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CADERNO DE QUESTÕES

Prova de Suficiência em Língua Inglesa

ATENÇÃO!

Não abra este caderno antes de ser autorizado pelo fiscal.

Você está recebendo um **CADERNO DE QUESTÕES** e um **CADERNO DE RESPOSTAS.**

O **CADERNO DE QUESTÕES** consta de **6 (seis) páginas**, numeradas sequencialmente, incluindo espaço para rascunho.

O **CADERNO DE RESPOSTAS** consta de **2 (duas) páginas** numeradas sequencialmente.

A resposta deverá ser escrita na folha destinada a cada questão.

Esta é uma prova dissertativa com o valor máximo de **10 (dez) pontos**.

TODAS AS QUESTÕES DEVEM SER RESPONDIDAS EM PORTUGUÊS.

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O texto a seguir refere-se ao uso da Inteligência Artificial na pesquisa científica. Leia-o e responda em português às questões propostas:

This is how AI will transform the way science gets done

Science is about to become much more exciting — and that will affect us all, argues Google's former CEO.

[...]

If we play our cards right, with sensible regulation and proper support for innovative uses of AI to address science's most pressing issues, AI can rewrite the scientific prencouraging breakthroughs that would otherwise take decades.

AI in recent months has become almost synonymous with large language models, or LLMs, but in science there are a multitude of different model architectures that may have even bigger impacts. In the past decade, most progress in science has come through smaller, "classical" models focused on specific questions. These models have already brought about profound advances. More recently, larger deep-learning models that are beginning to incorporate cross-domain knowledge and generative AI have expanded what is possible.

Scientists at McMaster and MIT, for example, used an AI model to identify an antibiotic to combat a pathogen that the World Health Organization labeled one of the world's most dangerous antibiotic-resistant bacteria for hospital patients. A Google DeepMind model can control plasma in nuclear fusion reactions, bringing us closer to a clean-energy revolution. Within health care, the US Food and Drug Administration has already cleared 523 devices that use AI — 75% of them for use in radiology.

Reimagining science

At its core, the scientific process we all learned in elementary school will remain the same: conduct background research, identify a hypothesis, test it through experimentation, analyze the collected data, and reach a conclusion. But AI has the potential to revolutionize how each of these components looks in the future.

[...]

Moving on to the experimentation step, AI will be able to conduct experiments faster, cheaper, and at greater scale. For example, we can build AI-powered machines with hundreds of micropipettes running day and night to create samples at a rate no human could match. Instead of limiting themselves to just six experiments, scientists can use AI tools to run a thousand.

Scientists who are worried about their next grant, publication, or tenure process will no longer be bound to safe experiments with the highest odds of success; they will be free to pursue bolder and more interdisciplinary hypotheses. When evaluating new molecules, for example, researchers tend to stick to candidates similar in structure to those we already know, but AI models do not have to have the same biases and constraints.

Eventually, much of science will be conducted at "self-driving labs" — automated robotic platforms combined with artificial intelligence. Here, we can bring AI prowess from the digital realm into the physical world. Such self-driving labs are already emerging at companies like Emerald Cloud Lab and Artificial and even at Argonne National Laboratory.

Finally, at the stage of analysis and conclusion, self-driving labs will move beyond automation

and, informed by experimental results they produced, use LLMs to interpret the results and recommend the next experiment to run. Then, as partners in the research process, the AI lab assistant could order supplies to replace those used in earlier experiments and set up and run the next recommended experiments overnight, with results ready to deliver in the morning—all while the experimenter is home sleeping.

Possibilities and limitations

[...]

AI tools have incredible potential, but we must recognize where the human touch is still important and avoid running before we can walk. For example, successfully melding AI and robotics through self-driving labs will not be easy. There is a lot of tacit knowledge that scientists learn in labs that is difficult to pass to AI-powered robotics. Similarly, we should be cognizant of the limitations—and even hallucinations—of current LLMs before we offload much of our paperwork, research, and analysis to them.

In addition to reaching new heights, AI can help verify what we already know by addressing science's replicability crisis. Around 70% of scientists report having been unable to reproduce another scientist's experiment—a disheartening figure. As AI lowers the cost and effort of running experiments, it will in some cases be easier to replicate results or conclude that they can't be replicated, contributing to a greater trust in science.

The key to replicability and trust is transparency. In an ideal world, everything in science would be open access, from articles without paywalls to open-source data, code, and models. Sadly, with the dangers that such models are able to unleash, it isn't always realistic to make all models open source. In many cases, the risks of being completely transparent outweigh the benefits of trust and equity. Nevertheless, to the extent that we can be transparent with models—especially classical AI models with more limited uses—we should be.

[...]

The road ahead to broad AI adoption in the sciences is long, with a lot that we must get right, from building the right databases to implementing the right regulations, mitigating biases in AI algorithms to ensuring equal access to computing resources across borders.

Nevertheless, this is a profoundly optimistic moment. Previous paradigm shifts in science, like the emergence of the scientific process or big data, have been inwardly focused—making science more precise, accurate, and methodical. AI, meanwhile, is expansive, allowing us to combine information in novel ways and bring creativity and progress in the sciences to new heights.

Eric Schmidt was the CEO of Google from 2001 to 2011. He is currently cofounder of Schmidt Futures, a philanthropic initiative that bets early on exceptional people making the world better, applying science and technology, and bringing people together across fields.

Adaptado de "This is how AI will transform the way science gets done"
<https://www.technologyreview.com/2023/07/05/1075865/eric-schmidt-ai-will- transform-science/>.
Acessado em 10 de agosto de 2023.

Questão 01 (2 pontos)

Cite dois avanços proporcionados pela Inteligência Artificial (IA) que já estão ocorrendo na área da saúde, de acordo com o texto.

Questão 02 (3 pontos)

Segundo Eric Schmidt, a Inteligência Artificial revolucionará a configuração de cada uma das etapas do processo científico, apesar de elas continuarem a existir. O autor se debruça na etapa da experimentação afirmando que esta poderá ficar mais rápida, mais barata e em larga escala.

a) De acordo com a visão do autor, como a IA pode diminuir os custos desta etapa?

b) Como a experimentação em larga escala pode ser implementada com a IA?

Questão 03 (3 pontos)

Explique o que o autor afirma a respeito da relação entre replicabilidade e IA.

Questão 04 (2 pontos)

O que são os laboratórios autônomos e como os modelos de linguagem podem contribuir para seu estabelecimento?

RASCUNHO

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