讲义

Artificial Intelligence

人工智能

How AI can revolutionise science

人工智能如何彻底改变科学

The technology is being applied in many fields-and could lead to a surge in scientific progress

人工智能正被应用于多个领域，并有望推动科学发展

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In the 17th century microscopes and telescopes opened up new vistas of discovery and encouraged researchers to favour their own observations over the received wisdom of antiquity, while the introduction of scientific journals gave them new ways to share and publicise their findings. The result was rapid progress in astronomy, physics and other fields, and new inventions from the pendulum clock to the steam engine—the prime mover of the Industrial Revolution.	在 17 世纪，显微镜和望远镜开辟了新的探索领域，并鼓励学者们更专注于个人的独立探索，而不是公认的远古智慧，而且，科学期刊的出现为他们提供了分享和宣传研究成果的新途径。在这些因素的推动下，天文学、物理学和其他领域飞速发展，从摆钟到蒸汽机的新发明成为了工业革命的原动力。

【词汇】

1. **revolutionise** /ˌrevəˈluːʃənaɪz/ v. to completely change the way that something is done 彻底改变；完全变革

例：Aerial photography has revolutionized the study of archaeology.

航空摄影已经给考古学研究带来了一场革命。

2. **surge** /sɜːrdʒ/ n. 雅思/GRE 考研/专八 a sudden increase in the amount or number of something（数量的）急剧上升，激增

例：We are having trouble keeping up with the recent surge in demand.

对于近来出现的需求猛增，我们难以应对。

<同义替换> spike

3. **vista** /ˈvɪstə/ n. GRE/专八 a beautiful view, for example, of the countryside, a city, etc.（农村、城市等的）景色，景观

例：She turned her gaze towards the soothing vista of river and fields.

她将目光转向河流和田野的舒缓景色。

<同义替换> scenery

4. **received** /rɪˈsiːvd/ adj. accepted by most people as being correct 被承认的；被一致认可的

例：The received wisdom is that they cannot win.

大家一致认为他们不会赢。

5. **antiquity** /ænˈtɪkwəti/ n. 托福/专八 the ancient past, especially the times of the Greeks and Romans 古代（尤指古希腊和古罗马时期）

例：a study of society from late antiquity to the fifteenth century

从上古晚期到十五世纪的社会研究

6. **pendulum** /ˈpendʒələm/ n. a long straight part with a weight at the end that moves regularly from side to side to control the movement of a clock 钟摆

例：the pendulum of public opinion

舆论的转变

7. **prime** /praɪm/ adj. 四级/雅思/考研 main; most important; basic 主要的；首要的；基本的

例：My prime concern is to protect my property.

我最关心的是保护自己的财产。

<同义替换> principal

Then, starting in the late 19th century, the establishment of research laboratories, which brought together ideas, people and materials on an industrial scale, gave rise to further innovations such as artificial fertiliser, pharmaceuticals and the transistor, the building block of the computer. From the mid-20th century, computers in turn enabled new forms of science based on simulation and modelling, from the design of weapons and aircraft to more accurate weather	接着，19 世纪末起，研究实验室的出现在工业规模上将思想、人和原材料汇聚在一起，催生了更多创新成果，如化肥、药物和晶体管（计算机的构件）等。从 20 世纪中期开始，计算机反过来又促进了基于模拟和建模的新型科学的发展，包括武器、飞机的设计以及更精确的天气预报等。

forecasting.	

【词汇】

1. **fertiliser** /ˈfɜːrtəlaɪzər/ n. a substance added to soil to make plants grow more successfully 肥料

例：liquid fertilizer

液体肥料

2. **pharmaceutical** /ˌfɑːrməˈsuːtɪkl/ n. 雅思/GRE/专八 a medical drug 药物

例：the development of new pharmaceuticals

新药的开发

3. **transistor** /trænˈzɪstər/ n. a small electronic device used in computers, radios, televisions, etc. for controlling an electric current as it passes along a circuit 晶体管

4. **building block** /ˈbɪldɪŋ blɑːk/ parts that are joined together in order to make a large thing exist 组成部分；构成要素

例：Single words are the building blocks of language.

单词是语言结构的基本单位。

5. **simulation** /ˌsɪmjuˈleɪʃn/ n. a situation in which a particular set of conditions is created artificially in order to study or experience something that could exist in reality 模拟；仿真

例：a computer simulation of how the planet functions

行星活动方式的计算机模拟图像

6. **aircraft** /ˈerkræft/ n. 四级/考研 any vehicle that can fly and carry goods or passengers 飞机；航空器

例：The aircraft was flown by a young American pilot.

飞机由一名年轻的美国飞行员驾驶。

<同义替换> airplane

【长难句】

Then, starting in the late 19th century, the establishment of research laboratories, which brought together ideas, people and materials on an industrial scale, gave rise to further innovations such as artificial fertiliser, pharmaceuticals and the transistor, the building block of the computer.

句子的**主干部分**为：the establishment of research laboratories gave rise to further innovations，意思是：研究实验室的建立催生了更多创新成果

Then, starting in the late 19th century 为**时间状语**，意思是：接着，19 世纪末起

which brought together ideas, people and materials on an industrial scale 为**非限定性定语从句**，意思是：（研究实

验室的建立）在工业规模上将思想、人员和原材料汇聚在一起

such as artificial fertiliser, pharmaceuticals and the transistor, the building block of the computer.为 further innovations 的举例说明，意思是：如人造肥料、药物和晶体管（计算机的构件）等

And the computer revolution may not be finished yet. As we report in a special Science section, AI tools and techniques are now being applied in almost every field of science, though the degree of adoption varies widely: 7.2% of physics and astronomy papers published in 2022 involved AI, for example, compared with 1.4% in veterinary science. AI is being employed in many ways. It can identify promising candidates for analysis, such as molecules with particular properties in drug discovery, or materials with the characteristics needed in batteries or solar cells. It can sift through piles of data such as those produced by particle colliders or robotic telescopes, looking for patterns. And AI can model and analyse even more complex systems, such as the folding of proteins and the formation of galaxies. AI tools have been used to identify new antibiotics, reveal the Higgs boson and spot regional accents in wolves, among other things.	计算机革命可能还没有结束。正如我们在“科学”专栏中报道的那样，目前人工智能工具和技术正被应用于几乎每一个科学领域，尽管人工智能在不同领域的运用程度差别很大：例如，2022 年发表的物理学和天文学论文中有 7.2%的内容涉及人工智能，而兽医学只有 1.4%。人类正在以多种方式应用人工智能。它可以识别并分析有利用价值的材料，例如在药物发现中具有特殊性质的分子，或者发现具有电池或太阳能电池所需特性的材料。它可以筛选粒子对撞机或机器人望远镜产生的大量数据，探索其中的规律。人工智能甚至可以模拟和分析更复杂的系统，如蛋白质的折叠和星系的形成。人工智能工具已经被用来识别新的抗生素、发现希格斯玻色子、识别狼嚎的区域特点等等。

【词汇】

1. **adoption** /əˈdɑːpʃn/ n. 六级/专八 the decision to start using something such as an idea, a plan or a name（想法、计划、名字等的）采用

例：The committee recommended the adoption of new safety procedures.

委员会建议采用新的安全程序。

2. **veterinary** /ˈvetərəneri/ adj. GRE/专八 connected with caring for the health of animals 兽医的

例：veterinary medicine/science

兽医学

3. **employ** /ɪmˈplɔɪ/ v. 四级/GRE/考研 to use something such as a skill, method, etc. for a particular purpose 应用；

运用；使用

例：to employ a technique/strategy/tactic

运用技术/策略/战术

4. **molecule** /ˈmɑːlɪkjuːl/ n. a group of atoms that forms the smallest unit that a substance can be divided into without a change in its chemical nature 分子

例：A molecule of water consists of two atoms of hydrogen and one atom of oxygen.

水分子由两个氢原子和一个氧原子构成。

5. **property** /ˈprɑːpərti/ n. 四级/雅思/考研 a quality or characteristic that something has 性质；特性

例：Compare the physical properties of the two substances.

比较一下这两种物质的物理性质。

<同义替换> nature

6. **cell** /sel/ n. a device for producing an electric current, for example by the action of chemicals or light 电池

例：a photoelectric cell

光电池

<同义替换> battery

7. **sift** /sɪft/ v. to examine something very carefully in order to decide what is important or useful or to find something important 细查；详审

例：Crash investigators have been sifting through the wreckage of the aircraft.

调查坠机事件的专家一直在仔细检查飞机残骸。

<同义替换> scrutinize

8. **particle** /ˈpɑːrtɪkl/ n. 四级/雅思/托福/考研 a very small piece of something 颗粒；微粒

例：particles of dust/gold

灰尘；金屑

9. **protein** /ˈprəʊtiːn/ n. a substance, found within all living things, that forms the structure of muscles, organs, etc. There are many different proteins and they are an essential part of what humans and animals eat to help them grow and stay healthy.蛋白质

例：protein deficiency

蛋白质缺乏

10. **antibiotic** /ˌæntaɪbaɪˈɑːtɪk/ n. a substance, for example penicillin, that can destroy or prevent the growth of bacteria and cure infections 抗菌素，抗生素（如青霉素）

例：The doctor put her on antibiotics (= told her to take them).

医生要她服用抗生素。

【其他】

1. **Higgs boson** : a piece of matter smaller than an atom that is thought to give mass to other very small pieces of matter 希格斯玻色子（英语：Higgs boson）是粒子物理学标准模型预言的一种自旋为零的玻色子（有异议），不带电荷、色荷，极不稳定，生成后会立刻衰变。

All this is to be welcomed. But the journal and the laboratory went further still: they altered scientific practice itself and unlocked more powerful means of making discoveries, by allowing people and ideas to mingle in new ways and on a larger scale. AI, too, has the potential to set off such a transformation.	这一切都是值得欢迎的。但期刊和实验室的深远影响不可小觑：他们改变了科学实践本身，并通过允许人们和思想以新的方式和更大的规模交融，开启更强大的探索途径。人工智能也有促进这种转变的潜力。

【词汇】

1. **alter** /ˈɔːltər/ v. 四级/雅思/考研 to become different; to make somebody/something different（使）改变，更改，改动

例：He had altered so much I scarcely recognized him.

他变化大得我几乎认不出来了。

<同义替换> transform

2. **mingle** /ˈmɪŋgl/ v. 六级/雅思/考研/专八 to combine or make one thing combine with another（使）与…结合；使混合；使联结

例：The sounds of laughter and singing mingled in the evening air.

笑声和歌声交织在夜空中。

<同义替换> mix

【短语】

1. **set off** : to start a process or series of events 引发；激起

例：Panic on the stock market set off a wave of selling.

股市恐慌引发了一轮抛售潮。

Two areas in particular look promising. The first is "literature-based discovery" (LBD), which involves analysing	有两个领域看起来特别有前景。第一个领域是"基于文献的发现"（LBD），

existing scientific literature, using Chatgpt-style language analysis, to look for new hypotheses, connections or ideas that humans may have missed. LBD is showing promise in identifying new experiments to try—and even suggesting potential research collaborators. This could stimulate interdisciplinary work and foster innovation at the boundaries between fields. LBD systems can also identify "blind spots" in a given field, and even predict future discoveries and who will make them.	即利用 Chatgpt 式的语言分析来分析现有的科学文献，寻找人类可能忽略的新假设、联系或想法。LBD 还有望确定新的实验尝试，甚至推荐潜在的研究合作者。这可以推动跨学科工作，促进各领域之间的创新。LBD 系统还可以识别特定领域的"盲点"，甚至可以预测未来的发现以及谁将做出这些发现。

【词汇】

1. **hypothesis** /haɪˈpɑːθəsɪs/ n. an idea or explanation of something that is based on a few known facts but that has not yet been proved to be true or correct（有少量事实依据但未被证实的）假说，假设

例：a hypothesis about the function of dreams

关于梦的作用的假说

<同义替换> presumption

2. **stimulate** /ˈstɪmjuleɪt/ v. 四级/雅思/托福/考研 to make something develop or become more active; to encourage something 促进；激发；激励

例：The exhibition has stimulated interest in her work.

展览增进了人们对她作品的兴趣。

<同义替换> encourage

3. **interdisciplinary** /ˌɪntərˈdɪsəplɪneri/ adj. involving different areas of knowledge or study 多学科的；跨学科的

例：interdisciplinary research

跨学科研究

4. **foster** /ˈfɑːstər/ v. 六级/雅思/考研/专八 to encourage something to develop 促进；助长；培养；鼓励

例：The club's aim is to foster better relations within the community.

俱乐部的宗旨是促进团体内部的关系。

<同义替换> promote

【长难句】

The first is "literature-based discovery" (LBD), which involves analysing existing scientific literature, using Chatgpt-style language analysis, to look for new hypotheses, connections or ideas that humans may have missed.

句子的**主干部分**为：The first is “literature-based discovery” (LBD)，意思是：第一个领域是 "基于文献的发现"（LBD）which involves analysing existing scientific literature, using Chatgpt-style language analysis, to look for new hypotheses, connections or ideas that humans may have missed.为**定语从句**，解释 LBD，意思是：即利用 Chatgpt 式的语言分析来分析现有的科学文献，寻找人类可能忽略的新假设、联系或想法。

其中 using Chatgpt-style language analysis 为方式状语，意思是：利用 Chatgpt-style 语言分析；humans may have missed 为**定语从句**，修饰前文的 new hypotheses, connections or ideas，意思是：人类可能忽略的。

The second area is “robot scientists”, also known as “self-driving labs”. These are robotic systems that use AI to form new hypotheses, based on analysis of existing data and literature, and then test those hypotheses by performing hundreds or thousands of experiments, in fields including systems biology and materials science. Unlike human scientists, robots are less attached to previous results, less driven by bias—and, crucially, easy to replicate. They could scale up experimental research, develop unexpected theories and explore avenues that human investigators might not have considered.	第二个领域是“机器人科学家”，也被称为“自驱实验室”。这些机器人系统在分析现有数据和文献的基础上，利用人工智能生成新的假设，然后通过在系统生物学和材料科学等领域进行数百或数千次实验来检验这些假设。与人类科学家不同的是，机器人不那么执着于以前的结果，也不那么受偏见的驱使，而且最关键的是，它们很容易复制。它们可以扩大实验研究的规模，得到意想不到的理论，探索人类研究者可能未曾考虑过的方法。

【词汇】

1. **bias** /ˈbaɪəs/ n. a strong feeling in favour of or against one group of people, or one side in an argument, often not based on fair judgement 偏见；偏心；偏向

例：Employers must consider all candidates impartially and without bias.

雇主必须公平而毫无成见地考虑所有求职者。

2. **replicate** /ˈreplɪkeɪt/ v. GRE/专八 if you replicate someone’s work, a scientific study etc, you do it again, or try to get the same result again 重做；复制

例：Subsequent experiments failed to replicate these findings.

后来的实验没有得出同样的结果。

3. **avenue** /ˈævənuː/ n. 四级/考研 a choice or way of making progress towards something 选择；途径；手段

例：Several avenues are open to us.

有几个办法可以供我们选择。

【长难句】

These are robotic systems that use AI to form new hypotheses, based on analysis of existing data and literature, and then test those hypotheses by performing hundreds or thousands of experiments, in fields including systems biology and materials science.

句子的**主干部分**为：These are robotic systems that use AI to form new hypotheses and then test those hypotheses by performing hundreds or thousands of experiments，意思是：这些机器人系统利用人工智能生成新的假设，然后进行数百或数千次实验来检验这些假设。

based on analysis of existing data and literature 为**方式状语**，意思是：在分析现有数据和文献的基础上

in fields including systems biology and materials science 为**状语**，意思是：在系统生物学和材料科学等领域

The idea that AI might transform scientific practice is therefore feasible. But the main barrier is sociological: it can happen only if human scientists are willing and able to use such tools. Many lack skills and training; some worry about being put out of a job. Fortunately, there are hopeful signs. AI tools are now moving from being pushed by AI researchers to being embraced by specialists in other fields.	因此，人工智能可能改变科学实践的想法是可行的。但主要障碍在于社会学方面：只有人类科学家愿意并能够使用这些工具，才有可能实现这一目标。许多人缺乏相关技能和培训；有些人担心会失业。幸运的是，有一些好的迹象出现。得益于人工智能研究人员的推动，人工智能工具正为其他领域专家所接受。

【词汇】

1. **feasible** /ˈfiːzəbl/ adj. 四级/雅思/托福/GRE/考研 that is possible and likely to be achieved 可行的；行得通的

例：a feasible plan/suggestion/idea

可行的计划 / 建议 / 想法

2. **sociological** /ˌsəʊsiəˈlɑːdʒɪkl/ adj. connected with sociology (= the scientific study of the nature and development of society and social behaviour) 社会学的

例：sociological theories

社会学理论

3. **embrace** /ɪmˈbreɪs/ v. 四级/六级/雅思/托福/考研 to accept an idea, a proposal, a set of beliefs, etc., especially when it is done with enthusiasm 欣然接受，乐意采纳（思想、建议等）；信奉（宗教、信仰等）

例：It is unlikely that such countries will embrace capitalist ideas.

这样的国家不太可能接受资本主义思想。

<同义替换> accept

4. **specialist** /ˈspeʃəlɪst/ n. a person who is an expert in a particular area of work or study 专家

例： This is the view of virtually all independent specialists on the region.

这实际上是该地区所有独立专家的观点。

<同义替换> expert

In 1665, during a period of rapid scientific progress, Robert Hooke, an English polymath, described the advent of new scientific instruments such as the microscope and telescope as "the adding of artificial organs to the natural". They let researchers explore previously inaccessible realms and discover things in new ways, "with prodigious benefit to all sorts of useful knowledge". For Hooke's modern-day successors, the adding of artificial intelligence to the scientific toolkit is poised to do the same in the coming years—with similarly world-changing results.	1665 年，在科学飞速发展的时期，英国博学家罗伯特·胡克（Robert Hooke）将显微镜和望远镜等新科学仪器的出现描述为“为人类器官加入人造工具”。它们使得研究人员以新的方式发现事物，探索以前无法企及的领域，“对各种有用的知识都有巨大的好处”。对于胡克的现代接班人来说，在未来几年里，将人工智能纳入科学工具包中也将起到同样的作用，即带来类似的改变世界的结果。

【词汇】

1. **polymath** /ˈpɑːlimæθ/ n. a person who knows a lot about many different subjects 博学家；博学大师

例：Among the most famous of Cambridge polymaths are Sir Isaac Newton.

剑桥最有名气的学者要算是艾萨克·牛顿了，此外还有弗朗西斯培根。

2. **advent** /ˈædvent/ n. the coming of an important event, person, invention, etc.（重要事件、人物、发明等的）出现，到来

例：the advent of new technology

新技术的出现

3. **inaccessible** /ˌɪnækˈsesəbl/ adj. 六级/专八 (of language or art) difficult to understand or appreciate 难以达到的；不可得到的

例：Stockhausen's music is thought to be difficult and inaccessible.

施托克豪森的音乐被认为费解难懂。

4. **realm** /relm/ n. an area of activity, interest or knowledge 领域；场所

例：At the end of the speech he seemed to be moving into the realms of fantasy.

讲话的最后，他似乎进入了虚幻的境地。

5. **prodigious** /prəˈdɪdʒəs/ adj. 雅思/托福/GRE very large or powerful and causing surprise; impressive 巨大的；伟大的

例：USBs can store prodigious amounts of information.

USB 可以存储大量信息。

<同义替换> significant

6. **successor** /səkˈsesər/ n. a person or thing that comes after somebody/something else and takes their/its place 接替者；继任者；接替的事物；后继的事物

例：Their latest release is a worthy successor to their popular debut album.

继首张唱片大受欢迎之后，他们最新推出的专辑再获成功。

<反义词> predecessor

7. **poised** /pɔɪzd/ adj. in a position that is completely still but is ready to move at any moment 处于准备状态；蓄势待发

例：The cat crouched in the grass, poised to jump.

猫儿蹲踞在草丛中，准备跳跃。

总结

1) 文章架构

- 背景
  - ➢显微镜、望远镜和期刊等推动了工业革命时期科学发展
  - ➢社会不断进步，新事物的产生推动科技发展
  - ➢计算机革命还没有结束
- 前景
  - ➢人工智能被应用于几乎每一个科学领域
  - ➢人工智能利用价值巨大
  - ➢前景领域一："基于文献的发现"（LBD）
  - ➢前景领域二："机器人科学家"
- 障碍
  - ➢主要障碍在于社会学方面
  - ➢缺乏相关技能和培训/担心失业
- 思考
  - ➢好的迹象：人工智能工具正为其他领域专家所接受
  - ➢未来，人工智能将改变世界

2) 同义替换

✓ 领域

realm

They let researchers explore previously inaccessible realms and discover things in new ways...

它们使得研究人员探索以前无法企及的领域...

field

The technology is being applied in many fields...

人工智能正被应用于多个领域...

其他：domain

例: Financial matters are her domain.

财务问题是她的专业领域。

✓ 应用；运用

employ

AI is being employed in many ways.

人类正在以多种方式应用人工智能。

apply

The technology is being applied in many fields...

人工智能正被应用于多个领域...

其他：utilize/harness

例: The Romans were the first to utilize concrete as a building material.

罗马人首先使用混凝土作建筑材料。

3) 一词多义

✓ **cell**

✓ 文章原句： ...or materials with the characteristics needed in batteries or solar cells. ...或者具有电池或太阳能电池所需特性的材料。

✓ 释义：

①**a device for producing an electric current, for example by the action of chemicals or light 电池**

a photoelectric ～

光电池

② **a room for one or more prisoners in a prison or police station 单间牢房；牢房**

He spent a night in a prison ～.

他在牢房里过夜。

③ **a phone that does not have wires and works by radio, and that you can carry with you and use anywhere 移动电话；手机**

Call me on my ～ if you're running late.

如果你要迟到的话就给我打电话。

✓ **sift**

✓ 文章原句： It can sift through piles of data such as those produced by particle colliders or robotic telescopes... 它可以筛查如粒子对撞机或机器人望远镜产生的大量数据...

✓ 释义：

① **to examine something very carefully in order to decide what is important or useful or to find something important 细查；详审**

We will ～ every scrap of evidence.

我们将细查每一点证据。

② **to put flour or some other fine substance through a sieve / sifter 筛（面粉或颗粒较细的物质）**

～ the flour into a bowl.

把面粉筛到碗里。

4) 仿写训练

✓ **描述阻碍和好迹象**

✓ **文章原句：**

The idea that AI might transform scientific practice is therefore feasible. But the main barrier is sociological: it can happen only if human scientists are willing and able to use such tools. Many lack skills and training; some worry about being put out of a job. Fortunately, there are hopeful signs. AI tools are now moving from being pushed by AI researchers to being embraced by specialists in other fields.

✓ **句型及表达：**

The idea that...might transform...is... ...能改变的...的想法是...的

it can happen only if...are willing and able to... 只有当...愿意并且能够...的时候，（这个想法才是可行的）

...are now moving from being pushed by...to being embraced by... 得益于...的推动，...正在被...所接受

✓ **仿写示例：**

The idea that online working might transform the workplace is feasible. But the main barrier is sociological: it can happen only if bosses are willing and able to use such platforms. Many lack experience; some worry about work efficiency. Fortunately, there are hopeful signs. Online office platforms are now moving from being pushed by employees to being embraced by

managers in many companies.

✓ **仿写作业——描述阻碍和好迹象**

远程课堂可能改变教育的想法是可行的。但主要障碍是社会学方面的：只有当教师和家长愿意并且能够使用这样的平台时，这个想法才是可行的。许多人缺乏经验；有些人担心学习效率。幸运的是，有一些好的迹象的出现。得益于开发者的推动，在线课程应用程序现在被许多学校所接受。

5) 主题词总结

今日主题——人工智能	
1. research laboratories	研究实验室
2. simulation	模拟；仿真
3. antibiotic	抗生素
4. literature-based discovery	基于文献的发现
5. robot scientists	机器人科学家