Inteligência Artificial: passado, presente e futuro

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Inteligência Artificial, Aprendizado de Máquina e Visualização de Dados

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Agenda

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1. Início da Inteligência Artificial

2. Conceitos e aplicações

3. Oportunidades e desafios

O início da IA

Onde tudo começou...

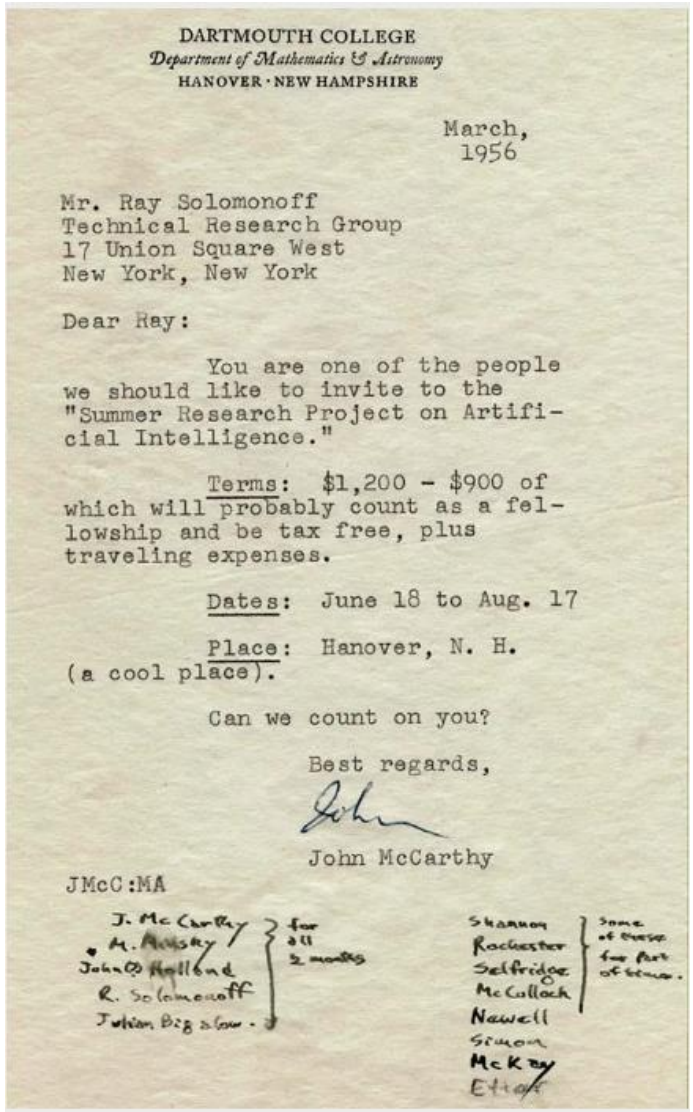
O início da Inteligência Artificial

- I Workshop de IA, em Dartmouth College, em 1956
- Brainstorming de seis semanas
- John Nash, prêmio Nobel em economia – Teoria dos Jogos

Trenchard More, John McCarthy, Marvin Minsky, Oliver Selfridge, and Ray Solomonoff.

Foto de 2006 com alguns dos participantes da conferência chamada “Os próximos 50 anos (AI@50) para comemorar o 50º aniversário da conferência de Dartmouth

O início da Inteligência Artificial



DARTMOUTH COLLEGE
Department of Mathematics & Astronomy
HANOVER · NEW HAMPSHIRE

March,
1956

Mr. Ray Solomonoff
Technical Research Group
17 Union Square West
New York, New York

Dear Ray:

You are one of the people we should like to invite to the "Summer Research Project on Artificial Intelligence."

Terms: $1,200 - $900 of which will probably count as a fellowship and be tax free, plus traveling expenses.

Dates: June 18 to Aug. 17

Place: Hanover, N. H. (a cool place).

Can we count on you?

Best regards,

John McCarthy

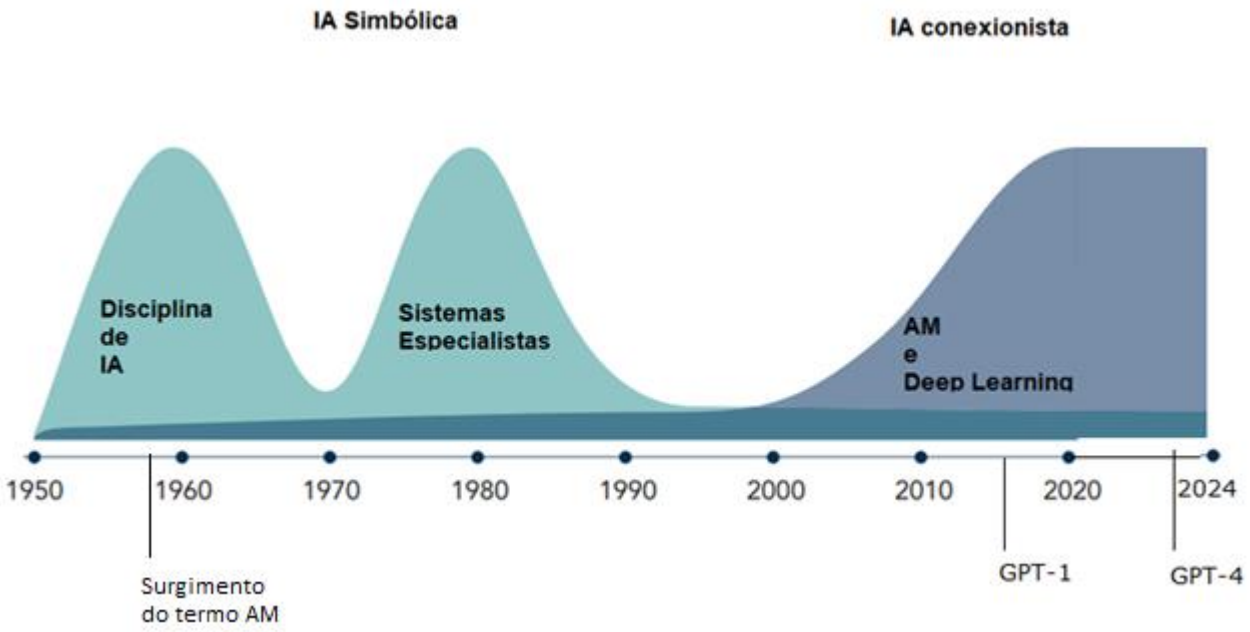
JMcC:MA

J. McCarthy
M. Minsky
John Holland
R. Solomonoff
Julian Bigelow
} for all 2 months

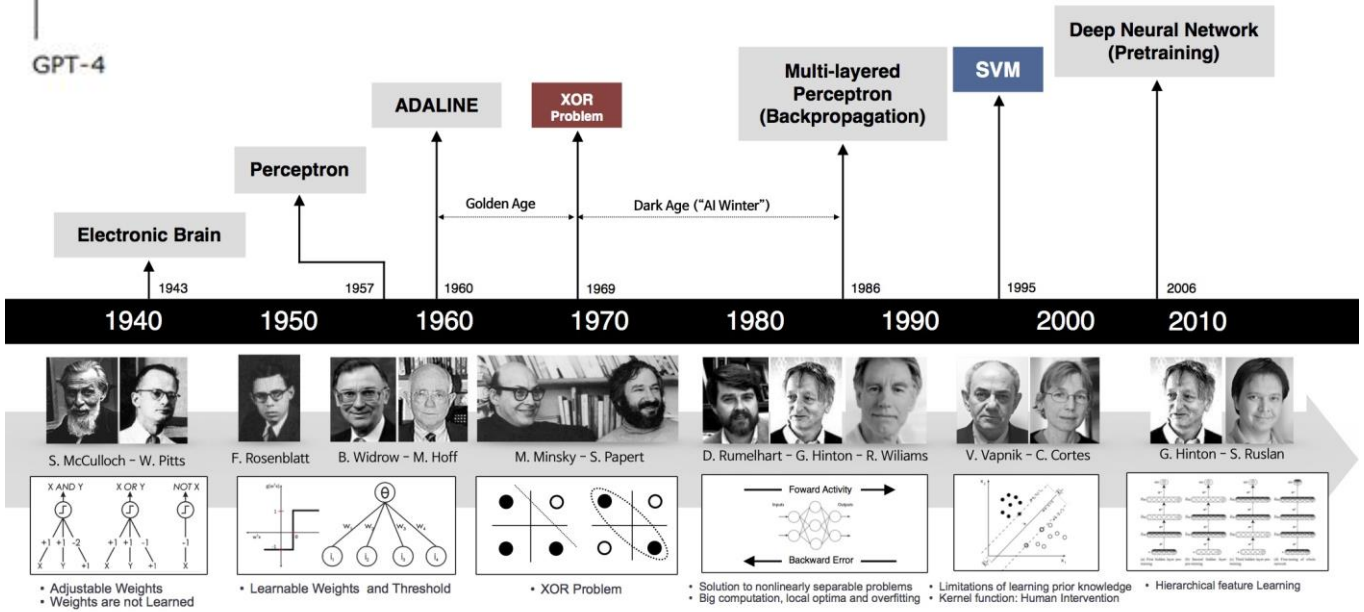
Shannon
Rochester
Selfridge
McCulloch
Nawell
Simon
McKay
Ethot
} some of these for part of time.

In March 1956, John McCarthy, one of the Dartmouth AI workshop's organizers, invited Ray Solomonoff to the summer workshop in Hanover, N.H. GRACE SOLOMONOFF

Abordagens da IA



- O surgimento do termo **Aprendizado de máquina** foi em 1959, por Arthur Lee Samuel



Abordagens da IA

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Letter | Published: 09 October 1986

Learning representations by back-propagating errors

David E. Rumelhart, Geoffrey E. Hinton & Ronald J. Williams

Nature **323**, 533–536 (1986) | Cite this article

Abstract

We describe a new learning procedure, back-propagation, for networks of neurone-like units. The procedure repeatedly adjusts the weights of the connections in the network so as to minimize a measure of the difference between the actual output vector of the net and the desired output vector. As a result of the weight adjustments, internal 'hidden' units which are not part of the input or output come to represent important features of the task domain, and the regularities in the task are captured by the interactions of these units. The ability to create useful new features distinguishes back-propagation from earlier, simpler methods such as the perceptron-convergence procedure[1].

Aplicações

E que aplicações temos visto com a IA?

Assistentes virtuais

Google Translate

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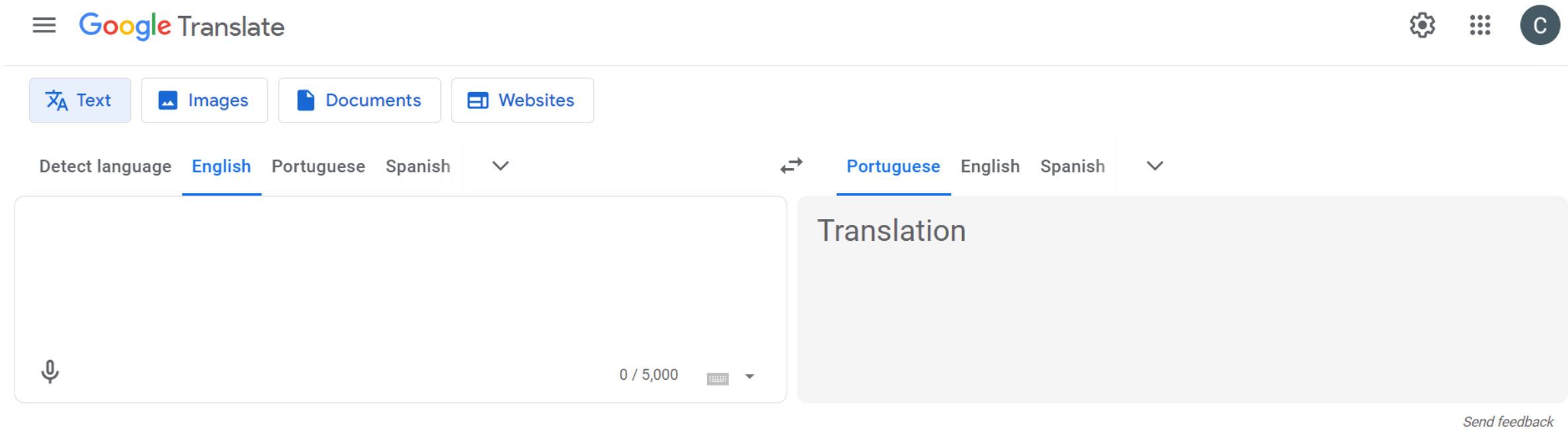

Grammarly

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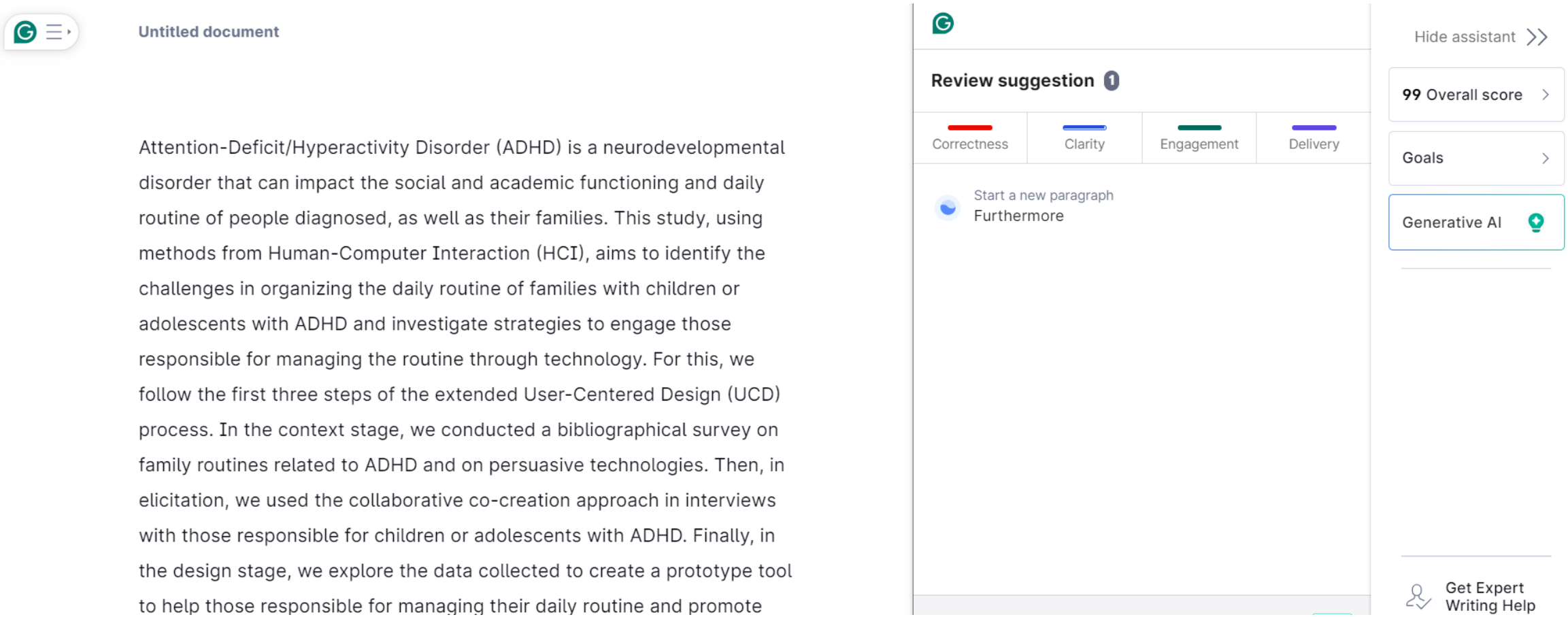

Recomendações de séries

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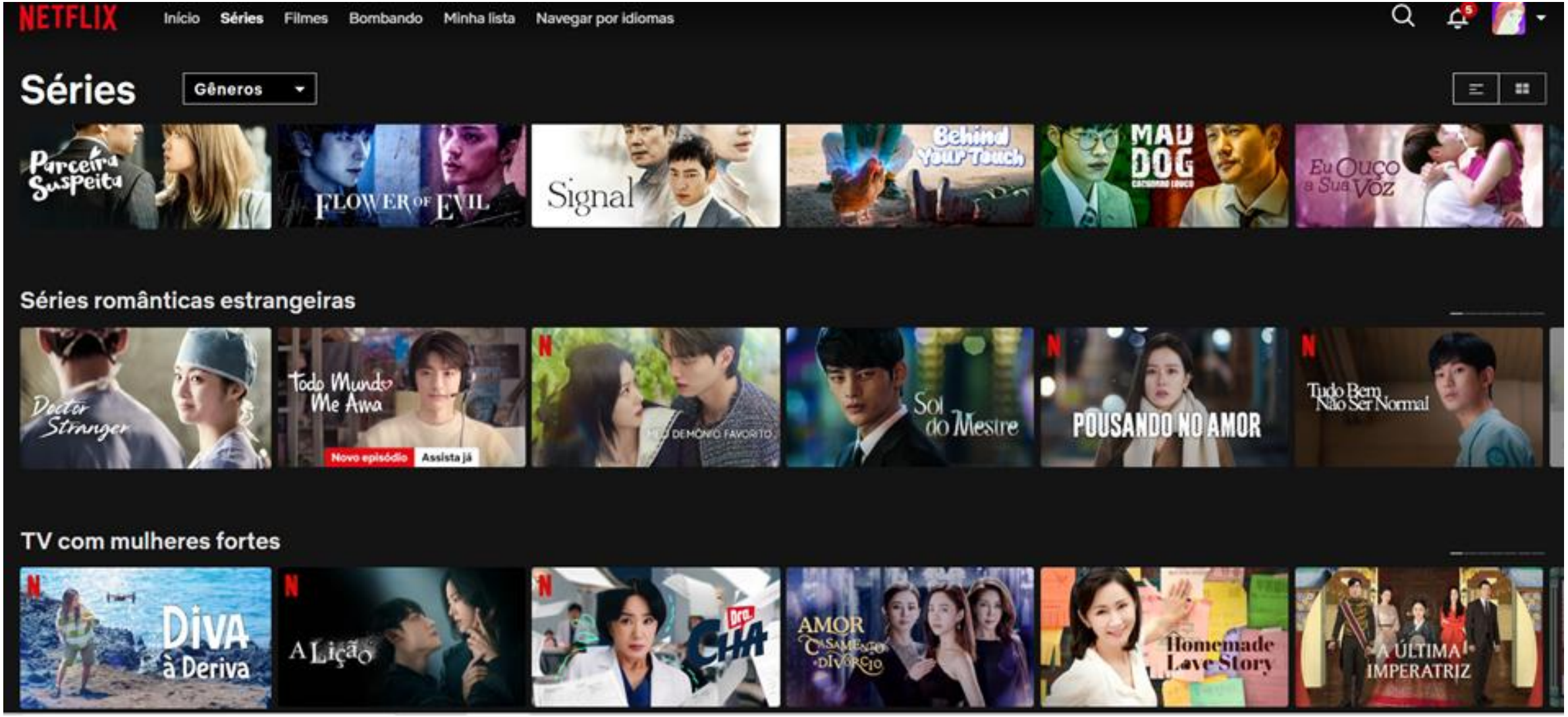

Identificação de placas em shoppings

Geração de imagens, áudios, textos e vídeos

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Charlote Jones

Predominantly inattentive presentation ADHD

Comorbidity with Social Anxiety Disorder | **Hyperfocus on Building-Block Toys**

Discovering ADHD

Charlotte is a very affectionate child and loves making friends, but lately, she has had problems socializing. Because she has difficulty expressing her thoughts in words, Charlotte has been labeled by some classmates as "strange", for she mixes topics different from those being said in the middle of the conversation, presenting statements out of context. Charlote's low academic performance and her recent problems with friends led her mother, Mônica, to investigate the reason for these difficulties. After much analysis, together with a neurologist and other health professionals, Charlote was diagnosed with ADHD of predominantly inattentive presentation. Together with ADHD, due to bullying suffered by her classmates, Charlote developed Social Anxiety Disorder, which makes her afraid of social interactions or performing tasks that require some exposure. After the diagnosis, Mônica sought guidance from specialists regarding techniques that could help Charlote to minimize her difficulties. Mônica also shared with Charlote's school the problems faced by her daughter to align which actions would be adopted for better organization and educational/social development of Charlote.

Age: 9 years old.
School type: Private.

Personality

Shy	Talkative
Quiet	Agitated
Calm	Irritable
Patient	Impatient

Challenges experienced

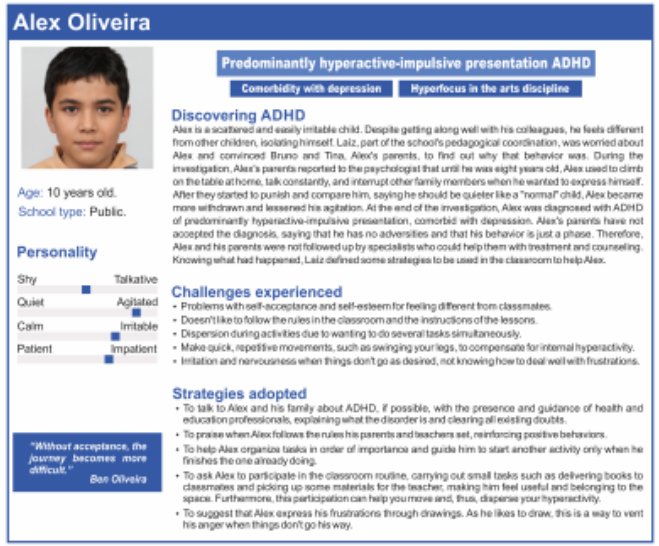
- Forgets to hand in school exercises.
- Understands little of what teachers discuss and present in the classroom.
- Easily distracted by thoughts/memories and visual stimuli.
- During a conversation, it is a challenge to remember what topic to talk about.
- Gets lost in group conversations, not following the different topics discussed.

Strategies adopted

- To assist Charlote in preparing weekly calendars that detail the planning of her daily routine.
- Tasks such as organizing the delivery of academic activities, making the bed, and separating the school supplies needed for the day are examples of activities that can be part of daily planning. This process can help Charlote gain autonomy, allowing her to carry out her tasks without needing guidance on what should be done.
- To hire a private teacher to help Charlote with her homework and school organization.
- To give Charlote short, clear, and objective guidelines at home and school.
- To determine a classroom desk away from the door and windows and closest to the teacher. This way, distractions, and visual stimuli can be reduced when looking through the window or door. In addition, being close to the teacher allows better contact between Charlote and the teacher, enabling the teacher to encourage her participation in classes.

"Being bad in academic terms doesn't mean you're a failure."
Rick Riordan

(a) Inattentive



Alex Oliveira

Predominantly hyperactive-impulsive presentation ADHD

Comorbidity with depression | **Hyperfocus in the arts discipline**

Discovering ADHD

Alex is a scattered and easily irritable child. Despite getting along well with his colleagues, he feels different from other children, isolating himself. Laiz, part of the school's pedagogical coordination, was worried about Alex and convinced Bruno and Tina, Alex's parents, to find out why that behavior was. During the investigation, Alex's parents reported to the psychologist that until he was eight years old, Alex used to climb on the table at home, talk constantly, and interrupt other family members when he wanted to express himself. After they started to punish and compare him, saying he should be quieter like a "normal" child, Alex became more withdrawn and lessened his agitation. At the end of the investigation, Alex was diagnosed with ADHD of predominantly hyperactive-impulsive presentation, comorbid with depression. Alex's parents have not accepted the diagnosis, saying that he has no adversities and that his behavior is just a phase. Therefore, Alex and his parents were not followed up by specialists who could help them with treatment and counseling. Knowing what had happened, Laiz defined some strategies to be used in the classroom to help Alex.

Age: 10 years old.
School type: Public.

Personality

Shy	Talkative
Quiet	Agitated
Calm	Irritable
Patient	Impatient

Challenges experienced

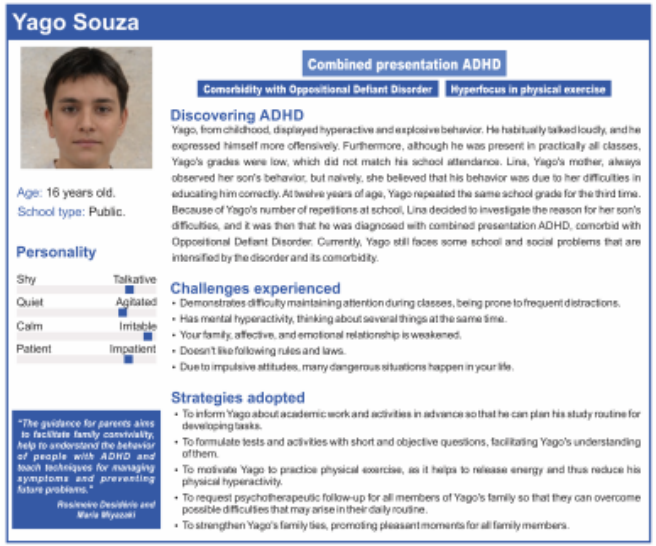
- Problems with self-acceptance and self-esteem for feeling different from classmates.
- Doesn't like to follow the rules in the classroom and the instructions of the lessons.
- Dispersion during activities due to wanting to do several tasks simultaneously.
- Make quick, repetitive movements, such as swinging your legs, to compensate for internal hyperactivity.
- Irritation and nervousness when things don't go as desired, not knowing how to deal well with frustrations.

Strategies adopted

- To talk to Alex and his family about ADHD, if possible, with the presence and guidance of health and education professionals, explaining what the disorder is and clearing all existing doubts.
- To praise when Alex follows the rules his parents and teachers set, reinforcing positive behaviors.
- To help Alex organize tasks in order of importance and guide him to start another activity only when he finishes the one already doing.
- To ask Alex to participate in the classroom routine, carrying out small tasks such as delivering books to classmates and picking up some materials for the teacher, making him feel useful and belonging to the space. Furthermore, this participation can help you move and, thus, disperse your hyperactivity.
- To suggest that Alex express his frustrations through drawings. As he likes to draw, this is a way to vent his anger when things don't go his way.

"Without acceptance, the journey becomes more difficult."
Bon Oliveira

(b) Hyperactive-Impulsive



Yago Souza

Combined presentation ADHD

Comorbidity with Oppositional Defiant Disorder | **Hyperfocus in physical exercise**

Discovering ADHD

Yago, from childhood, displayed hyperactive and explosive behavior. He habitually talked loudly, and he expressed himself more offensively. Furthermore, although he was present in practically all classes, Yago's grades were low, which did not match his school attendance. Lina, Yago's mother, always observed her son's behavior, but naively, she believed that his behavior was due to her difficulties in educating him correctly. At twelve years of age, Yago repeated the same school grade for the third time. Because of Yago's number of repetitions at school, Lina decided to investigate the reason for her son's difficulties, and it was then that he was diagnosed with combined presentation ADHD, comorbid with Oppositional Defiant Disorder. Currently, Yago still faces some school and social problems that are intensified by the disorder and its comorbidity.

Age: 16 years old.
School type: Public.

Personality

Shy	Talkative
Quiet	Agitated
Calm	Irritable
Patient	Impatient

Challenges experienced

- Demonstrates difficulty maintaining attention during classes, being prone to frequent distractions.
- Has mental hyperactivity, thinking about several things at the same time.
- Your family, affective, and emotional relationship is weakened.
- Doesn't like following rules and laws.
- Due to impulsive attitudes, many dangerous situations happen in your life.

Strategies adopted

- To inform Yago about academic work and activities in advance so that he can plan his study routine for developing tasks.
- To formulate tests and activities with short and objective questions, facilitating Yago's understanding of them.
- To motivate Yago to practice physical exercise, as it helps to release energy and thus reduce his physical hyperactivity.
- To request psychotherapeutic follow-up for all members of Yago's family so that they can overcome possible difficulties that may arise in their daily routine.
- To strengthen Yago's family ties, promoting pleasant moments for all family members.

"The guidance for parents aims to facilitate family conviviality, help to understand the behavior of people with ADHD and teach techniques for managing symptoms and preventing future problems."
Rosineire Desidério and Maria Miyazaki

Precisão em diagnósticos médicos

PUC Minas

Research | Open access | Published: 09 August 2023

The accuracy of artificial intelligence in predicting COVID-19 patient mortality: a systematic review and meta-analysis

Yu Xin, Hongxu Li, Yuxin Zhou, Qing Yang, Wenjing Mu, Han Xiao, Zipeng Zhuo, Hongyu Liu, Hongying Wang, Xutong Qu, Changsong Wang ✉, Haitao Liu ✉ & Kaijiang Yu ✉

BMC Medical Informatics and Decision Making **23**, Article number: 155 (2023) | Cite this article

Precisão em diagnósticos médicos

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JOURNAL ARTICLE

Using ChatGPT to evaluate cancer myths and misconceptions: artificial intelligence and cancer information

Skyler B Johnson, MD ✉, Andy J King, PhD, Echo L Warner, PhD, Sanjay Aneja, MD, Benjamin H Kann, MD, Carma L Bylund, PhD

JNCI Cancer Spectrum, Volume 7, Issue 2, April 2023, pkad015,
https://doi.org/10.1093/jncics/pkad015

Published: 17 March 2023 **Article history** ▾

Lançamento do GPT-4o...

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Oportunidades e desafios

Quais são as oportunidades e desafios?

Algumas oportunidades

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- **Negócios e Finanças**: Análise preditiva para **tendências de mercado**, gerenciamento de risco e detecção de fraudes

- **Governança**: **Análise de dados para tomada de decisões** políticas e sociais mais informadas

- **Recursos Humanos**: Melhoria na **seleção de candidatos e gestão de talentos** com base em análise de dados de desempenho

- **Segurança Cibernética**: **Detecção e resposta a ameaças** em tempo real

- **Vigilância Urbana**: **Monitoramento de áreas públicas** e prevenção de crimes através de **análise de vídeo**.

Alguns desafios

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- **Modelos não interpretáveis**
  - Desempenho preditivo *versus* interpretabilidade dos modelos

ELSEVIER

Expert Systems with Applications

Volume 228, 15 October 2023, 120373

CSSE - An agnostic method of counterfactual, selected, and social explanations for classification models

Marcelo de Sousa Balbino [a b 1], Luis Enrique Zárate Gálvez [a 1], Cristiane Neri Nobre [a 1]

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https://doi.org/10.1016/j.eswa.2023.120373

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Alguns desafios

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- **Modelos com vieses discriminatórios (etnia, gênero, religião...)**

INÍCIO / ARQUIVOS /
2023: ANAIS DO XI SYMPOSIUM ON KNOWLEDGE DISCOVERY, MINING AND LEARNING /
Explanations

Proposal of a Method for Identifying Unfairness in Machine Learning Models based on Counterfactual Explanations

Fernanda R. P. Cirino, Carlos D. Maia, Marcelo S. Balbino, Cristiane N. Nobre
DOI: https://doi.org/10.5753/kdmile.2023.232900

Alguns desafios

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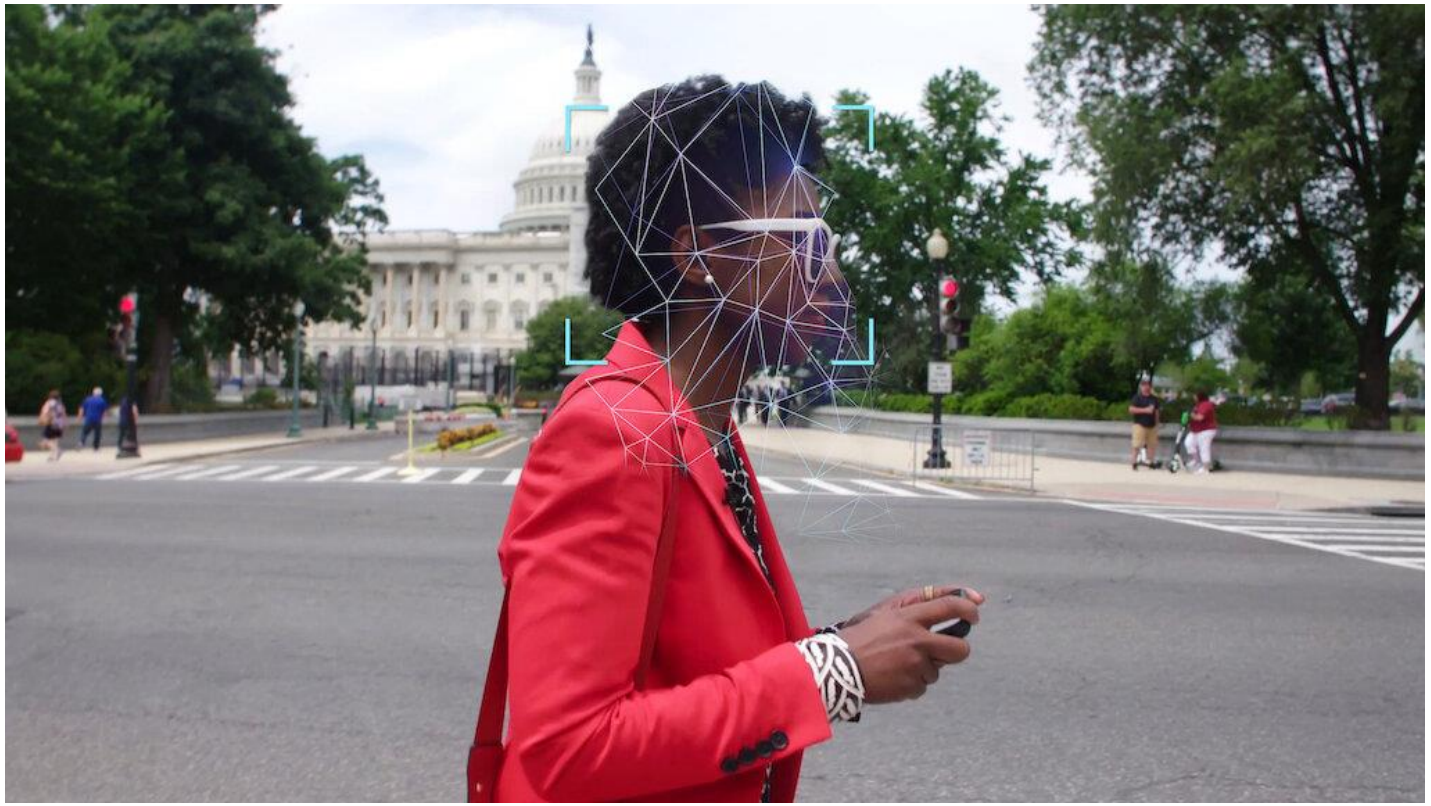
Coded Bias: documentário da Netflix revela **viés racista** em algoritmos de IA



Joy Buolamwini fundou a Algorithmic Justice League (AJL)

Alguns desafios

PUC Minas

- **Disseminação de Fake News**

Vídeo do Dráuzio Varela fazendo propaganda de remédio caseiro para emagrecer

Imagem viral do papa acende alerta sobre desinformação gerada por inteligência artificial (gerada pela ferramenta **Midjourney)**

Recomendação da SBC para publicação de artigos no IHC

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Uso de Inteligência Artificial (IA) Generativa:

a utilização de ferramentas e tecnologias de IA Generativa para geração de conteúdos, na escrita e/ou revisão do conteúdo de artigos, **deve ser declarada explicitamente no trabalho**.

A declaração pode ocorrer na **Seção de Agradecimentos**, na **metodologia** ou em uma **seção definida** especificamente para este fim, de acordo com o template adotado, e deve **listar as ferramentas** e descrever onde foram empregadas, por exemplo, textos, tabelas, gráficos, citações, etc.

Essas ferramentas não podem ser listadas como autores de um artigo. O uso de tais ferramentas não exime os autores da responsabilidade sobre todo o seu conteúdo, inclusive no caso de ser identificado plágio.

Disponível em: https://sol.sbc.org.br/index.php/indice/conduta/

Projetos de lei para regulamentar o uso de IA

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- A Itália e os EUA, dentre outros países e governos, estão propondo políticas para **regular a IA** e mitigar a possibilidade de **desinformação e preconceito**

- No Brasil, o projeto de **Lei Nº 2338**, de 2023, que dispõe sobre o **uso de IA**, está em tramitação no Congresso Nacional

SENADO FEDERAL

PROJETO DE LEI
N° 2338, DE 2023

Dispõe sobre o uso da Inteligência Artificial.

Situação do projeto de Lei nº 2338

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Projeto de Lei n° 2338, de 2023

Iniciativa Senador Rodrigo Pacheco (PSD/MG)
Assunto Jurídico > Direito Civil > Responsabilidade Civil
Jurídico > Direitos e Garantias > Direitos Individuais e Coletivos
Economia e Desenvolvimento > Ciência, Tecnologia e Informática
Natureza Norma Geral

Ementa:
Dispõe sobre o uso da Inteligência Artificial.

Situação Atual Em tramitação

Relator atual: Senador Eduardo Gomes
Último local: 21/02/2024 – Comissão Temporária Interna sobre Inteligência Artificial no Brasil
Último estado: 21/02/2024 – MATÉRIA COM A RELATORIA

Participe

Opine sobre esta matéria

910 355

SIM NÃO

Compartilhe

Resultado apurado em 2024-05-15 às 18:06

IA, qual o seu futuro?

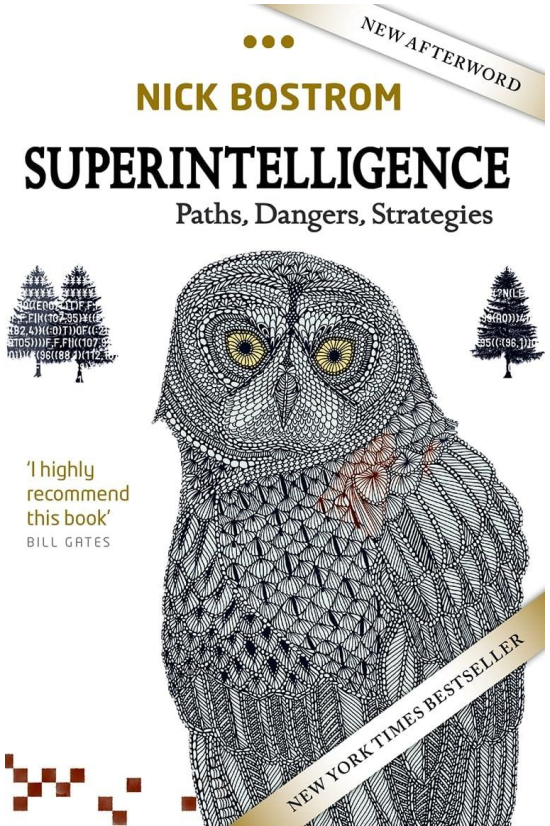
Para onde estamos caminhando?

Como será o futuro com a IA?

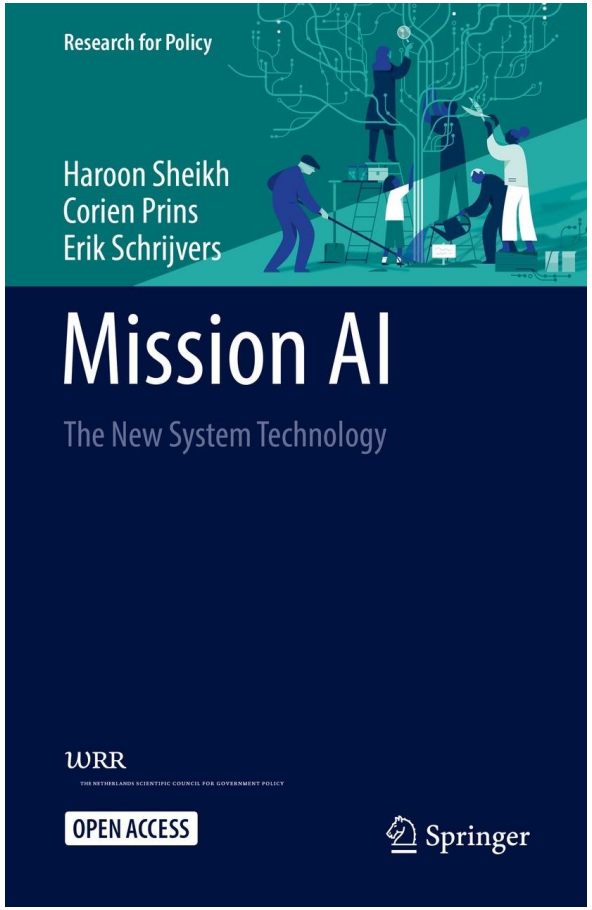
- "Fábula Inacabada dos Pardais“: Como domar a coruja antes de trazê-la “para o meio dos pardais".

AI@50:

- **Minsky**: Pesquisadores brilhantes, persigam as suas próprias boas ideias. Sejam persistentes!
- **Solomonoff:** máquinas realmente inteligentes não estão tão longe assim. O perigo, segundo ele, é político!
- **Selfridge:** os computadores farão mais planejamento e incorporarão sentimentos e afetos



Referências



Projeto de Lei 2338

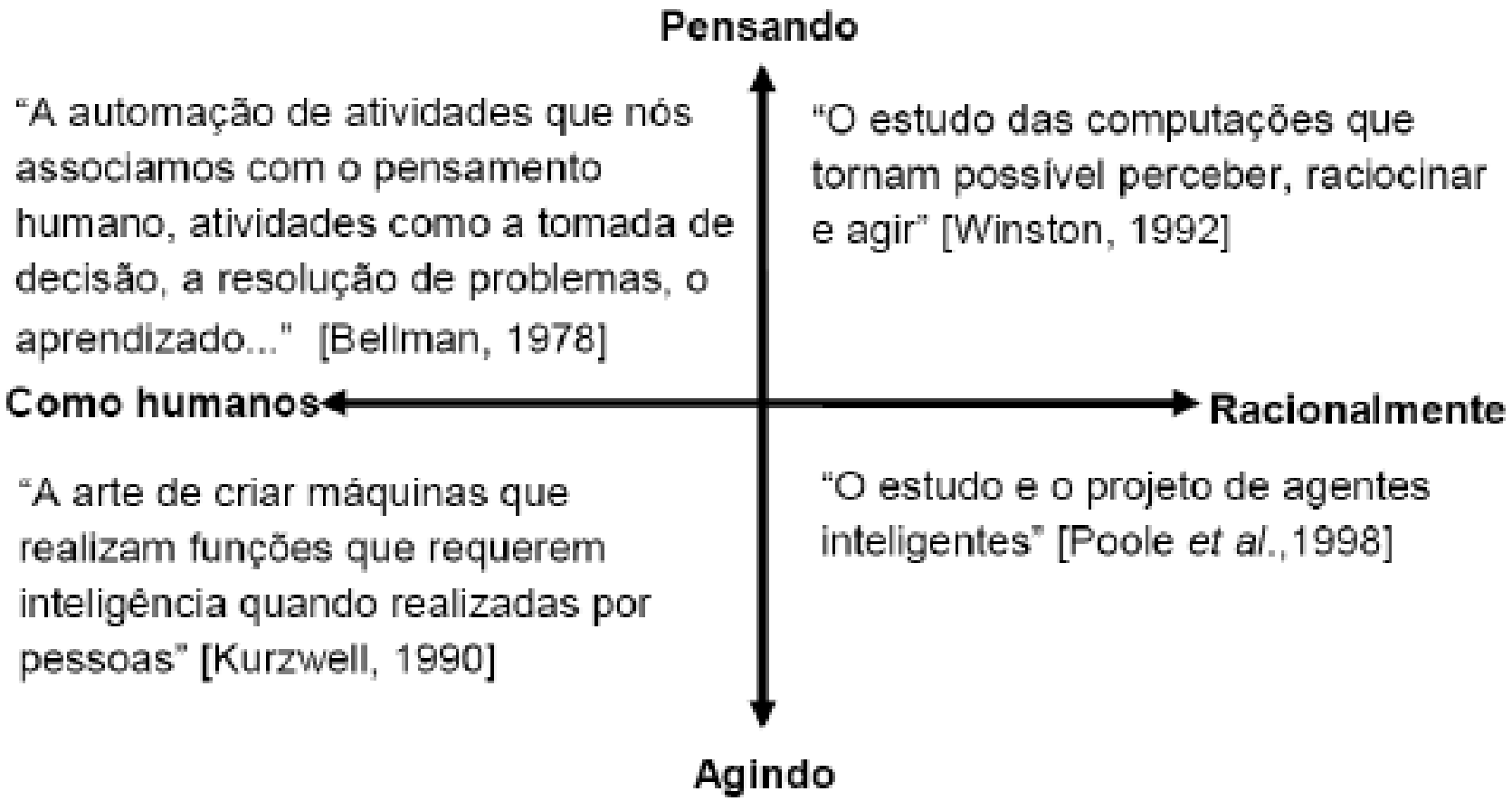
https://www25.senado.leg.br/web/atividade/materias/-/materia/157233

AI@50
https://www.researchgate.net/publication/220605256_The_Dartmouth_College_Artificial_Intelligence_Conference_The_Next_Fifty_Years

INTRODUÇÃO À INTELIGÊNCIA ARTIFICIAL

Cristiane Neri Nobre

Quatro pontos de vista da IA



Pensar Racionalmente

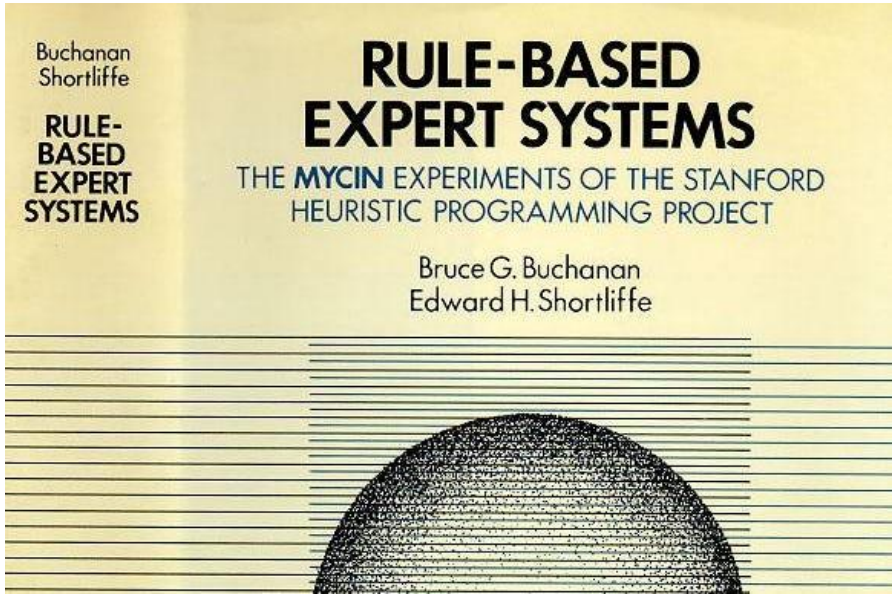
- IA “Clássica” ou “Simbólica”
- Representação do mundo através de proposições lógicas
- Socrátes é homem
  - Todo homem é mortal
  - Logo, Socrates é mortal

- Os programas tiram conclusões a partir das proposições
- Em princípio, qualquer problema descrito através de lógica pode ser resolvido

Pensar Racionalmente

- Sistemas muito famosos na década de 70 e 80

MYCIN: Diagnóstico de doenças



Pensar Racionalmente

Pensar Racionalmente

- Assistentes virtuais

"Hey Alexa"

"Hey Siri"

"Hey Google"

Pensar Humanamente

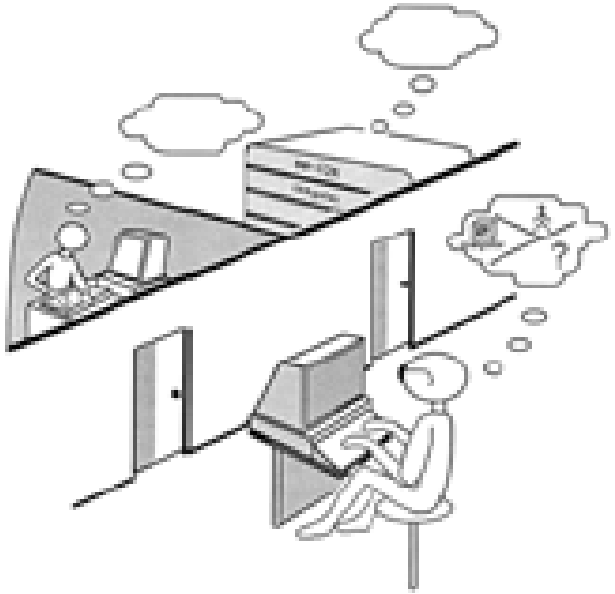
- **Problema:**

  Ainda não se sabe como nós pensamos!

- Portanto é preciso estudar e entender como o ser humano pensa
  - Ciências Cognitivas

- Redes neurais

Agir Humanamente



Teste de Turing Invertido

Ex:

Teste de Turing:

Métrica: parecer humano

Envolve:

- Processamento de linguagem natural
- Representação do conhecimento
- Raciocínio
- Aprendizado
- "Ser capaz de errar"

Agir Racionalmente

Agentes

Um agente pode ser considerado uma entidade que percebe o ambiente através de seus sensores e age através de atuadores

Exemplos:

- Ser humano (tem olhos, ouvidos e outros órgaos como sensores, e tem mãos, pernas, boca como atuadores)
- Robô (câmeras e detectores de faixa infravermelho funcionando como sensores e vários motores como atuadores)
- Softbot (agente de software) – recebe sequências de teclas digitadas como entrada e atua sobre o ambiente exibindo algo na tela.

Algumas definições

"Inteligência Artificial é o estudo de como fazer os computadores realizarem coisas que, no momento, as pessoas fazem melhor." Elaine Rich & Kevin Knight (1993)

"IA pode ser definida como o ramo da ciência da computação que se preocupa com a automação do *comportamento inteligente*."
"IA é a coleção de problemas e metodologias estudadas pelos pesquisadores de IA." Luger & Stubblefield (1993)

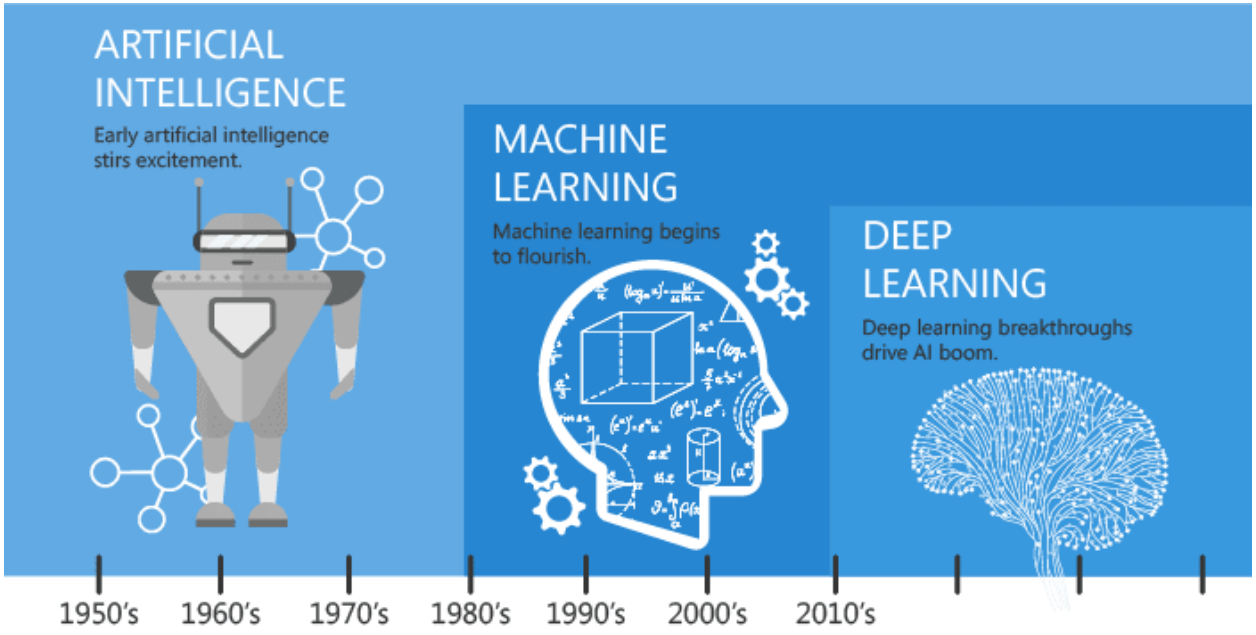
"Inteligência Artificial é o estudo das computações que tornam possível *perceber, raciocinar e agir*." Winston (1992)

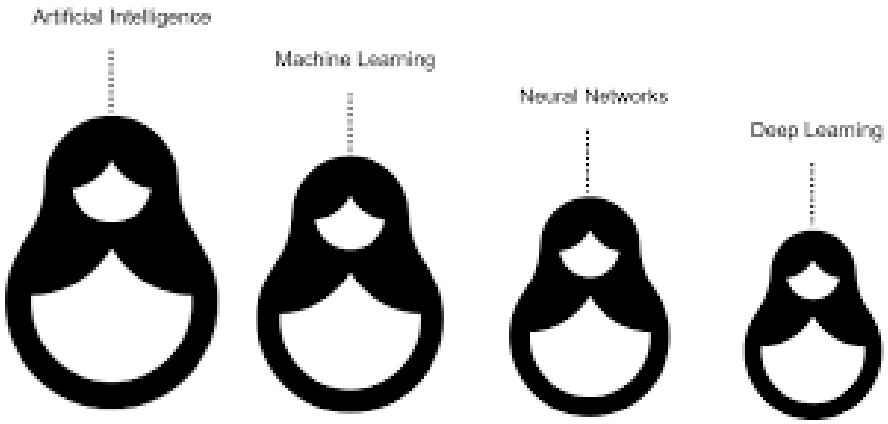
Algumas definições

"IA é a parte da ciência da computação que se preocupa em desenvolver sistemas computacionais inteligentes, isto é, sistemas que exibem *características, as quais nós associamos com a inteligência no comportamento humano* - por exemplo, compreensão da linguagem, aprendizado, raciocínio, resolução de problemas, etc." Barr & Feigenbaum (1981)

Inteligência Artificial é a inteligência demonstrada por máquinas ao executar tarefas complexas associadas a seres inteligentes, além de também ser um campo de estudo acadêmico, onde seu principal objetivo é de executar funções de modo autônomo (wikipedia, 2022)

IA x ML x DL


ARTIFICIAL INTELLIGENCE
Early artificial intelligence stirs excitement.
MACHINE LEARNING
Machine learning begins to flourish.
DEEP LEARNING
Deep learning breakthroughs drive AI boom.
1950's
1960's
1970's
1980's
1990's
2000's
2010's


Artificial Intelligence
Machine Learning
Neural Networks
Deep Learning

Aplicações da IA

- Chatterbots(robôs de software para conversação)
- Sistemas com Visão computacional
- Reconhecimento Facial
- NETtalk–leitura de textos
- Reconhecimento de padrões