Centro Federal de Educação Tecnológica Celso Suckow da Fonseca - CEFET/RJ

Programa de Pós-Graduação em Ciência da Computação

PROCESSO SELETIVO 2019.2

PROVA DE LÍNGUA INGLESA

INSTRUÇÕES GERAIS AOS CANDIDATOS

- O tempo total para realização das provas é de **1 hora e 00 minutos**.
- Ao término da prova, o candidato deverá devolver o cartão resposta.
- É imprescindível verificar no cartão resposta o número de inscrição do candidato no espaço reservado para tal.

  A IDENTIFICAÇÃO DOS CANDIDATOS EM TODAS AS PÁGINAS DEVERÁ SER FEITA **APENAS** PELO NÚMERO DE INSCRIÇÃO.
- As respostas deverão ser transpostas para o cartão resposta com caneta de tinta azul ou preta. Não serã consideradas as respostas que não estiverem transcritas no cartão resposta, bem como não serão consideradas respostas rasuradas.
- A Prova de Língua Inglesa é constituída por 10 questões objetivas.
- Cada questão objetiva tem somente uma resposta correta.
- A prova deve ser feita sem consulta e sem empréstimo de material.
- Verifique se sua prova contém 10 questões, assim como o cartão de respostas.
- **Não** é permitido o uso de calculadora, celular ou qualquer outro aparelho durante a realização da prova. É vedado o empréstimo de qualquer material entre os candidatos.

Boa Prova !

CARTÃO DE RESPOSTAS

INSCRIÇÃO N^o: ___

Questão	Alternativa			
1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D

TEXT 1

The reproducibility crisis in the age of digital medicine

If anyone doubts the explosive growth of interest in digital medicine, consider a recent conference and workshop in Beijing, jointly organized by the People's Liberation Army General Hospital and MIT Critical Data to showcase the opportunities and challenges of applying machine learning to the kind of data routinely collected during the provision of care. In person, 500 attendees heard a keynote and panels and participated in a health data hackathon. Online, however, the event was streamed to more than one million unique viewers. As databases of medical information are growing, the cost of analyzing data is falling, and computer scientists, engineers, and investment are flooding into the field, digital medicine is subject to increasingly hyperbolic claims. Every week brings news of advances: superior algorithms that can predict clinical events and disease trajectory, classify images better than humans, translate clinical texts, and generate sensational discoveries around new risk factors and treatment effects. Yet the excitement about digital medicine - along with the technologies like the ones that enable a million people to watch a major event - poses risks for its robustness. How many of those new findings, in other words, are likely to be reproducible? Digital medicine must take steps to avoid a reproducibility "crisis" of the kind that has engulfed other areas of biomedicine and human science in the last decade and shaken public confidence in the validity of scientific work. Researchers in many fields now widely accept the existence of a "replication crisis" or "reproducibility crisis." For our purposes here, we take reproducibility to mean "obtaining the same results from the conduct of an independent study whose procedures are as closely matched to the original experiment as possible" (also known as "research reproducibility" or simply "replicability"). A sense of crisis itself began with the widespread awareness of reproducibility failures among the public, when the Center for Open Science announced in 2015 that it could confirm just 39 of 100 published studies in psychology. For many scientists, however - not just in psychology- the Center's Reproducibility Project merely publicized their existing fears that unverifiable results were passing science's institutional checks and becoming accepted as findings and entrenched as facts. By many accounts, digital medicine holds the potential to transform how scientists and physicians study human health. It is worth considering, therefore, a few other moments when novel technologies reshaped the scientific enterprise, and the effects those technologies had on what we might today call reproducibility. During one of the key episodes in the creation of modern science, Robert Boyle and the Royal Society proposed an entirely new model of learning things about the world. Rather than deduce facts like philosophers, experimenters would achieve consensus about nature through observation. As today, Boyle's innovation was in new ways of sharing his data. By circulating reports that described his methods in exhaustive detail, his radical "literary technology" of "virtual witnessing" persuaded readers of his findings without those readers ever having to make comparable tests themselves. In fact, those who tried to actually produce Boyle's results solely from those reports failed. As the historians Simon Schaffer and Steven Shapin demonstrated, no one could redo Boyle's "trials" without direct assistance from someone who had witnessed the original experiment directly rather than virtually If reproducibility in the age of digital medicine now means the practical (rather than hypothetical) ability to redo an experiment and obtain the same finding, that is partly because the cost of such recreations has plummeted. In most fields and until very recently reproductions were implausibly costly. When the historian Otto Sibum, in the 1990s, tried to re-create James Joule's landmark 1840 experiments on the mechanical equivalent of heat, Sibum found that Joule possessed a whole set of skills and tools that would have taken anyone else a lifetime and fortune to acquire. Likewise, Louis Pasteur shrewdly exploited the difference between science in public and private. In large and highly publicized experiments, Pasteur famously demonstrated his anthrax vaccine on farm animals in northern France and preached the importance of his rational method, but his notebooks reveal that he dissimulated about his laboratory's actual procedures and routinely stretched truth and ethics in pursuit of recognition. For digital medicine, it is especially critical to avoid drawing unsubstantiated conclusions from work that appears to rest firmly on impressive gobs of data. Clinical data are a particularly fragile substrate in the sense that it is prone to unique problems ranging from faulty or missing human entry to artifacts and errors that occur in the use of technology for diagnosis and monitoring. The heterogeneity of the global population of diseased humans is also a formidable challenge for mathematical modeling in terms of capturing the variety of biological, environmental, and behavioral confounders that must be measured and accounted for. Finally, the construction of any artificial intelligence based on these data must be as free as possible from the conscious and unconscious bias of those involved in the development of the algorithms.

(Adapted from (`https://www.nature.com/articles/s41746-019-0079-z`))

1. Marque a opção CORRETA, em relação às informações do texto 1.

A. Uma conferência organizada pelo Hospital Geral do Exército Popular de Libertação mostrou oportunidades e desafios para aplicar resultados de aprendizado de máquina aos dados rotineiramente coletados em consultas.

B. Não há quem duvide do crescimento explosivo do interesse pela medicina digital, principalmente aqueles que estavam presentes à palestra da conferência em Pequim sobre o MIT Critical Data.

C. O crescimento do banco de dados de informações médicas cresce hiperbolicamente o custo da análise de dados e os vencimentos dos cientistas da computação e dos engenheiros.

D. Não podemos esquecer dos riscos da medicina digital para os pacientes do atendimento rotineiro nos hospitais.

2. A que conclusão chegam os autores do texto quanto à reprodutibilidade e ordem social da medicina digital?

A. Os dados clínicos são um substrato que desconta as falhas e os erros no uso de tecnologias de diagnóstico.

B. A homogeneidade das doenças na era global é um desafio para a modelagem matemática.

C. A variedade de fatores de confusão biológicas, ambientais e comportamentais devem ser levados em conta na modelagem matemática.

D. Qualquer inteligência artificial a ser produzida pela medicina digital escapará das tendências dos que lidam com o desenvolvimento de algoritmos.

3. Text 1 has a rich vocabulary of words created by the adding of suffixes. Suffixes require our attention for the correct understanding of a text. Suffixes are letters added to the ending of words to change their meaning or function. Just one of the options below contains a RIGHT explanation for the use of them in the text. Mark it.

A. Both “th” and “ing” are suffixes that can be added to the verb “grow” to form nouns, as in **growth** (l.1) and **growing** (l. 7).

B. The suffix “ly” in **routinely** (l. 4) and **increasingly** (l. 9) performs the same function, that is, mean the word is used as an adjective.

C. The suffix “ee”, as in **attendees**(l. 5), is used when a person receives an action whereas the suffix “er”, as in **viewers** (l.7), labels the person who performs an action.

D. **Robustness** (l. 14) is formed by the use of a suffix to mean without something, as the use in **restless**.

4. It is TRUE, in relation to the information in text 1, that

A. Louis Pasteur was one of the scientists that could prove that reproducibility in the age of digital medicine is true and feasible.

B. digital medicine should not agree on conclusions without prior scrutiny by peers.

C. impressive data together with peer conclusions guarantee that digital medicine breakthroughs can be used for the improvement of the health of human beings.

D. until recently it was not cheap to reproduce a practical experiment to achieve the same conclusions in medicine.

5. False cognates (or false friends) are words that look like they have the same spelling and meaning both in English and Portuguese, but they do not. Which of these is a true example of them?

A. Scientists.

B. Physicians.

C. Health.

D. Enterprise.

TEXT 2

Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries

Technological advances have driven dramatic increases in industrial productivity since the dawn of the Industrial Revolution. The steam engine powered factories in the nineteenth century, electrification led to mass production in the early part of the twentieth century, and industry became automated in the 1970s. In the decades that followed, however, industrial technological advancements were only incremental, especially compared with the breakthroughs that transformed IT, mobile communications, and e-commerce. Now, though, we are in the midst of a fourth wave of technological advancement: the rise of new digital industrial technology known as Industry 4.0, a transformation that is powered by nine foundational technology advances. In this transformation, sensors, machines, workpieces, and IT systems will be connected along the value chain beyond a single enterprise. These connected systems (also referred to as cyberphysical systems) can interact with one another using standard Internet-based protocols and analyze data to predict failure, configure themselves, and adapt to changes. Industry 4.0 will make it possible to gather and analyze data across machines, enabling faster, more flexible, and more efficient processes to produce higher-quality goods at reduced costs. This in turn will increase manufacturing productivity, shift economics, foster industrial growth, and modify the profile of the workforce - ultimately changing the competitiveness of companies and regions.

The Nine Pillars of Technological Advancement

Many of the nine advances in technology that form the foundation for Industry 4.0 are already used in manufacturing, but with Industry 4.0, they will transform production: isolated, optimized cells will come together as a fully integrated, automated, and optimized production flow, leading to greater efficiencies and changing traditional production relationships among suppliers, producers, and customers - as well as between human and machine.

Autonomous Robots

Manufacturers in many industries have long used robots to tackle complex assignments, but robots are evolving for even greater utility. They are becoming more autonomous, flexible, and cooperative. Eventually, they will interact with one another and work safely side by side with humans and learn from them. These robots will cost less and have a greater range of capabilities than those used in manufacturing today. For example, Kuka, a European manufacturer of robotic equipment, offers autonomous robots that interact with one another. These robots are interconnected so that they can work together and automatically adjust their actions to fit the next unfinished product in line. High-end sensors and control units enable close collaboration with humans. Similarly, industrial-robot supplier ABB is launching a two-armed robot called YuMi that is specifically designed to assemble products (such as consumer electronics) alongside humans. Two padded arms and computer vision allow for safe interaction and parts recognition.

Simulation

In the engineering phase, 3−D simulations of products, materials, and production processes are already used, but in the future, simulations will be used more extensively in plant operations as well. These simulations will leverage real-time data to mirror the physical world in a virtual model, which can include machines, products, and humans. This allows operators to test and optimize the machine settings for the next product in line in the virtual world before the physical changeover, thereby driving down machine setup times and increasing quality. For example, Siemens and a German machine-tool vendor developed a virtual machine that can simulate the machining of parts using data from the physical machine. This lowers the setup time for the actual machining process by as much as 80 percent.

Horizontal and Vertical System Integration

Most of today's IT systems are not fully integrated. Companies, suppliers, and customers are rarely closely linked. Nor are departments such as engineering, production, and service. Functions from the enterprise to the shop floor level are not fully integrated. Even engineering itself - from products to plants to automation-lacks complete integration. But with Industry 4.0, companies, departments, functions, and capabilities will become much more cohesive, as cross-company, universal data-integration networks evolve and enable truly automated value chains. For instance, Dassault Systèmes and Boost Aero Space launched a collaboration platform for the European aerospace and defense industry. The platform, AirDesign, serves as a common workspace for design and manufacturing collaboration and is available as a service on a private cloud. It manages the complex task of exchanging product and production data among multiple partners.

The Industrial Internet of Things

Today, only some of a manufacturer's sensors and machines are networked and make use of embedded computing. They are typically organized in a vertical automation pyramid in which sensors and field devices with limited intelligence and automation controllers feed into an overarching manufacturing-process control system. But with the Industrial Internet of Things, more devices - sometimes including even unfinished products - will be enriched with embedded computing and connected using standard technologies. This allows field devices to communicate and interact both with one another and with more centralized controllers, as necessary. It also decentralizes analytics and decision making, enabling real-time responses. Bosch Rexroth, a drive-and-control-system vendor, outfitted a production facility for valves with a semi-automated, decentralized production process. Products are identified by radio frequency identification codes, and workstations "know" which manufacturing steps must be performed for each product and can adapt to perform the specific operation.

Cybersecurity

Many companies still rely on management and production systems that are unconnected or closed. With the increased connectivity and use of standard communications protocols that come with Industry 4.0, the need to protect critical industrial systems and manufacturing lines from cybersecurity threats increases dramatically. As a result, secure, reliable communications as well as sophisticated identity and access management of machines and users are essential. During the past year, several industrial-equipment vendors have joined forces with cybersecurity companies through partnerships or acquisitions.

The Cloud

Companies are already using cloud-based software for some enterprise and analytics applications, but with Industry 4.0, more production-related undertakings will require increased data sharing across sites and company boundaries. At the same time, the performance of cloud technologies will improve, achieving reaction times of just several milliseconds. As a result, machine data and functionality will increasingly be deployed to the cloud, enabling more data-driven services for production systems. Even systems that monitor and control processes may become cloud based. Vendors of manufacturing-execution systems are among the companies that have started to offer cloud-based solutions.

Additive Manufacturing

Companies have just begun to adopt additive manufacturing, such as 3−D printing, which they use mostly to prototype and produce individual components. With Industry 4.0, these additive-manufacturing methods will be widely used to produce products that offer construction advantages, such as complex, lightweight designs. High-performance, decentralized additive manufacturing systems will reduce transport distances and stock on hand. For instance, aerospace companies are already using additive manufacturing to apply new designs that reduce aircraft weight, lowering their expenses for raw materials such as titanium.

Augmented Reality

Augmented-reality-based systems support a variety of services, such as selecting parts in a warehouse and sending repair instructions over mobile devices. These systems are currently in their infancy, but in the future, companies will make much broader use of augmented reality to provide workers with real-time information to improve decision making and work procedures. For example, workers may receive repair instructions on how to replace a particular part as they are looking at the actual system needing repair. This information may be displayed directly in workers? field of sight using devices such as augmented-reality glasses. Another application is virtual training. Siemens has developed a virtual plant-operator training module for its Comos software that uses a realistic, data-based 3−D environment with augmented-reality glasses to train plant personnel to handle emergencies. In this virtual world, operators can learn to interact with machines by clicking on a cyber representation. They also can change parameters and retrieve operational data and maintenance instructions.

(Adapted from `http://www.inovasyon.org/pdf/bcg.perspectives_Industry.4.0_2015.pdf`)

6. NÃO é correto dizer que Industry 4.0

A. corresponde à quarta onda de avanço tecnológico.

B. é alimentada por nove avanços tecnológicos.

C. possibilitará coletar e analisar dados de forma mais rápida e eficiente.

D. é, após a Revolução Industrial, o avanço tecnológico industrial que veio modificar o comércio eletrônico.

7. É CORRETO dizer que

A. apenas a Industry 4.0 usará os nove pilares do avanço tecnológico que conhecemos, e que praticamente não utilizamos.

B. com Industry 4.0, células isoladas e otimizadas se unirão como um fluxo de produção integrado e automatizado.

C. a Industry 4.0 transformará a relação entre fornecedores, produtores e clientes, mas não a relação entre homens e máquinas.

D. a Industry 4.0 não será capaz de fomentar o crescimento industrial ou modificar o perfil da força de trabalho como fez a Revolução Industrial.

8. The key word(s) to define the evolution of the utility of robots under the Industry 4.0 production is

A. manufacturer.

B. decision making.

C. interconnected.

D. patterns.

9. In "in the future, simulations will be used more extensively in plant operations as well" (Simulation, l. 2), "as well" substitutes for

A. for good.

B. too.

C. better.

D. best.

10. "Such as" (Augmented reality, l. 1) conveys the author is introducing

A. a shift in focus.

B. emphasis.

C. a comparison.

D. illustrations.