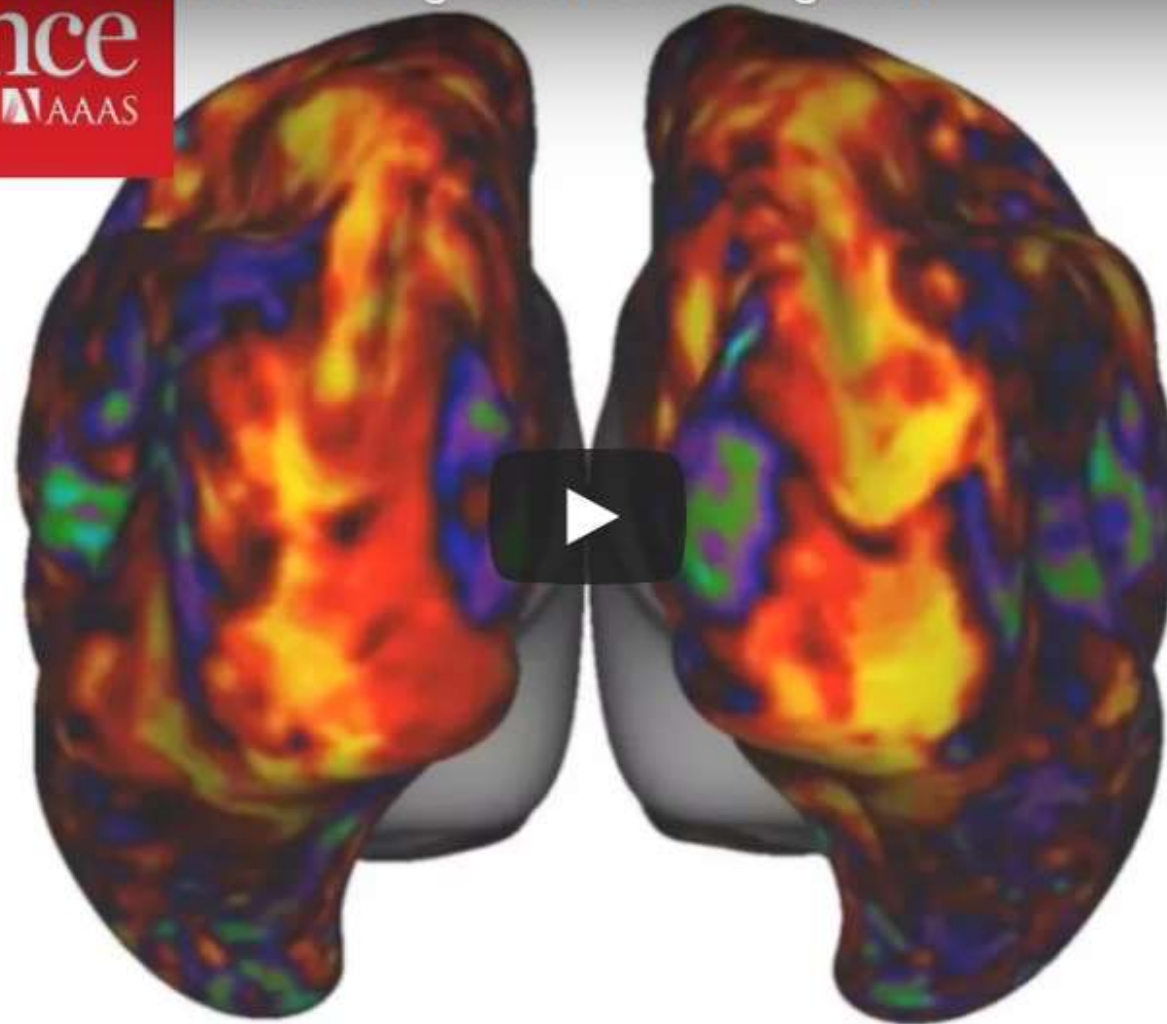
WRITTEN BY

Cecille De Jesus

June 28, 2016

Researchers demonstrate 'mind-reading' brain-decoding tech

Science
AAAS



Artificial intelligence is learning to read your mind—and display what it sees

By [Matthew Hutson](#) | Oct. 27, 2017 , 2:00 PM

“Umetna inteligenca”

- ▶ Umetna inteligenca je področje računalništva, ki se ukvarja z razvojem računalniških sistemov, pri čemer lahko le-ti izvajajo naloge, ki jih tradicionalno povezujemo z inteligenco ljudi. Te naloge lahko vključujejo učenje, sklepanje, načrtovanje in reševanje problemov.

- ▶ Touringov test

http://en.wikipedia.org/wiki/Turing_test

- ▶ Turing's report, 1948!
"Intelligent Machinery,,

Potrebni pogoji za UI

▶ **Avtonomnost**

▶ **Prilagodljivost**

Strojno učenje

- ▶ (Arthur Samuel, 1959) – računalnik se uči reševati problem, ne da bi bil za to eksplicitno programiran
- ▶ Nadzorovano (supervised) učenje – ko programu ponudimo rešitve za množico problemov
- ▶ Nenadzorovano (unsupervised) učenje – ko program sam ugotavlja zakonitosti (npr. tržne, družbene, astronomske...)

▶ Infografika o strojnem učenju:

<https://futurism.com/images/understanding-machine-learning-infographic/>



Generativna UI

- ▶ **Samodejno ustvarja vsebino** na pozive
- ▶ Generativna UI se uči na že opravljenem delu človeka – vendar to dela **izjemno učinkovito** in iz velike množice virov.
- ▶ **Kako?**
 - Statistično analizira porazdelitve ter identificira in ponavlja vzorce s tehnologijo nevronske mreže

Nihče ne ve točno kako!

Kaj povzročča ali je povezano s Parkinsonovo boleznijo?

Filters:

Subject:

Value	Count
Parkinson Disease	18
LRRK2	9
PARK2	9
parkin gene	9
LRRK2 gene	7
PARK7	7
PINK1	7
APOE	5
UBE2D2 protein, human	5
multicatalytic endopeptidase complex	5
ubiquitin-protein ligase	5
Levodopa	4
Monoamine Oxidase B	4
PINK1 gene	4
Pesticides	4

Relation:

Value	Count
ASSOCIATED WITH	521
CAUSES	230
NEG ASSOCIATED WITH	41
NEG CAUSES	4

Object:

Value	Count
Parkinson Disease	691
Autosomal Recessive	

Semantic relation search

Query: `relation:(causes OR associated_with) AND parkinson` Expand: none Filters:

Microarray filter: Experiment: none Limit arguments any to top N 100 all genes at p <= 0.0001

Search

Semantic Relations:

Subject	Sem Relation	Object	Frequency
alpha-Synuclein	ASSOCIATED_WITH	Parkinson Disease	<u>168</u>
Levodopa	ASSOCIATED_WITH	Parkinson Disease	<u>99</u>
Dopamine	ASSOCIATED_WITH	Parkinson Disease	<u>79</u>
alpha-Synuclein	CAUSES	Parkinson Disease	<u>33</u>
dopamine transporter	ASSOCIATED_WITH	Parkinson Disease	<u>24</u>
Iron	ASSOCIATED_WITH	Parkinson Disease	<u>23</u>
Pesticides	ASSOCIATED_WITH	Parkinson Disease	<u>23</u>
alpha synuclein gene	ASSOCIATED_WITH	Parkinson Disease	<u>22</u>
Single Nucleotide Polymorphism	ASSOCIATED_WITH	Parkinson Disease	<u>19</u>
Neurotoxins	CAUSES	Parkinson Disease	<u>19</u>
parkin gene	CAUSES	Autosomal Recessive Juvenile Parkinson Disease	<u>18</u>
Neurotoxins	ASSOCIATED_WITH	Parkinson Disease	<u>17</u>
LRRK2	ASSOCIATED_WITH	Parkinson Disease	<u>16</u>
Free Radicals	ASSOCIATED_WITH	Parkinson Disease	<u>15</u>
parkin gene	ASSOCIATED_WITH	Parkinson Disease	<u>14</u>
PARK7	ASSOCIATED_WITH	Parkinson Disease	<u>14</u>
LRRK2 LRRK2 gene	ASSOCIATED_WITH	Parkinson Disease	<u>14</u>
MSMB MSMB gene	ASSOCIATED_WITH	Parkinson Disease	<u>14</u>
CYP2D6 CYP2D6 gene	ASSOCIATED_WITH	Parkinson Disease	<u>14</u>
1-Methyl-4-phenyl-1,2,3,6-tetrahydropyridine	CAUSES	Parkinson Disease	<u>13</u>

« Previous 1 2 3 4 5 6 7 8 9 ... 39 40 Next »

Stavki, iz katerih so izluščene semantične relacije

alpha-Synuclein	CAUSES	Parkinson Disease
Alpha-synuclein	mutations that cause	familial Parkinson's disease (PMID: 16959795)
The new mutation, E46K, of alpha-synuclein	causes	Parkinson (PMID: 14755719)
Mutations in the genes coding for alpha-synuclein and parkin	cause	autosomal-dominant and autosomal-recessive forms of Parkinson's disease (PMID: 16597723)
Our results demonstrate that mutant alpha-synuclein induces neurodegeneration independent of parkin-mediated ubiquitin E3 ligase activity in nondopaminergic systems and suggest that PD caused by alpha-synuclein and parkin mutations may occur via independent mechanisms.		(PMID: 16597723)
A staging procedure for sporadic PD pathology was developed by Braak et al. assuming that the abnormal deposition of alpha-synuclein indicates the intracellular process responsible for clinical PD		(PMID: 17017515)
alpha-Synuclein	is a synaptic protein that has been directly linked to both the etiology and pathogenesis of	Parkinson's disease (PMID: 17055279)
While progressive accumulation of amyloid beta protein (Abeta) oligomers has been identified as one of the central toxic events in AD, accumulation of alpha-synuclein (alpha-syn) resulting in the formation of oligomers and protofibrils has been linked to PD		(PMID: 18769546)
Using recombinant alpha-synuclein , we have produced synthetic filaments indistinguishable from those present in the intracellular inclusions of		Parkinson's disease (PMID: 18591134)
Increased alpha-synuclein (SNCA) expression is known to cause a rare form of		PD (PMID: 18511044)
Conversion of human alpha-synuclein (aS) from the free soluble state to the insoluble fibrillar state has been implicated in the etiology of		Parkinson's disease (PMID: 18423664)
Alpha-synuclein	is known to be the major cause of	Parkinson's disease (PMID: 18282005)
Excessive wild type alpha-synuclein levels can lead to		PD (PMID: 18708765)
These data indicate that overexpression of alpha-synuclein is sufficient to cause olfactory deficits in mice similar to that observed in patients with		PD (PMID: 18702696)
alpha-Synuclein	is one of the principal toxic triggers of	Parkinson disease (PMID: 18192273)
The aggregation of alpha-synuclein (AS) is a critical step in the etiology of		Parkinson's disease (PMID: 18693689)
In humans, only mutated forms of alpha-synuclein are linked to PD; however, panneural expression of human wild-type (WT) alpha-synuclein induces		Parkinson (PMID: 18683964)

RESEARCH ARTICLE

Open Access

Biomedical question answering using semantic relations

Dimitar Hristovski^{1*}, Dejan Dinevski², Andrej Kastrin³ and Thomas C Rindflesch⁴

Abstract

Background: The proliferation of the scientific literature in the field of biomedicine makes it difficult to keep abreast of current knowledge, even for domain experts. While general Web search engines and specialized information retrieval (IR) systems have made important strides in recent decades, the problem of accurate knowledge extraction from the biomedical literature is far from solved. Classical IR systems usually return a list of documents that have to be read by the user to extract relevant information. This tedious and time-consuming work can be lessened with automatic Question Answering (QA) systems, which aim to provide users with direct and precise answers to their questions. In this work we propose a novel methodology for QA based on semantic relations extracted from the biomedical literature.

Results: We extracted semantic relations with the SemRep natural language processing system from 122,421,765 sentences, which came from 21,014,382 MEDLINE citations (i.e., the complete MEDLINE distribution up to the end of 2012). A total of 58,879,300 semantic relation instances were extracted and organized in a relational database. The QA process is implemented as a search in this database, which is accessed through a Web-based application, called SemBT (available at <http://sembt.mf.uni-lj.si>). We conducted an extensive evaluation of the proposed methodology in order to estimate the accuracy of extracting a particular semantic relation from a particular sentence. Evaluation was performed by 80 domain experts. In total 7,510 semantic relation instances belonging to 2,675 distinct relations were evaluated

Veliki jezikovni modeli (LLM)

1. Učenje na velikih podatkih
2. „Fine tuning“
3. Naknadno učenje in obširno preverjanje

Za posebne namene še: RAG (Retrieval augmented generation)
Povezava z generatorji slik, zvoka in videa = „Multimodalni LLM“

ChatGPT: chat.openai.com

Bing: www.bing.com

Gemini: gemini.google.com

Perplexity AI: perplexity.ai

GPT – Generative pretrained transformer

1. Poziv / Prompt
2. Stat. vzorci za napoved verjetne besede/zveze
3. Berljivo besedilo
4. Varovalne ograje (več iteracij 2.-4.)
5. Naknadna obdelava besedila glede na zahteve

Na nam nerazumljiv način zna model sklepati!

Kaj zna Generativna UI? (1)

- ▶ **Smiselno in argumentirano odgovarja** na vprašanja/pozive (po novem tudi v govorni komunikaciji)
- ▶ **Napiše** poljubno dolg tekst / esej na zahtevano temo
- ▶ **Povzame** poljubno dolg tekst ali pa smiselno **organizira vsebino** nestrukturiranega besedila

Kaj zna Generativna UI? (2)

- ▶ Zapiše **govorjen** tekst ter tudi agendo in **zaključke** posnetega sestanka
- ▶ Napiše **računalniški program**
- ▶ Samostojno **analizira** surove podatke in jih **grafično prikaže**
- ▶ **Interpretira** in opiše slike/grafe
- ▶ Generira **slike, glasbo, video**

```
In [2]: import openai
import os

openai.api_key = os.getenv("OPENAI_API_KEY")

def llm_response(prompt):
    response = openai.ChatCompletion.create(
        model='gpt-3.5-turbo',
        messages=[{'role': 'user', 'content': prompt}],
        temperature=0
    )
    return response.choices[0].message['content']
```



```
In [10]: prompt = '''
    Preglej odgovor in ga razvrsti v pozitivnega ali negativnega:
    Predavanje Dejana Dinevskega je bilo odlično!
    ...

    response = llm_response(prompt)
    print(response)
```

Pozitiven


```
In [12]: prompt = '''
Preglej odgovor in ga razvrsti v pozitivnega ali negativnega:

Ob predavanju Dejana Dinevskega sem se počutil neumno, saj nisem
ničesar razumel!
'''

response = llm_response(prompt)
print(response)
```

Negativni

```
In [5]: all_reviews = [  
    'The lecture was excellent!',  
    'Predavanje je bilo dokaj zanimivo.',  
    'Lahko bi bilo tudi boljše.',  
    'Der Vortrag war interessant, aber zu lang!',  
    'Jaz nikoli nisem z ničemer zadovoljen.'  
]  
  
all_reviews
```

```
In [7]: all_sentiments = []  
for review in all_reviews:  
    prompt = f'''  
        Classify the following review as having either a positive or  
        negative sentiment. State your answer as a single word, either  
        "positive" or "negative":  
  
        {review}  
        ...  
  
    response = llm_response(prompt)  
    all_sentiments.append(response)  
  
all_sentiments
```

```
['positive', 'positive', 'negative', 'negative', 'negative']
```

```
In [4]: num_positive = 0
num_negative = 0
for sentiment in all_sentiments:
    if sentiment == 'positive':
        num_positive += 1
    elif sentiment == 'negative':
        num_negative += 1
print(f"There are {num_positive} positive and {num_negative} negative reviews")
```

There are 3 positive and 2 negative reviews.

- ▶ Prav ta lastnost jezikovnega modela (določanje pozitivnega ali negativnega odziva) je bila prva prebojna tehnologija, ki jo je leta 2017 uporabil Amazon za analizo odziva strank.



You

I have some data i need to plot. Please make a python script that reads the data from .csv file. It has 2 columns X and Y. Plot the data and make a linear and non-linear regression line that follows the data accordingly



ChatGPT

Certainly! To achieve this, you can use the `pandas` library for reading data from the CSV file, and `matplotlib` for plotting the data and regression lines. For non-linear regression, I'll use the `scipy.optimize` module. Make sure you have these libraries installed. You can install them using:

```
bash
```

Copy code

```
pip install pandas matplotlib scipy
```

Now, you can use the following Python script to read the data from a CSV file, plot it, and fit both linear and non-linear regression lines:

```
python
```

Copy code

```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
from scipy.optimize import curve_fit
```



```
[2]: import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
from scipy.optimize import curve_fit

# Function for non-linear regression
def non_linear_function(x, a, b, c):
    return a * np.exp(b * x) + c

# Read data from CSV file
file_path = 'your_data.csv' # Replace with your CSV file path
data = pd.read_csv(file_path)

# Extract X and Y columns
x_data = data['X']
y_data = data['Y']

# Plot the data
plt.scatter(x_data, y_data, label='Data')

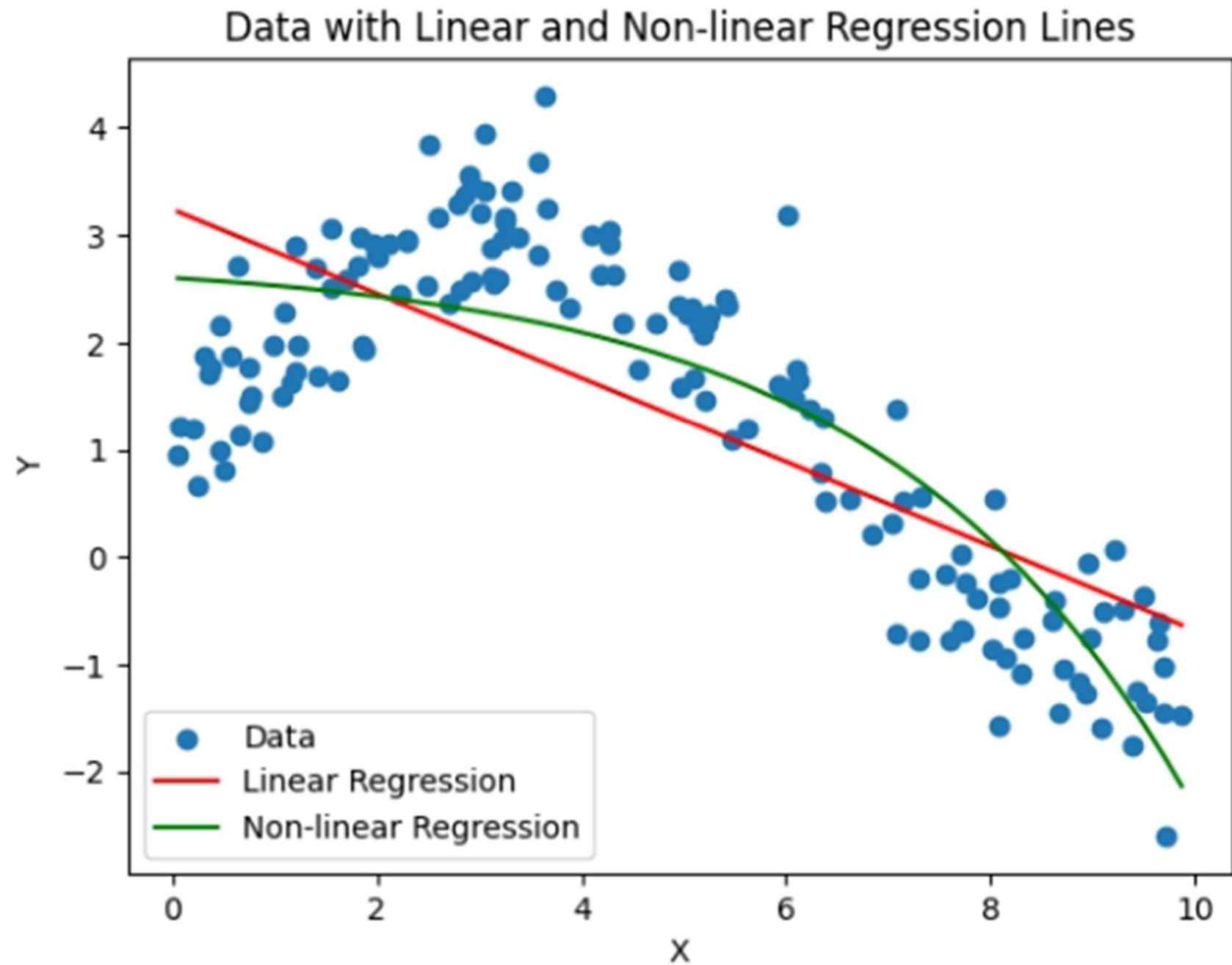
# Linear regression
slope, intercept = np.polyfit(x_data, y_data, 1)
linear_regression_line = slope * x_data + intercept
plt.plot(x_data, linear_regression_line, color='r', label='Linear Regression')

# Non-linear regression
popt, _ = curve_fit(non_linear_function, x_data, y_data)
non_linear_regression_line = non_linear_function(x_data, *popt)
plt.plot(x_data, non_linear_regression_line, color='g', label='Non-linear Regression')

# Show plot
plt.xlabel('X')
plt.ylabel('Y')
plt.legend()
plt.title('Data with Linear and Non-linear Regression Lines')
plt.show()
```

```
-----
FileNotFoundError                                Traceback (most recent call last)
Cell In[2], line 12
     10 # Read data from CSV file
     11 file_path = 'your_data.csv' # Replace with your CSV file path
--> 12 data = pd.read_csv(file_path)
     13
     14 # Extract X and Y columns
     15 x_data = data['X']
```

```
plt.title('Data with Linear and Non-linear Regression Lines')  
plt.show()
```



Uporaba jezikovnih modelov

- ▶ Jezikovni modeli so izjemno koristni – **če jih znamo pravilno** uporabljati
- ▶ **Koristijo vsem** – vendar bolj koristijo manj usposobljenim zaposlenim
- ▶ Zavedati se je potrebno **omejitev in možnosti napak**

Google Gemini



What are the risk factors for systemic reactions in typical cold urticaria?

✦ The risk factors for systemic reactions in typical cold urticaria (ColdU) include:

- **Severe skin reactions:** Patients with more severe skin reactions, such as generalized hives, angioedema, acral swelling, oropharyngeal/laryngeal symptoms, and itch of earlobes are more likely to experience systemic reactions.
- **Complete cold water immersion:** Systemic reactions are more likely to be triggered by complete cold water immersion than by cold air exposure.
- **Living in a warmer climate:** Systemic reactions caused by cold air are more common in countries with a warmer climate.
- **Hymenoptera sting allergy:** Patients with a history of systemic reaction to a Hymenoptera sting (e.g., bee or wasp sting) are more likely to experience systemic reactions to cold.
- **Oropharyngeal/laryngeal symptoms:** Patients with oropharyngeal/laryngeal symptoms, such as difficulty breathing or swallowing, are more likely to experience systemic reactions.
- **Itchy earlobes:** Patients with itchy earlobes are more likely to experience systemic reactions.

Additional risk factors:

- **Age:** Children are more likely to experience systemic reactions than adults.
- **Gender:** Females are more likely to experience systemic reactions than males.
- **Exercise:** Exercise can trigger systemic reactions in some patients with ColdU.
- **Certain medications:** Some medications, such as aspirin, ibuprofen, and nonsteroidal anti-inflammatory drugs (NSAIDs), can trigger systemic reactions in patients with ColdU.

It is important to note that not all patients with ColdU will experience systemic reactions, and even those who are at high risk may not have a reaction every time they are exposed to cold. However, it is important to be aware of the risk factors so that you can take steps to avoid triggers and manage your symptoms effectively.

If you have ColdU and are concerned about the risk of systemic reactions, please talk to your doctor. They can help you develop a management plan to reduce your risk and treat any reactions that do occur.



can you provide scientific sources for these statements?

View other drafts 



Sure. Here are some scientific sources for the statements about risk factors for systemic reactions in typical cold urticaria (ColdU):

- Severe skin reactions:

Bizjak, Mojca, et al. "Risk factors for systemic reactions in typical cold urticaria: results from the COLD-CE study." *Allergy* 77.12 (2022): 3108-3117.

This study found that patients with more severe skin reactions, such as generalized hives, angioedema, acral swelling, oropharyngeal/laryngeal symptoms, and itch of earlobes, were more likely to experience systemic reactions.

- Complete cold water immersion:

Bizjak, Mojca, et al. "Risk factors for systemic reactions in typical cold urticaria: results from the COLD-CE study." *Allergy* 77.12 (2022): 3108-3117.

- Itchy earlobes:

Bizjak, Mojca, et al. "Risk factors for systemic reactions in typical cold urticaria: results from the COLD-CE study." *Allergy* 77.12 (2022): 3108-3117.

This study found that patients with itchy earlobes were more likely to experience systemic reactions.

Additional risk factors:

- Age:

Maurer, Marcus, et al. "Cold urticaria: current perspectives." *Journal of Allergy and Clinical Immunology* 139.1 (2017): 28-38.

This review article states that children are more likely to experience systemic reactions than adults with ColdU.

- Gender:

Maurer, Marcus, et al. "Cold urticaria: current perspectives." *Journal of Allergy and Clinical Immunology* 139.1 (2017): 28-38.

This review article states that females are more likely to experience systemic reactions than males with ColdU.

ORIGINAL ARTICLE

Atopic Dermatitis, Urticaria and Skin Disease

Risk factors for systemic reactions in typical cold urticaria: Results from the COLD-CE study

Mojca Bizjak^{1,2}  | Mitja Košnik^{1,3}  | Dejan Dinevski²  | Simon Francis Thomsen⁴  |
Daria Fomina^{5,6}  | Elena Borzova^{7,8}  | Kanokvalai Kulthanan⁹  | Raisa Meshkova¹⁰  |
Dalia Melina Ahsan^{11,12} | Mona Al-Ahmad¹³  | Sabine Altrichter^{11,12,14}  |
Andrea Bauer¹⁵  | Maxi Brockstädt^{11,12} | Célia Costa¹⁶  | Semra Demir¹⁷  |
Roberta Fachini Criado¹⁸  | Luis Felipe Ensina¹⁹  | Asli Gelincik¹⁷  |
Ana Maria Giménez-Arnau²⁰  | Margarida Gonçalo²¹  | Maia Gotua²²  |
Jesper Grønlund Holm⁴  | Naoko Inomata²³  | Alicja Kasperska-Zajac²⁴  |
Maryam Khoshkhui²⁵  | Aliya Klyucharova^{26,27}  | Emek Kocatürk²⁸  |
Rongbiao Lu²⁹  | Michael Makris³⁰  | Natalya Maltseva⁵ | Jovan Miljković²  |
Maria Pasali³⁰ | Marisa Paulino¹⁶  | David Pesqué²⁰  | Jonny Peter^{31,32}  |
German Dario Ramón³³  | Carla Ritchie³⁴ | Solange Oliveira Rodrigues Valle³⁵  |
Michael Rudenko³⁶  | Agnieszka Sikora²⁴  | Eduardo M. de Souza Lima³⁷ |
Nicola Wagner³⁸  | Paraskevi Xepapadaki³⁹  | Xiaoyang Xue⁴⁰  | Zuotao Zhao⁴¹  |
Dorothea Terhorst-Molawi^{11,12}  | Marcus Maurer^{11,12} 

Chat GPT



can you provide scientific sources for these statements?



I apologize, but I don't have direct access to external sources, including scientific databases or medical journals, to provide specific references. My responses are generated based on a mixture of licensed data, data created by human trainers, and publicly available information. However, I can offer some guidance on where you can find scientific sources to support the statements I provided about cold urticaria and its risk factors.

To find scientific sources related to cold urticaria and its risk factors, I recommend conducting a search on reputable medical databases and journals. Here are some steps you can follow:

1. PubMed: PubMed is a widely-used database for biomedical and clinical research articles. You can search for scientific papers related to cold urticaria, its risk factors, and systemic reactions by using relevant keywords.
2. Google Scholar: Google Scholar is another useful tool for finding scholarly articles and research papers. You can use specific search terms to narrow down your results.

Primer – postavitev diagnoze

1. ChatGPT

Default (GPT-3.5)



What are potential diagnoses for the following symptoms: lower back pain, foot numbness, sciatic nerve pain?



I'm not a doctor, but those symptoms could be related to various conditions. Lower back pain and sciatic nerve pain might suggest issues like a herniated disc or spinal stenosis. The foot numbness could be linked to nerve compression. It's essential to consult with a healthcare professional for an accurate diagnosis and appropriate treatment.

2. Gemini



What are potential diagnoses for the following symptoms: lower back pain, foot numbness, sciatic nerve pain?

Regenerate draft



The following are potential diagnoses for the symptoms of lower back pain, foot numbness, and sciatic nerve pain:

- **Sciatica:** This is the most common diagnosis for these symptoms. Sciatica is caused by irritation or compression of the sciatic nerve, which is the longest nerve in the body. The sciatic nerve runs from the lower back, through the buttocks and down the back of each leg. Sciatica can cause pain, numbness, and tingling anywhere along the path of the nerve.
- **Herniated disk:** A herniated disk occurs when the soft, gel-like center of a spinal disk pushes through a tear in the outer ring of the disk. This can put pressure on the sciatic nerve, causing pain, numbness, and tingling.
- **Spinal stenosis:** Spinal stenosis is a narrowing of the spinal canal, which can put pressure on the spinal cord and nerves. Spinal stenosis can cause pain, numbness, and weakness in the legs and feet.
- **Piriformis syndrome:** Piriformis syndrome is a condition in which the piriformis muscle, which is located in the buttocks, spasms and compresses the sciatic nerve. Piriformis syndrome can cause pain, numbness, and tingling in the buttocks, thigh, and leg.
- **Spondylolisthesis:** Spondylolisthesis is a condition in which one vertebra slips forward over the vertebra below it. This can put pressure on the sciatic nerve, causing pain, numbness, and weakness.

Other potential diagnoses for these symptoms include:

- **Infections:** Infections of the spine or sciatic nerve can cause pain, numbness, and weakness.
- **Tumors:** Tumors of the spine or sciatic nerve can also cause pain, numbness, and weakness.
- **Trauma:** Injuries to the spine or sciatic nerve can cause pain, numbness, and weakness.

If you are experiencing lower back pain, foot numbness, and sciatic nerve pain, it is important to see a doctor to get a diagnosis and treatment plan. Treatment for these conditions may include physical therapy, medication, or surgery, depending on the underlying cause.

3. Bing

What are potential diagnoses for the following symptoms: lower back pain, foot numbness, sciatic nerve pain?

- ✓ Searching for: **diagnoses for lower back pain, foot numbness, sciatic nerve pain**
- ✓ Generating answers for you...



Your personal and company data are protected in this chat

The symptoms you mentioned - lower back pain, foot numbness, and sciatic nerve pain - are often associated with a condition called **Sciatica**¹.

Sciatica refers to pain that travels along the path of the sciatic nerve, which travels from the lower back through the hips and buttocks and down each leg¹. It most often occurs when a herniated disk or an overgrowth of bone puts pressure on part of the nerve¹. This causes inflammation, pain, and often some numbness in the affected leg¹.

The pain can vary from a mild ache to a sharp, burning sensation, and it can feel like a jolt or electric shock¹. It can be worse when coughing or sneezing or sitting for a long time¹. Usually, sciatica affects only one side of the body¹. Some people also have numbness, tingling, or muscle weakness in the leg or foot¹. One part of the leg can be in pain, while another part can feel numb¹.

Diagnosis of sciatica usually involves a physical exam, where a healthcare provider might check muscle strength and reflexes^{2 3}. Imaging tests such as X-rays, MRI scans, or CT scans may also be used to reveal an overgrowth of bone that could be pressing on a nerve².

Please note that this information is intended to be informative and does not replace professional medical advice. If you're experiencing these symptoms, it's important to consult with a healthcare professional for an accurate diagnosis and treatment.

Learn more: [1. mayoclinic.org](https://www.mayoclinic.org) [2. mayoclinic.org](https://www.mayoclinic.org) [3. nhsinform.scot](https://www.nhsinform.scot) [4. medicalnewstoday.com](https://www.medicalnewstoday.com)

4. Perplexity 1 / 2


What are potential diagnoses for the following symptoms: lower back pain, foot numbness, sciatic nerve pain?

☰ Sources

Low Back Pain: Causes, Diagnosis & Treatments -...

 clevelandclinic • 1

Low Back Pain – Causes, Diagnosis and Treatment

 aans • 2

Lower Back Pain Symptoms, Diagnosis, an...

 spine-health • 3



View 3 more

☰ Answer

Lower back pain, foot numbness, and sciatic nerve pain can be caused by a variety of injuries, conditions, or diseases. Here are some potential diagnoses based on the symptoms:

- **Muscle or ligament strain:** Repeated heavy lifting or a sudden awkward movement can strain back muscles and spinal ligaments, leading to lower back pain ⁵. This can also cause foot numbness if the strain affects the nerves in the lower back ³.
- **Herniated disc:** A herniated disc occurs when the soft material inside a disk bulges or ruptures and presses on a nerve, causing lower back pain and sciatic nerve pain that can radiate down the back of the legs and into the feet ⁵.

Perplexity 2 / 2

- **Spinal stenosis:** Spinal stenosis is a narrowing of the spinal canal that can put pressure on the nerves in the lower back, causing lower back pain and sciatic nerve pain that can radiate down the back of the legs and into the feet ².
- **Osteoarthritis:** Osteoarthritis can affect the lower back and cause lower back pain ⁵.
- **Structural problems:** Structural problems in the back, such as a fracture or traumatic injury, can cause lower back pain ¹.
- **Disk injuries:** Disk injuries, such as a herniated disc, can cause lower back pain and sciatic nerve pain that can radiate down the back of the legs and into the feet ¹.
- **Sciatica:** Sciatica is a condition that occurs when the sciatic nerve, which runs from the lower back down the back of each leg, is compressed or irritated. This can cause lower back pain and sciatic nerve pain that can radiate down the back of the legs and into the feet ³.

It's important to note that these are just potential diagnoses and that a healthcare provider should be consulted for an accurate diagnosis and treatment plan.

UI v medicini – tipične vloge

- ▶ Je „svetovalka“ in „pomočnica“!
- ▶ **Diagnosticira** – v eksperimentalnem okolju tudi bolje kot zdravnik specialist (recimo redke bolezni)
- ▶ **Interpretira** diagnostične slike (RTG, MRI, CT)
- ▶ **Pomaga** napisati izvid in določiti terapijo
- ▶ **Raziskuje** – recimo učinkovine za nova zdravila
- ▶ **Spremlja in nadzira bolnika** preko senzorjev
- ▶ **Povzame stanje pacienta** iz obširne dokumentacije



Review

What Is Machine Learning, Artificial Neural Networks and Deep Learning?—Examples of Practical Applications in Medicine

Jakub Kufel ^{1,*}, Katarzyna Bargiel-Lączek ², Szymon Kocot ³, Maciej Kozlik ⁴, Wiktoria Bartnikowska ², Michał Janik ⁵, Lukasz Czogalik ⁵, Piotr Dudek ⁵, Mikołaj Magiera ⁵, Anna Lis ⁶, Iga Paszkiewicz ⁵, Zbigniew Nawrat ¹, Maciej Cebula ⁷ and Katarzyna Gruszczyńska ⁸

¹ Department of Biophysics, Faculty of Medical Sciences in Zabrze, Medical University of Silesia, 41-808 Zabrze, Poland; znawrat@sum.edu.pl or nawrat@frk.pl

² Paediatric Radiology Students' Scientific Association at the Division of Diagnostic Imaging, Department of Radiology and Nuclear Medicine, Faculty of Medical Science in Katowice, Medical University of Silesia, 40-752 Katowice, Poland; katarzyna.bargiel@op.pl (K.B.-L.); wiktoriabart96@gmail.com (W.B.)

³ Bright Coders' Factory, Technologiczna 2, 45-839 Opole, Poland

⁴ Division of Cardiology and Structural Heart Disease, Medical University of Silesia, 40-635 Katowice, Poland; kozlik.maciej@gmail.com

⁵ Student Scientific Association Named after Professor Zbigniew Religa at the Department of Biophysics, Faculty of Medical Sciences in Zabrze, Medical University of Silesia, Jordana 19, 41-808 Zabrze, Poland; michal.janik0801@gmail.com (M.J.); lukczog@gmail.com (L.C.); piotrek233@gmail.com (P.D.); mikaczu7422@gmail.com (M.M.); igapaszkiewicz.ip@gmail.com (I.P.)

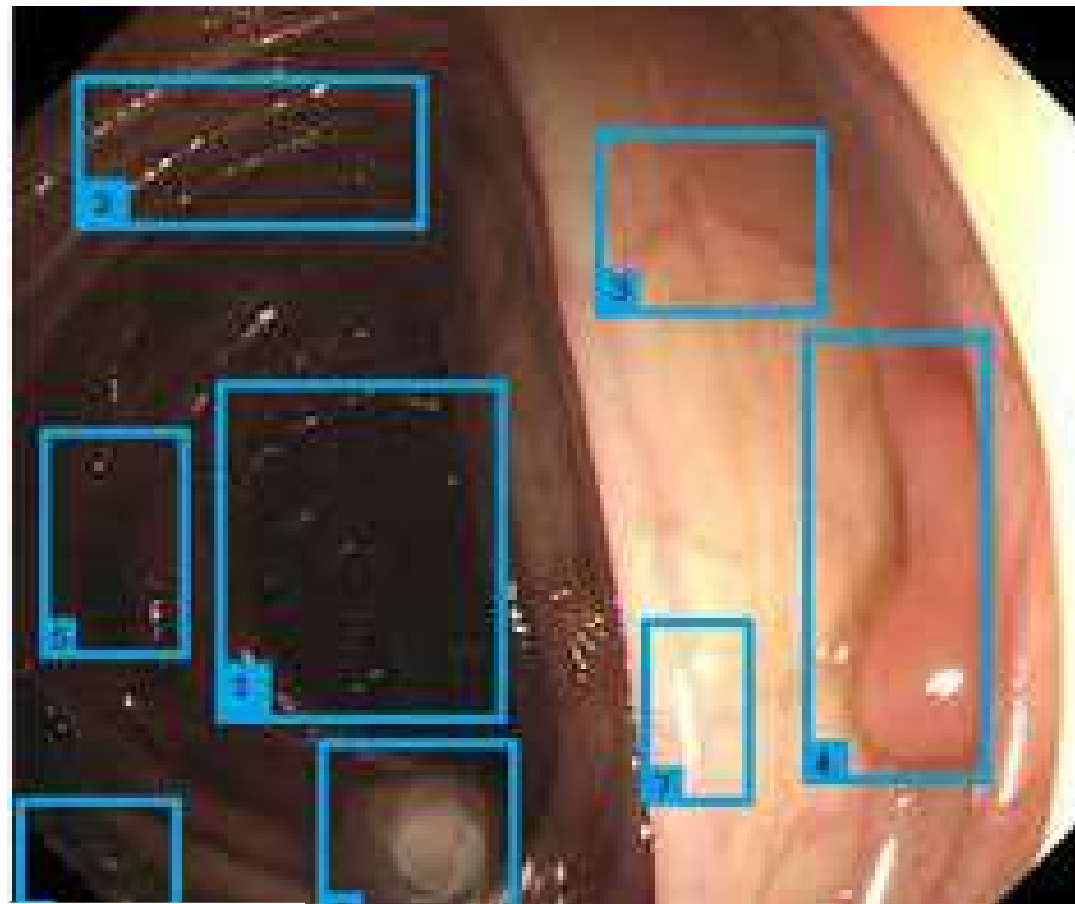
⁶ Cardiology Students' Scientific Association at the III Department of Cardiology, Faculty of Medical Sciences in Katowice, Medical University of Silesia, 40-635 Katowice, Poland; lis.anna9898@gmail.com

⁷ Individual Specialist Medical Practice Maciej Cebula, 40-754 Katowice, Poland; maciejmichalcebul@gmail.com

⁸ Department of Radiodiagnostics, Invasive Radiology and Nuclear Medicine, Department of Radiology and

Računalniški vid v medicini

- ▶ slikovna diagnostika (MRI, PET)
- ▶ kardiovaskularna MR
- ▶ patologija
- ▶ EKG
- ▶ radiografija
- ▶ mamografija
- ▶ retinopatija
- ▶ onkologija
- ▶ genetika



2023

- ▶ **UI (CNN) „zna“ diagnosticirati kožnega raka iz dermatoskopske slike enakovredno vrhunskemu specialistu**
- ▶ **V eksperimentalnih pogojih! Manj v realnem okolju!**
- ▶ **Tehnologija ni robustna – slike morajo biti „idealne“**
- ▶ **Izjemen potencial:**
 - Kot pomoč dermatologu
 - Za razvoj teledermatologije

[Cancers \(Basel\)](#). 2023 Feb; 15(4): 1183.

Published online 2023 Feb 13. doi: [10.3390/cancers15041183](https://doi.org/10.3390/cancers15041183)

PMCID: PMC9953963

PMID: [36831525](https://pubmed.ncbi.nlm.nih.gov/36831525/)

AI-Powered Diagnosis of Skin Cancer: A Contemporary Review, Open Challenges and Future Research Directions




[Navneet Melarkode](#),¹ [Kathiravan Srinivasan](#),^{1,*} [Saeed Mian Qaisar](#),^{2,3} and [Pawel Plawiak](#)^{4,5,*}

Muhammad Fazal Ijaz, Academic Editor and Marcin Woźniak, Academic Editor

Dermatol Ther (Heidelb) (2022) 12:2637–2651
<https://doi.org/10.1007/s13555-022-00833-8>

COMMENTARY

Artificial Intelligence in Dermatology: Challenges and Perspectives

Konstantinos Liopyris  · Stamatios Gregoriou  · Julia Dias  ·

Alexandros J. Stratigos

Artificial Intelligence in Dermatology Image Analysis: Current Developments and Future Trends

by  [Zhouxiao Li](#) ^{1,2,†}  [Konstantin Christoph Koban](#) ^{2,†}  [Thilo Ludwig Schenck](#) ²,
 [Riccardo Enzo Giunta](#) ²,  [Qingfeng Li](#) ^{1,*}  and  [Yangbai Sun](#) ^{1,*} 

¹ Department of Plastic and Reconstructive Surgery, Shanghai 9th People's Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai 200023, China

² Division of Hand, Plastic and Aesthetic Surgery, University Hospital, LMU Munich, 80339 Munich, Germany

* Authors to whom correspondence should be addressed.

† These authors contributed equally to this work.

Umetna inteligenca v dermatologiji – diagnostika

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Vol. 542, No. 7639

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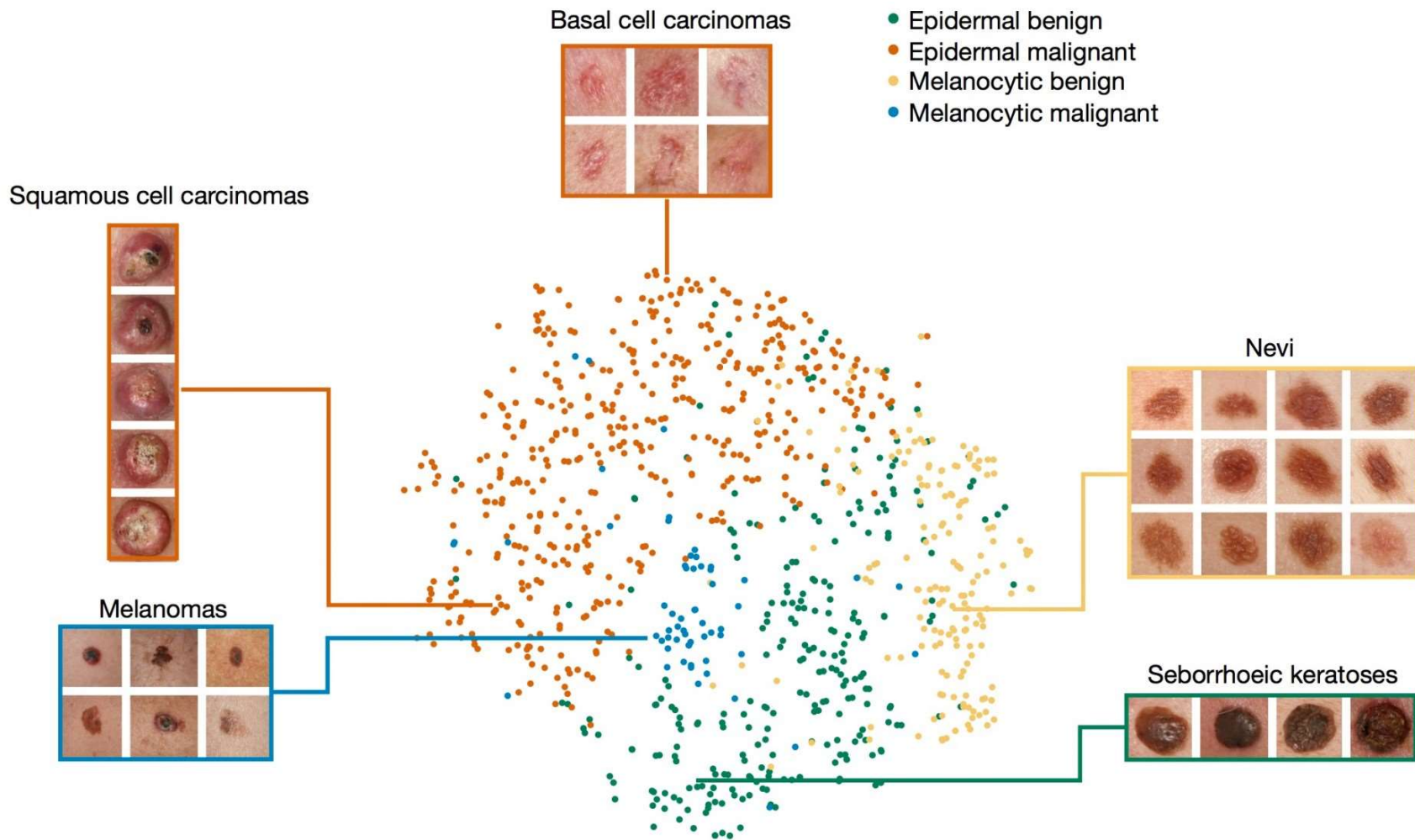
LESIONS LEARNT

*Artificial intelligence powers detection
of skin cancer from images* **PAGES 36 & 115**

Nature video channel

<https://cs.stanford.edu/people/esteva/nature/>



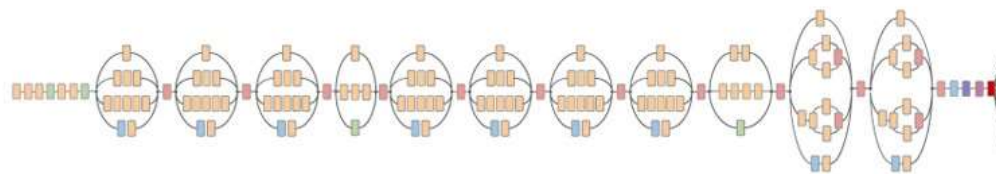


Skin lesion image

Deep convolutional neural network (Inception v3)

Training classes (757)

Inference classes (varies by task)



- Convolution
- AvgPool
- MaxPool
- Concat
- Dropout
- Fully connected
- Softmax

- Acral-lentiginous melanoma
- Amelanotic melanoma
- Lentigo melanoma
- ...
- Blue nevus
- Halo nevus
- Mongolian spot
- ...

- ⊕ ● 92% malignant melanocytic lesion
- ⊖ ● 8% benign melanocytic lesion

Wien Klin Wochenschr (2011) 123: 700–709

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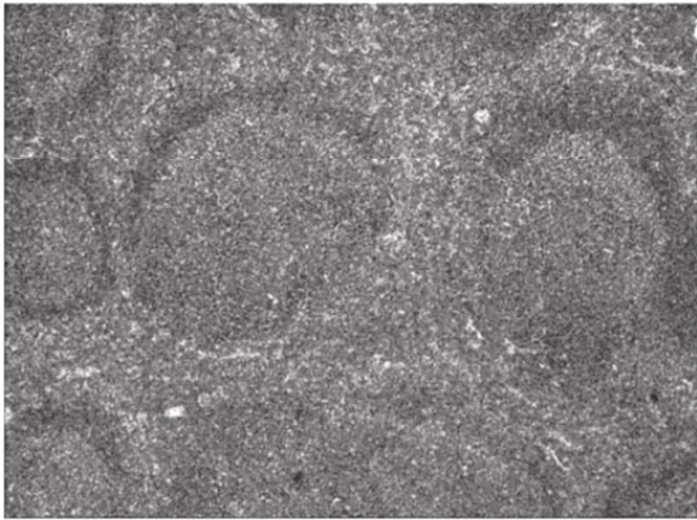
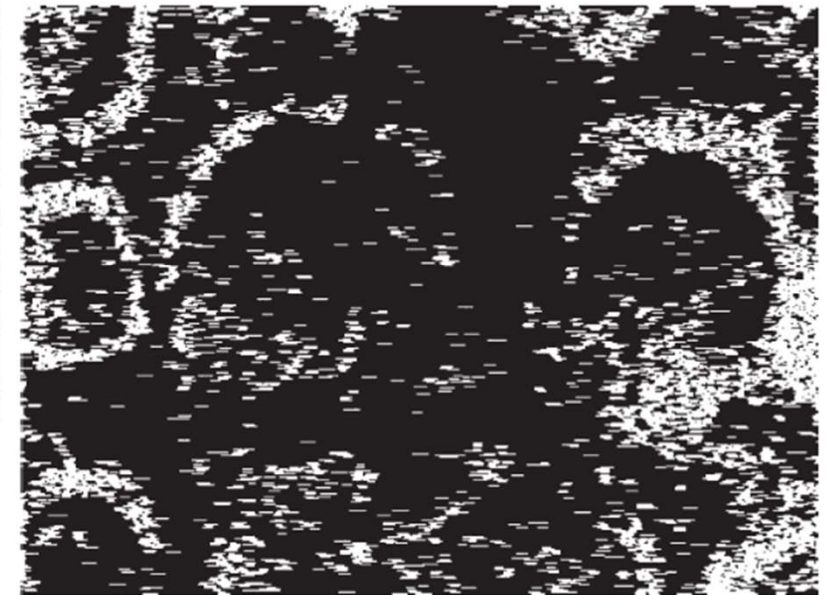
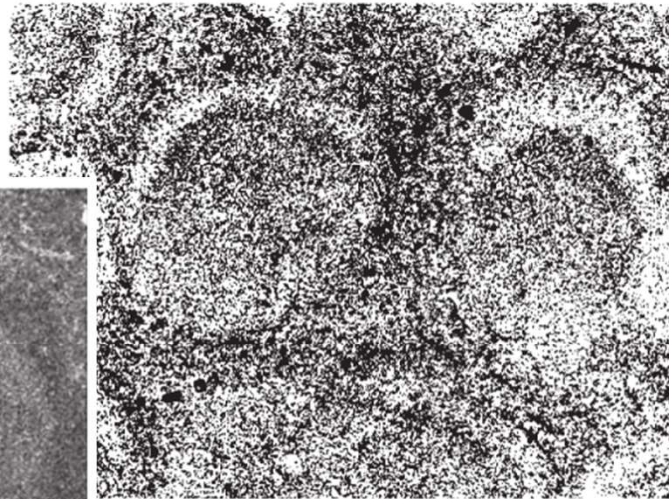
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Wiener klinische Wochenschrift

The Central European Journal of Medicine

Classification of follicular lymphoma images: A holistic approach with symbol-based machine learning methods

Milan Zorman¹, José Luis Sánchez de la Rosa², Dejan Dinevski³



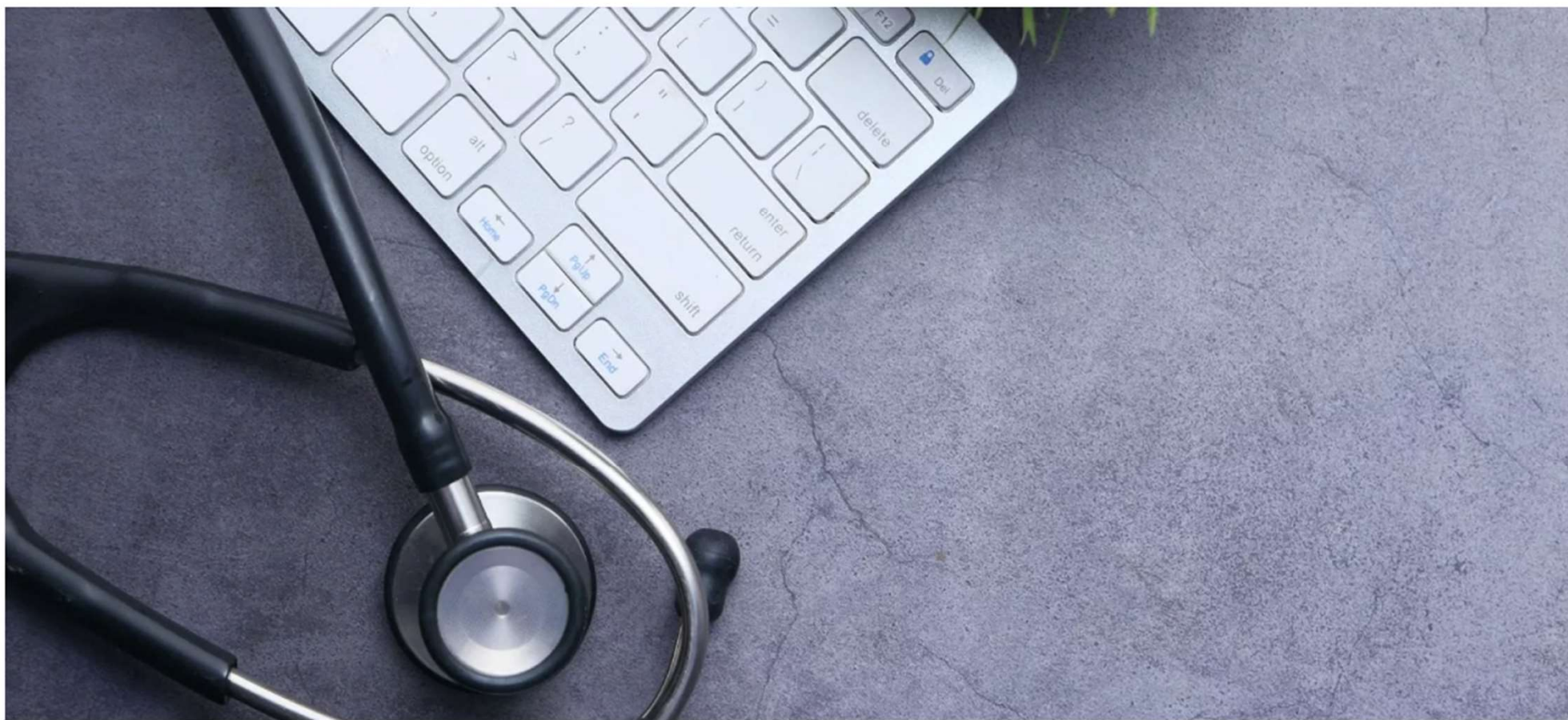


By Oceane Duboust

Published on 02/11/2023 - 15:37 GMT+1

[Home](#) > [Health](#) > [Health news](#)

AI algorithm more accurate than radiologists at detecting a rare cancer, study shows



UI v medicini – potenciali in pogoji

▶ Potencialno povišuje:

- Varnost
- Transparentnost
- Kakovost
- Učinkovitost

- **tako zdravljenja pacienta kot zdravstvenega sistema**

▶ Pogoji:

- **Digitalizacija informacij in zdravstvenih procesov**
- **„Veliki“ podatki**

Personalizirana in osebna medicina – bosta utemljeni na UI

- ▶ **Personalized medicine:** upošteva individualni genotip, okolje in način življenja ter temu prilagodi ukrepe preventive in zdravljenja
- ▶ **Precision medicine:** medicinske odločitve v diagnostičnih in terapevtskih procesih temeljijo predvsem na **genetskih informacijah**

ISSN: 2993-091X

AI^{IN} PRECISION ONCOLOGY



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intelligence applications in clinical and
precision oncology

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Nina Slaček, Radio Slovenija

25. september 2023 ob 6.25
MMC RTV SLO

Bralec ?



Tako kot umetna inteligenca piše stavke, lahko načrtuje tudi povsem nove molekule

Pogovor z Marinko Žitnik, docentko na Harvard Medical School

Marinka Žitnik na Univerzi Harvard razvija modele generativne umetne inteligence, specifično namenjene uporabi v medicini. Pri tem sodeluje z vrsto vodilnih inštitucij in podjetij.



Dr. Marinka Žitnik je docentka na Harvard Medical School, kjer na oddelku za biomedicinsko informatiko vodi svoj laboratorij za umetno inteligenco v medicini in znanosti. Foto: Radio Slovenija/Nina Slaček

Delovanje vsem dobro znanega ChatGpt-ja je lahko preverila že mesece prej, preden je zanj prvič slišala širša javnost. Tudi njo so presenetili njegovi odgovori. A razvoj novih, še mnogo zmogljivejših modelov je v polnem razmahu in z njimi se v temelju spreminjajo tako znanost in raziskovanje kot tudi številne druge človeške dejavnosti.

Zadnje iz sekcije



Bezos prisiljen naročiti Muskove rakete, italijanska postojanka na Luni, napredek Ariane 6



Nova evropska raketa Ariane 6 bo prvič poletela prihodnje poletje



Zoisova nagrada Josu Vukmanu in Danilu Zavrtaniku, Puhova nagrada Jožetu Vižintinu



HSE: Zamejili smo vdor in preprečili večjo škodo



Fakulteta za elektrotehniko bogatejša za redki superločljivostni mikroskop

Ovire, težave in izzivi UI v medicini

- ▶ **Razložljivost** - večinoma UI ne zna pojasniti odgovorov in odločitev
- ▶ **Napake** - so vedno prisotne - tako pri človeku kot UI (kdo je odgovoren za UI?)
- ▶ Ne more (trenutno) nadomestiti **osebnega odnosa** med pacientom in zdravnikom
- ▶ **Etični** zadržki

Intelligent Machines

The Dark Secret at the Heart of AI

No one really knows how the most advanced algorithms do what they do. That could be a problem.

by Will Knight April 11, 2017

Last year, a strange self-driving car was released onto the quiet roads of Monmouth County, New Jersey. The experimental vehicle, developed by researchers at the chip maker Nvidia, didn't look different from other autonomous cars, but it was unlike anything demonstrated by Google, Tesla, or General Motors, and it showed the rising power of artificial intelligence. The car didn't follow a single instruction provided by an engineer or programmer. Instead, it relied entirely on an algorithm that had taught itself to drive by watching a human do it.

Getting a car to drive this way was an impressive feat. But it's also a bit unsettling, since it isn't completely clear how the car makes its decisions.

Razložljiva UI

- ▶ Razložljiva umetna inteligenca (explainable AI – XAI) je področje umetne inteligence, ki se ukvarja z razvojem metod in tehnik za **izboljšanje razumljivosti odločitev in napovedi modelov strojnega učenja.**
- ▶ XAI je še v povojih, vendar je hitro rastoče strokovno področje.

Etika uporabe UI

- ▶ Tri skupine etičnih vprašanj:
 - **Varstvo in namen uporabe podatkov**
 - **Izguba zasebnosti**
 - **Diskriminacija in pristranskost**
- ▶ Zahteve EU (2019): **spoštovanje človekove avtonomije, preprečevanje škode, pravičnost in razložljivost!**
- ▶ Globalne kampanje k reguliranju UI (zakonitost, etičnost in robustnost)

Uporabnost UI v znanosti (1)

- ▶ Izjemna sposobnost natančnega **analiziranja in sinteze velikih količin kompleksnih podatkov**
- ▶ UI lahko **najde vzorce**, ki jih človek sam ne bi odkril
- ▶ Sposobnost (potrjena) sugeriranja **novih hipotez** – ki jih potem preverimo v raziskovalnem delu
- ▶ UI lahko natančno prilagodi svoje odgovore ali pripravi **več odgovorov**, kar raziskovalcem ponudi dragocen pogled iz različnih perspektiv

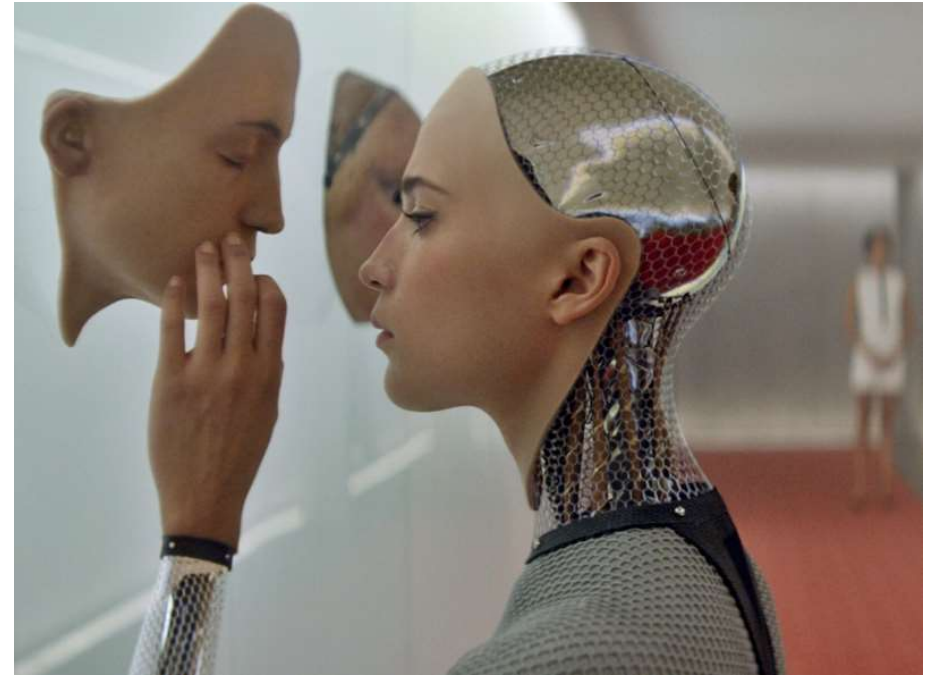
Uporabnost UI v znanosti (2)

- ▶ **Multimodalna UI** razume (in razloži) tudi grafe, slike, video posnetke.
- ▶ Razvijajo se naprave, ki bodo spremljale **kar vidimo** v živo in to delile z UI.
- ▶ Naslednji korak je preseči korespondenco in pogovor s človekom ter realizirati „**lastno razmišljanje UI**“ (*Mira Murati, CTO OpenAI, 10.2023*)

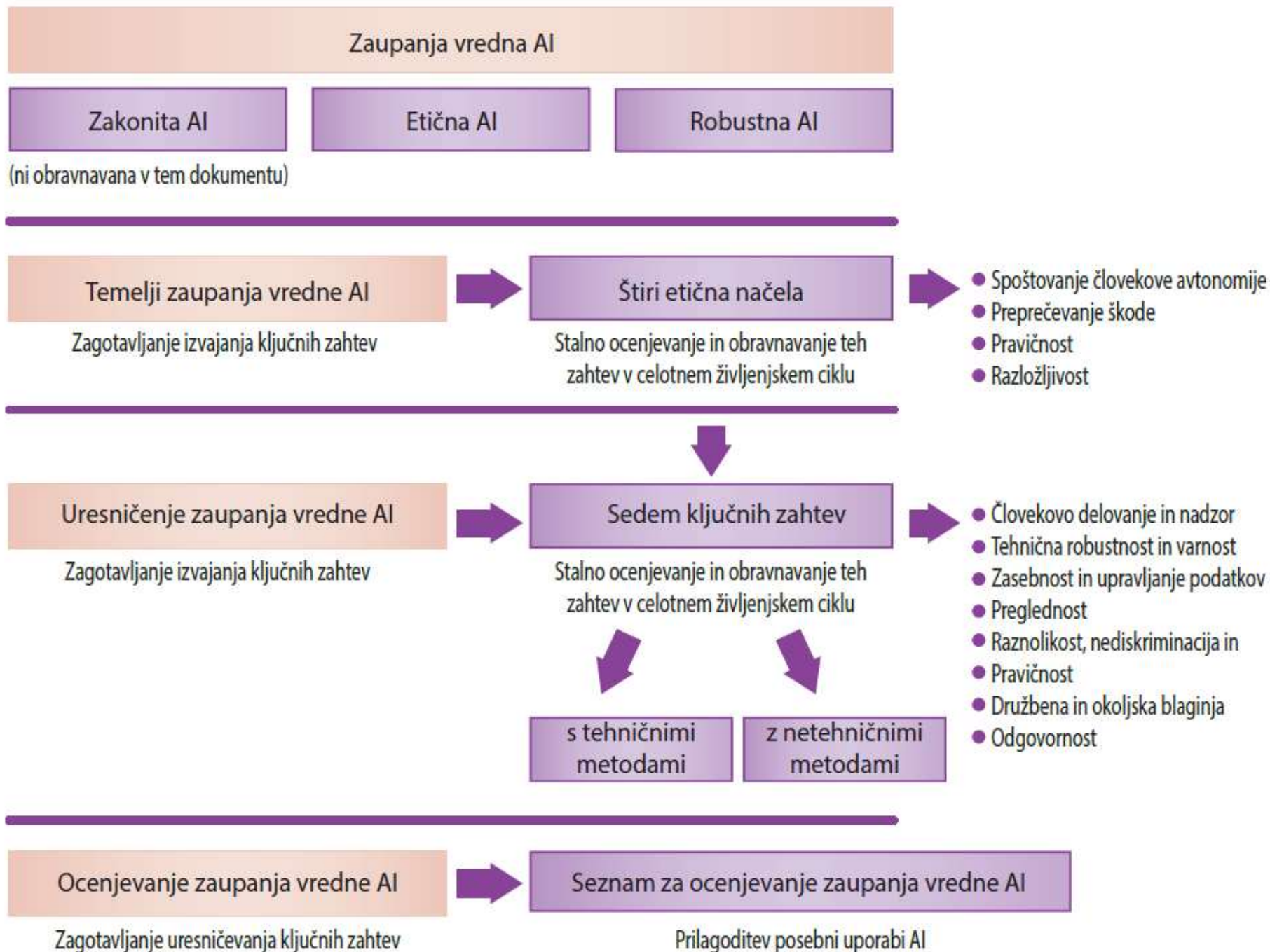
Umetna inteligenca je tehnologija z visokim tveganjem

- ▶ **Vpliv na javno mnenje in vedenje ljudi -**
Psihološko profiliranje: preference, interesi, stališča, usmerjenost, socialna mreža, dejavnosti.
- ▶ **Posegi v svobodo ljudi**
 - spremljanje gibanja vseh oseb v realnem času
 - „točkovanje“ državljanov
- ▶ Avtomatizirani vojaški sistemi – **avtonomna orožja**
- ▶ Avtonomno odločanje UI in „**Superinteligence**“
(AGI - Artificial general intelligence)

Kaj je ultimativna grožnja umetne inteligence? „Singularity“ (Kurzweil), E. Musk, S. Hawking



Okvir zaupanja vredne UI (EC, 2019)



Nadaljnji razvoj UI (1)

- ▶ Zmogljivosti računalnikov eksponentno naraščajo že 60 let, razvoj UI pa zadnjih 20 let
- ▶ Generiramo vedno več podatkov o našem življenju, fiziologiji, gibanju...

„**Neomejena**“ računalniška moč za nizko ceno (z vedno več podatki) **obeta vedno hitrejši razvoj UI**

UI bo kmalu generirala slike, tekste, knjige, programsko kodo ipd. - bolje kot človek!

Nadaljnji razvoj UI (2)

Razvoj UI je izjemno **hiter** in **nepredvidljiv!**

Kako jo bomo uporabljali čez 10 let?
Nimamo pojma!



IN THE CHAIR | THURSDAY by MAGGIE HARRISON

Microsoft Patents AI-Powered Therapy App

Dr. Roboto will see you now.

[/ Artificial Intelligence](#) / [/ Ai](#) / [/ Chatbots](#) / [/ Microsoft](#)




Naslednja stopnja: Transformativna UI

- ▶ Transformativna UI bo „spreminjala“ svet
- ▶ Avtomatizacija delovnih procesov
- ▶ UI je v realnem okolju že uspešno opravljala delo tajnika, ekonomistke, bančnega uslužbenca, delavca za tekočim trakom, voznice, skladiščnika.
- ▶ V eksperimentalnih okoljih je uspešno opravila večino delovnih procesov odvetnika, raziskovalca, filozofa in direktorja srednje velikega podjetja

Med naštetimi poklici ni zdravnika in učitelja!

Topics

Will Artificial Intelligence Become Conscious?

By **Subhash Kak** - Dec 15, 2017  32



Forget about today's **modest incremental advances** in artificial intelligence, such as the increasing abilities of cars to **drive themselves**. Waiting in the wings might be a **groundbreaking development**: a machine that is aware of itself and its surroundings, and that could take in and process massive amounts of data in real time. It could be sent on dangerous missions, into space or combat. In addition to driving people around, it might be able to cook, clean, do laundry—and even keep humans company when other people aren't nearby.

Veliko vprašanje prihodnosti: Kakšen bo odnos med človekom in UI?

- ▶ Ljudje intuitivno dojemamo robote na **antropomorfen** način - pripišemo jim lastno voljo, sposobnost čutenja in razumevanja.

Ali bomo z roboti **prijatelji** ali celo **ljubimci**?

- ▶ **UI se ne „zaveda“!**
- ▶ **UI ne „razume“** pomena enako kot človek – zna pa odlično simulirati inteligentnost.
- ▶ **UI ni kritično razmišljujoča** in nima lastne presoje – čeprav se včasih zdi tako.

Za poglubljen razmislek o odnosih z roboti!

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Ich bin dein Mensch

2021 · R · 1h 48m

IMDb RATING **7.1/10**
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Vprašajmo Gemini!

14.9.2024



Ali nas bodo namesto zdravnikov kmalu zdravili inteligentni roboti?

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Odlično vprašanje! To je tema, ki postaja vse bolj aktualna in sproža veliko zanimanja ter tudi nekaj pomislekov.

Kratek odgovor je: ne povsem, vsaj ne v bližnji prihodnosti. Čeprav umetna inteligenca in robotika dosegata neverjetne napredke, še vedno ne moreta popolnoma nadomestiti človeškega zdravnika.

Zakaj?

- **Človeška empatija in sočutje:** Zdravniki ne zdravijo le fizičnih težav, ampak nudijo tudi čustveno podporo in razumevanje. Roboti, čeprav lahko zberejo ogromno podatkov in izvedejo zapletene analize, še vedno nimajo sposobnosti empatije in sočutja, ki sta ključna za celostno zdravljenje.
- **Nejasne situacije:** V medicini se pogosto pojavljajo nepredvidene situacije, kjer je potrebna hitra presoja in prilagodljivost. Čeprav se strojno učenje nenehno izboljšuje, še vedno ni tako dobro kot človeški možgani pri reševanju kompleksnih in nejasnih problemov.
- **Etična vprašanja:** Uporaba robotov v medicini odpira številna etična vprašanja, kot so odgovornost v primeru napak, varnost pacientov in vloga človeka v zdravstvu.

Zaključek

V prihodnosti lahko pričakujemo, da bo sodelovanje med zdravniki in roboti postajalo vse tesnejše. Roboti bodo zdravnikom pomagali pri njihovem delu, vendar jih ne bodo nadomestili. Človeška inteligenca, empatija in sposobnost prilagajanja bodo še naprej ključne za zagotavljanje kakovostne zdravstvene oskrbe.



V strokovni literaturi sem prebral, da umetna inteligenca bolje rešuje prav kompleksne in nejasne probleme. Kako to, da si odgovoril obratno?

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Spoštovani,

Hvala za vaše vprašanje. Razumem, da ste v strokovni literaturi naleteli na trditev, da umetna inteligenca bolje rešuje kompleksne in nejasne probleme, kar se morda zdi v nasprotju z mojim prejšnjim odgovorom.

Pojasnimo si:

- **Trenutne omejitve umetne inteligence:** Čeprav se umetna inteligenca hitro razvija in dosega izjemne rezultate, še vedno ima svoje omejitve. Pri kompleksnih in nejasnih problemih, ki zahtevajo globoko razumevanje konteksta, človeških vrednot in nuanc naravnega jezika, umetna inteligenca še vedno zaostaja za človekom.
- **Moč človeške intuicije in izkušenj:** Ljudje imamo sposobnost intuitivnega razumevanja, ki temelji na naših izkušnjah, znanju in čustvih. To nam omogoča, da prepoznamo vzorce, ki jih umetna inteligenca morda spregleda, in da se prilagodimo nepredvidenim situacijam.