

Meteorology

气象学

Sunny spells

阳光灿烂的日子

Weather forecasting has a bright future.

More should be done to spread its benefits in the present

天气预报前景广阔。现在应该努力使更多人受益

选自：The Economist Jul 29th 2023 edition Leaders

MANIAC, a computer designed at Princeton after the second world war, could perform a blistering 10,000 calculations a second. This extraordinary power was applied to two main problems: modelling thermonuclear explosions and the Earth's weather. They were the two most consequential applications the machine's creators could imagine.

MANIAC 是普林斯顿大学在二战后研发的一台计算机，每秒可以进行一万次计算。这种超凡的科技被应用于两个重要问题中：模拟热核爆炸和预测天气。解决这两个问题是这台计算机的研发者所能想象到的最重要的应用。

【词汇】

1. **meteorology** /,mi:tiə'ra:lədʒi/ n. 雅思/专八 the scientific study of the earth's atmosphere and its changes, used especially in predicting what the weather will be like 气象学

2. **spell** /spel/ n. a short period of time during which something lasts (持续的) 一段时间

例：There will be rain at first, with sunny spells later.

开始会有雨，雨后间晴。

3. **maniac** /'meɪniæk/ n. a person who behaves in an extremely dangerous, wild or stupid way 行为极其危险 (或狂暴、愚蠢) 的人；疯子；狂人 (文中指的是：mathematical analyzer numerical integrator and computer 数学分析器数值积分器和计算机)

例：He was driving like a maniac.

他发了疯似的开车。

4. **blistering** /'blɪstərɪŋ/ adj. used to describe actions in sport that are very fast or forceful [体育动作] 疾速的，强劲的

例：Hamilton set a blistering pace.

汉密尔顿如脱缰的野马冲在前面。

5. **thermonuclear** /,θɜːrməʊ'nʊːkliər/ adj. connected with nuclear reactions that only happen at very high temperatures 热核的

例：a thermonuclear reaction

热核反应

6. **consequential** /,kɒːnsɪ'kwɛnʃl/ adj. GRE important; that will have important results 重要的；将产生重大结果的

例：The report discusses a number of consequential matters that are yet to be decided.

这份报告讨论了许多有待决定的重大问题。

<同义替换> vital

【短语】

1. **sunny spells** : "Sunny spells" generally refers to a period of time during which the sky is mostly sunny, but with some clouds present. It means some of the time it will be sunny, and some of the time it won't. 晴朗时段：指在一天中或一段时间内，阳光明媚的时期。

【背景信息】

1. **MANIAC** : mathematical analyzer numerical integrator and computer 数学分析器数值积分器和计算机

【长难句分析】

Maniac, a computer designed at Princeton after the second world war, could perform a blistering 10,000 calculations a second.

句子的主干部分为：Maniac could perform a blistering 10,000 calculations a second.意思是：MANIAC 每秒可以进行一万次计算

a computer designed at Princeton after the second world war 为**同位语**，对 Maniac 进行补充说明，其中，designed at Princeton after the second world war 是**后置定语**，意思是：普林斯顿大学在二战后研发的一台计算机

It would have taken maniac the entire 13.8bn-year history of the universe to perform as many calculations as today's fastest computer can carry out in an hour. But though

MANIAC 需要花费宇宙历史中的整整 138 亿年，才能达到当今最快的计算机在一小时内所能完成的计算量。但是，尽管

their abilities and **ambit** have increased, today's supercomputers still see a great deal of their capacity devoted to **weaponry** and weather. Their contributions to **h-bomb** design add little to most everyday lives beyond an **undercurrent** of dread. But their work on the weather at forecasting **outfits** around the world finds practical application almost everywhere.

现代超级计算机的能力和范围已经扩大，但它们仍然被主要用于武器研制和天气预测。超级计算机对氢弹研发的贡献，除了制造恐惧之外，对大多数日常生活没有什么帮助。但它们在世界各地的天气预报组织所做的贡献几乎在任何地方都发挥了作用。

【词汇】

1. **ambit** /'æmbɪt/ n. the range of the authority or influence of something (权力、影响的) 范围，界限

例：This case falls clearly within the ambit of the 2001 Act.

这件案子显然属于 2001 年法案的适用范围。

<同义替换> range

2. **weaponry** /'wepənri/ n. all the weapons of a particular type or belonging to a particular country or group (总称某一类型或某国、某组织的) 武器，兵器

例：high-tech weaponry

高科技武器

3. **h-bomb** /'ɛtʃ bɑ:m/ n. a very powerful nuclear bomb 氢弹

4. **undercurrent** /'ʌndərkɜ:rənt/ n. a feeling, especially a negative one, that is hidden but whose effects are felt 潜在的情绪 (尤指负面的)

例：I detect an undercurrent of resentment towards the new proposals.

我察觉到对新提案有一股潜在的不满情绪。

5. **outfit** /'aʊtfɪt/ n. a group of people working together as an organization, business, team, etc. 团队；小组；分队

例：a market research outfit

市场调查组

<同义替换> unit

Research from the World Bank and others puts the benefits of **numerical** weather prediction (**NWP**) at \$162bn a year. Its success can be **attested** to by any modern farmer or military commander. It can also be felt in the **fabric** of

世界银行和其他机构的研究显示，数值天气预报 (NWP) 每年带来 1620 亿美元的收益。任何现代农民或军事指挥官都可以证明它的成功。在日常生活中也

everyday life. No smartphone lacks **icons** **redolent** of sun, rain, wind or cloud. Deciding to leave an umbrella at home on a forecaster's advice is no longer necessarily a triumph of hope over experience.

有实用价值。每一款智能手机都有太阳、雨、风或云的图标。听从天气预报员的建议不带雨伞外出不再是相信天气预报而非个人经验判断的结果。

【词汇】

1. **numerical** /nu:'merɪkl/ adj. relating to numbers; expressed in numbers 数字的；用数字表示的

例：numerical data

数字数据

2. **attest** /ə'test/ v. GRE/专八 to show or prove that something is true 证实；是...的证据

例：Contemporary accounts attest to his courage and determination.

当时的报道证实了他的勇气和决心。

<同义替换> prove

3. **fabric** /'fæbrɪk/ n. 四级/雅思/GRE/考研 the basic structure of a society, an organization, etc. that enables it to function successfully (社会、机构等的) 结构

例：a trend which threatens the very fabric of society

威胁社会基本结构的趋势

<同义替换> system

4. **icon** /'aɪkɒn/ n. a small sign or picture on a computer screen that is used to start a particular operation [计算机屏幕上的] 图标

例：To open a new file, click on the icon.

要打开新文档，点击该图标。

5. **redolent** /'redələnt/ adj. GRE/专八 making you think of the thing mentioned 使人想到；使人联想起

例：an atmosphere redolent of the sea and ships

让人联想起大海和船只的氛围

【缩略词】

1. **NWP**：数值天气预报(Numerical Weather Prediction)

The application of machine learning and other forms of artificial intelligence (AI) will improve things further. The supercomputers used for NWP calculate the next days'

机器学习和其他形式的人工智能的应用将进一步造福社会。用于数值天气预报的超级计算机根据当下状况、物理定律

weather on the basis of current conditions, the laws of physics and various **rules of thumb**; doing so at a high **resolution** **eats up** calculations by the trillion with ridiculous **ease**. Now machine-learning systems trained simply on past weather data can more or less match their forecasts, at least in some **respects**. If advances in AI elsewhere are any guide, that is only the beginning.

和各种经验法则预测未来几天的天气。在高分辨率下这样做，可以轻松完成数万亿的计算量。如今，仅仅根据过去的天气数据训练，机器学习系统至少在某些方面可以或多或少地与它们的预测相匹配。如果其他领域的人工智能进步可以作为借鉴的话，这还仅仅是个开始。

【词汇】

1. **resolution** /ˌrezəˈluːʃn/ n. 四级/雅思/考研 the power of a computer screen, printer, etc. to give a clear image, depending on the size of the dots (= marks) that make up the image 清晰度；析像；分辨率

例：The graphics look fine, even at low resolution.

即使在低分辨率下，图形也看起来不错。

2. **ease** /iːz/ n. lack of difficulty 容易；轻易；不费劲

例：He passed the exam with ease.

他轻而易举地通过了考试。

3. **respect** /rɪˈspekt/ n. 四级/考研 a particular aspect or detail of something (事物的) 方面，细节

例：In this respect we are very fortunate.

在这方面，我们是很幸运的。

<同义替换> aspect

【短语】

1. **a rule of thumb** : a practical method of doing or measuring something, usually based on past experience rather than on exact measurement 实用的估算方法，经验工作法（常依据经验而非准确测量）

例：As a rule of thumb, you should cook a chicken for 20 minutes for each pound of weight.

根据经验，每磅鸡肉应煮 20 分钟。

2. **eat up** : to use something in large quantities 吃完；吃光

例：Legal costs had eaten up all the savings she had.

诉讼费耗掉了她所有的积蓄。

What is more, in some cases the AI approach seems able to reveal aspects of the weather's behaviour that NWP

更重要的是，在某些情况下，人工智能方法似乎能够揭示天气的具体情况，而这是

cannot reach by calculation alone. And AI's lower costs will attract new **entrants** into the weather business. They can be expected to bring products **exquisitely tailored** to customers' needs and fresh ideas that open new markets.

数值天气预报仅靠计算而无法达到的。人工智能的成本较低，这一点将吸引“新人”加入天气预报市场。他们能带来根据客户需求精心定制的产品和开拓新市场的新想法。

【词汇】

1. **entrant** /'entrənt/ n. 专八 a company that starts operating in an area of business where other companies already operate 进入者：在其他公司已经经营的业务领域开始经营的公司

例：The company is a new entrant into the multimedia market.

该公司是多媒体市场的新进入者。

<同义替换> newcomer

2. **exquisitely** /'ekskwɪzɪtli/ adv. in a way that is extremely beautiful or carefully made 精美的；精致的

例：an exquisitely crafted glass sculpture

精美的玻璃雕塑

3. **tailored** /'teɪlərd/ adj. made for a particular person or purpose 特制的；专门的

例：a tailored programme

量身定制的程序

Three things need to be done to make the most of the possibilities. One is to ensure that healthy competition does not **erode** basic infrastructure. The mostly governmental outfits that dominate NWP put a great deal of effort into **assimilating** observations from around the world into the **consistent** representations of the weather their models need. The costs of this can be **defrayed** by selling high-value forecasts into **specialist** markets.

The second thing to be done is to bring together AI and **number-crunching** to deal with climate change. At the moment it is not possible to run climate models at the resolution used for weather forecasting. New hardware

要充分利用这些可能性，需要做三件事。一是确保良性竞争不会损害基础设施。主导数值天气预报的主要是政府机构，他们投入了大量精力，将来自世界各地的观测数据运用到各自气候模型所需的统一的天气预报图中。他们可以通过向专业市场销售高价值天气预测来支付成本。

第二件事是将人工智能和数字运算结合起来应对气候变化。目前，人类还无法以用于天气预报的分辨率来运行气

being built for AI systems could help (Nvidia, a chipmaker, is interested). And AI could also be used to look for patterns in the projections such models produce, making them more informative, and as an **interface** that makes their insights more accessible to non-experts.

候模型。为人工智能系统打造的新硬件可能会有所帮助（芯片制造商英伟达对此很感兴趣）。人工智能也可以用来搜寻这些模型产生的模式，使它们更具信息性，并作为一个界面，使非专业人士更容易了解其内容。

【词汇】

1. **erode** /i'rəʊd/ v. 托福/GRE/专八 to gradually destroy something or make it weaker over a period of time; to be destroyed or made weaker in this way 逐渐毁坏；削弱；损害

例：Her confidence has been slowly eroded by repeated failures.

她的自信心因屡屡失败慢慢消磨掉了。

<同义替换> damage

2. **assimilate** /ə'sɪməleɪt/ v. 雅思/托福/GRE/考研/专八 to become, or allow somebody to become, a part of a country or community rather than remaining in a separate group (使) 同化，融入

例：New arrivals find it hard to assimilate.

新来者感到难以融入当地社会。

3. **consistent** /kən'sɪstənt/ adj. happening in the same way and continuing for a period of time 连续的；持续的

例：There has been a pattern of consistent growth in the economy.

经济呈持续增长态势。

4. **defray** /dɪ'freɪ/ v. to give somebody back the money that they have spent on something 支付，付给（已开支的款项）

例：\$2 million of the capital reserve was used to defray the costs of rebuilding the factory.

资本储备中的 200 万美元用于支付工厂的重建费用。

5. **specialist** /'speʃəlist/ 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。

6. **number-crunching** /'nʌmbər krʌntʃɪŋ/ n. the process of calculating numbers, especially when a large amount of data is involved and the data is processed in a short space of time 数字密集运算

7. **interface** /'ɪntərfeɪs/ n. 六级/考研/专八 the way a computer program presents information to a user or receives information from a user, in particular the layout of the screen and the menus (人机) 界面（尤指屏幕布局和选单）

例：the user interface

用户界面

<同义替换> layout

Before that becomes an issue, better access is needed in the **here and now**. In 2019 the Global Commission on Adaptation reported that 24 hours' notice of a destructive weather event could cut damage by 30%, and that a \$800m investment in early-warning systems for developing countries could prevent annual losses of \$3bn-16bn. Accordingly, the World Meteorological Organisation has made “Early Warnings for All” by 2027 its priority. Its chief, Petteri Taalas, argues that, given three out of four of the world's people have mobile phones, it is **outrageous** that only half their countries have systems to warn them of disaster.

No breakthroughs are required to **put this right**, just some modest investment, detailed planning, focused discussion and enough political determination to overcome the inevitable **institutional** barriers. It is not an effort in the **Promethean** tradition of maniac's **begetters**; it will neither **set the world on fire** nor model the ways in which it is already **smouldering**. But it should save thousands of lives and millions of **livelihoods**.

在这成为一个问题之前，现在我们需要更好的资源。2019年，全球适应委员会报告称，提前24小时通知破坏性天气事件可以减少30%的损失，而向发展中国家预警系统投资的8亿美元可以防止每年30亿至160亿美元的损失。因此，世界气象组织已将“在2027年前完成全民早期预警行动计划”的项目作为其优先事项。其负责人佩特里·塔拉斯（Petteri Taalas）认为，考虑到世界上四分之三的人拥有手机，而只有一半的国家拥有灾难预警系统，这是令人震惊的。

改善这一点不需要任何突破技术，只需要一些适度的投资、详尽的规划、齐心的讨论和足够的政治决心来克服不可避免的固有障碍。这不是MANIAC研发者那种普罗米修斯般勇于开创的努力；它既不会轰动世界，也不会照搬现有的方式。而它应该做的，是拯救数千人的生命和数百万人的生计。

【词汇】

1. **outrageous** /aʊt'reɪdʒəs/ adj. 雅思/托福/GRE/专八 very unusual and intended to shock people slightly 反常的；令人惊讶的

例：She says the most outrageous things sometimes.

她有时候尽说些耸人听闻的事。

2. **institutional** /ˌɪnstɪ'tu:ʃənl/ adj. 专八 institutional attitudes and behaviour have existed for a long time in an organization and have become accepted as normal even though they are bad [态度和行为因存在已久]已形成制度的；惯例的

例：accusations of institutional racism in the police force

对警察队伍中已形成风气的种族主义的谴责

<同义替换> habitual

3. **Promethean** /prə'mi:θiən/ adj. doing things in an individual and original way and showing no respect for authority and rules 勇于开创的；不畏权势的；不受约束的；普罗米修斯的

4. **begetter** /bɪ'getər/ n. the begetter of something has caused this thing to come into existence. 起因；成因；促成因素

例：Elvis Presley was the true begetter of modern youth culture.

埃尔维斯·普雷斯利是现代青年文化的真正奠基人。

5. **smoulder** /'sməʊldər/ v. 专八 if something such as wood smoulders, it burns slowly without a flame 无火焰地慢慢烧，闷燃

例：a smouldering cigarette

慢慢燃烧的香烟

6. **livelihood** /'lævli:həd/ n. 专八 a means of earning money in order to live 赚钱谋生的手段；生计

例：Communities on the island depended on whaling for their livelihood.

岛上的居民靠捕鲸为生。

【短语】

1. **here and now** : the present time; at the present time 此时此刻

例：We're going to settle this here and now.

我们将立即处理这事儿

2. **put right** : to make a situation better, especially after someone has made a mistake or behaved badly 把某事纠正过来

例：He has a chance to put things right by admitting a mistake was made.

他还有机会扭转局面，那就是承认犯了错。

3. **set the world on fire/alight** : to have a big effect or be very successful 引起轰动；大获成功

例：Her last film didn't exactly set the world on fire.

她的上一部电影并未引起轰动。

【长难句】

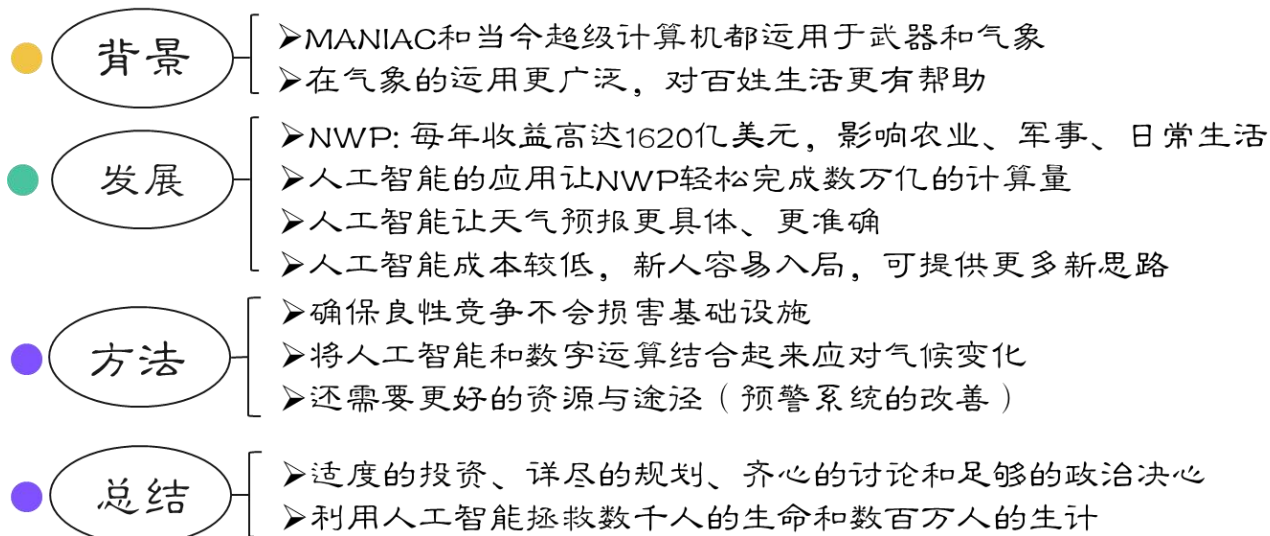
In 2019 the Global Commission on Adaptation reported that 24 hours' notice of a destructive weather event could cut damage by 30%, and that a \$800m investment in early-warning systems for developing countries could prevent annual losses of \$3bn-16bn.

句子的主干部分为：the Global Commission on Adaptation reported that 24 hours' notice of a destructive weather event could cut damage by 30%, and that a \$800m investment in early-warning systems for developing countries could prevent annual losses of \$3bn-16bn.意思是：全球适应委员会报告称，提前 24 小时通知破坏性天气事件可以减少 30%的损失，而向发展中国家预警系统投资的 8 亿美元可以防止每年 30 亿至 160 亿美元的损失。In 2019 为时间状语。

其中，that 24 hours' notice of a destructive weather event could cut damage by 30%, and that a \$800m investment in early-warning systems for developing countries could prevent annual losses of \$3bn-16bn.为并列的**宾语从句**，意思是：提前 24 小时通知破坏性天气事件可以减少 30%的损失，而向发展中国家预警系统投资的 8 亿美元可以防止每年 30 亿至 160 亿美元的损失。

总结

1) 文章架构



2) 同义替换

✓ 方面

respect

Now machine-learning systems trained simply on past weather data can more or less match their forecasts, at least in some respects.

现在，仅仅根据过去的天气数据训练，机器学习系统至少在某些方面可以或多或少地与它们的预测相匹配。

aspect

...in some cases the AI approach seems able to reveal aspects of the weather's behaviour that NWP cannot reach by calculation alone.

...在某些情况下，人工智能方法似乎能够揭示天气情况的各个方面，而这是数值天气预报仅靠计算而无法达到的。

其他：front

例： Progress is being made on all those fronts.

所有这些方面都在取得进展。

✓ 创造者；研发者

creator

They were the two most consequential applications the machine's creators could imagine.

解决这两个问题是这台计算机的研发者所能想象到的最重要的应用。

begetter

It is not an effort in the Promethean tradition of maniac's begetters...

这不是 MANIAC 研发者那种普罗米修斯般勇于开创的努力...

其他：founder

例: the founder and president of the company

公司的创办人和总裁

3) 一词多义

✓ **smoulder**

- ✓ 文章原句：...it will neither set the world on fire nor model the ways in which it is already smouldering. ...这不是 MANIAC 研发者那种普罗米修斯般勇于开创的努力；也不会照搬现有的方式。

✓ 释义：

① **to burn slowly without a flame** (无明火地) 阴燃，闷燃

The bonfire was still ~ the next day.

到了第二天，篝火还在闷燃。

② **to be filled with a strong emotion that you do not fully express** (感情) 郁积，压在心头

His eyes ~ with anger.

他眼里冒着强压的怒火。

✓ **resolution**

- ✓ 文章原句：...doing so at a high resolution eats up calculations by the trillion with

ridiculous ease. ...在高分辨率下这样做，可以轻松完成数万亿的计算量。

✓ 释义：

① **the power of a computer screen, printer, etc. to give a clear image, depending on the size of the dots (= marks) that make up the image** 清晰度；析像；分辨率

The graphics look fine, even at low ~.

即使在低分辨率下，图形也看起来不错。

② **a formal statement of an opinion agreed on by a committee or a council, especially by means of a vote** 决议；正式决定

The UN Security Council unanimously adopted a ~ calling for a halt to hostilities.

联合国安理会一致通过决议，呼吁各方停止对抗。

③ **the act of solving or settling a problem, argument, etc.** （问题、分歧等的）解决，消除

Hopes of a peaceful ~ to the conflict were fading.

和平解决冲突的希望日渐渺茫。

4) 仿写训练

✓ 描述事物的发展

✓ 文章原句：

But though their abilities and ambit have increased, today's supercomputers still see a great deal of their capacity devoted to weaponry and weather. Their contributions to h-bomb design add little to most everyday lives beyond an undercurrent of dread. But their work on the weather at forecasting outfits around the world finds practical application almost everywhere.

✓ 句型及表达：

...see a great deal of their capacity devoted to... ...的大部分功能运用于...

...on...finds practical application almost everywhere... ...的运用在...无处不在

✓ 仿写示例：

As the abilities and ambit of technology have increased, today's scientific achievements see a great deal of their capacity devoted to the overall development of human society. It is apparent that their work on society finds practical application almost everywhere.

✓ 仿写作业——描述事物的发展

随着可穿戴设备的功能和范围的增加，现在的可穿戴设备的大部分功能用于人类的日常生活。它们的运用在人类生活中几乎无处不在，令人印象深刻。

5) 主题词总结

今日主题——气象	
1. meteorology	气象学
2. weather forecasting	天气预报
3. numerical weather prediction (NWP)	数值天气预报
4. climate change	气候变化
5. forecaster	天气预报员