

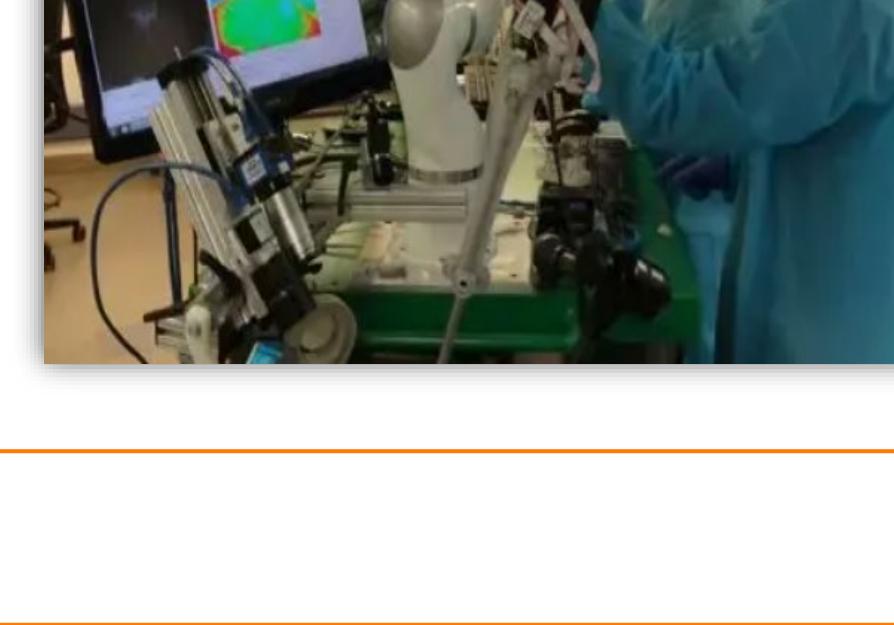
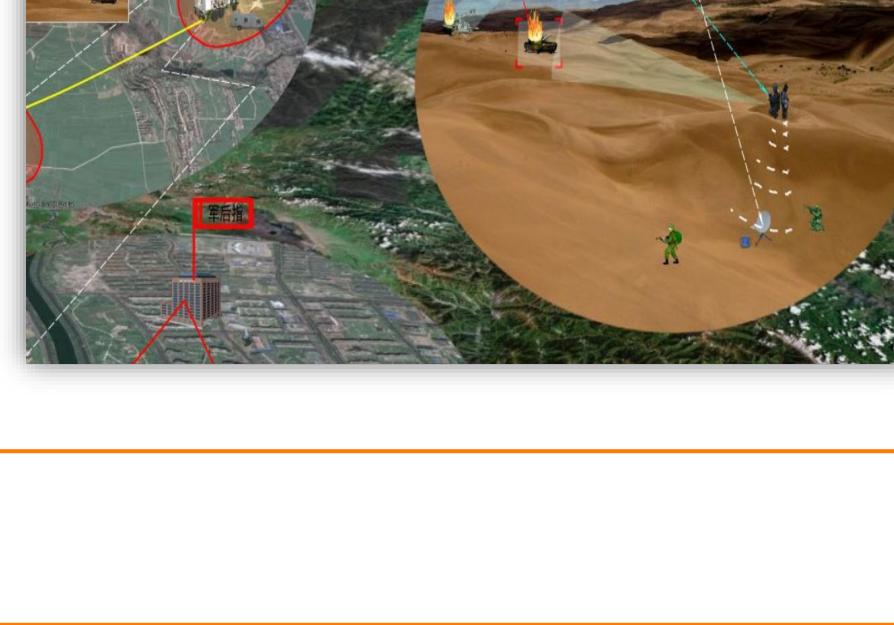
人机增强智能计算平台

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研究背景

智能驾驶、JS指挥、医学辅助诊断等复杂系统存在问题复杂多变、主体差异多样、结果可靠性要求高等特点，**单纯人工智能或人类智能均无法高效鲁棒地解决此类问题**。《自然》杂志“图灵诞辰百年”纪念专辑文章《The incomputable reality》指出“现实世界中很多问题是不可计算的”，**人机增强智能是解决这些现实世界中不可计算问题的有效途径**。



The incomputable reality

The natural world's interconnectedness should inspire better models of the Universe, says Barry Cooper.

Alan Turing put bounds on what is computable in his famous 1936 paper. He implemented finite algorithms, handling data code in binary form, and showed that there are some problems that cannot be solved by any other machine. But not every question has a definite answer, he found. You can't predict, for example, whether you will get heads or tails when you flip a coin. That's because the outcome is random, and there is no finite algorithm that can calculate all the possible series of numbers.

In computer science, the Newtonian view of physics assumed at about the same time as the computer was born, was that if you could solve a problem in classical physics, such as calculating the motion of a body after it had been hit by another, you could also solve it for bodies following a collision, maybe involving interactions between many bodies. The theory of general relativity opens up a new world of computation, however, because it describes spinning black holes. Quantum mechanics adds further complications, and then comes uncertainty.

The concept of incomputability is based on modern science, from particle physics to climate modeling. In everyday life, where it is useful to understand the world around us, it is often difficult to compute in practice from first principles. This is because the world is both very complex and very noisy. It is much easier to work with a machine. Incomputability is based on the idea that there is a breakdown of control in chaotic systems, but it is not absolute.

But disciplinary boundaries are becoming increasingly blurred, and the role of the role. Cosmetic differences may hide important differences in the way they work.

EMERGENT PHENOMENA

Turing was interested in the mathematics of computation, but he was also interested in the material environment that houses it. He had a particular interest in the brain and how it works. He was one of the first software engineers today seen as inventors of the field of computer vision. His theories triggered another. Levels of explanation, from the quantum to the macroscopic, are now being explored. But modeling the evolution of complex systems is still a challenge. There is something else that is beyond our models of the natural world.

The University of Turin's Institute of Physics has a team of researchers who have been working on the interface between mathematics and physics. They are looking for ways to build better models of the natural world. They are also looking for ways to build better models of the natural world. They are also looking for ways to build better models of the natural world.

BIG DATA

It took nature millions of years to build a complex system like the brain. We have to learn with the study of purely algorithmic processes, which is a challenge. Nature presents us with new ways of thinking, and we must learn to think them. Turing went on to build further theories to explain the behavior of complex systems, which include chaotic or unpredictable phenomena. Even in nonlinear systems, such as high-energy particle collisions, the same phenomenon triggers another. Levels of explanation, from the quantum to the macroscopic, are now being explored. But modeling the evolution of complex systems is still a challenge. There is something else that is beyond our models of the natural world.

THE FUTURE

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系统平台

在中国科学院软件研究所重大项目“人机增强智能计算平台”支持下，研发了多模态人机协同交互AI Agent开发平台，支持领域专家使用图形化界面快速开发AI Agent应用。

平台特色：

- 拖拽式智能体工作流编辑
- 支持6种通道的人-智能系统自然交互
- OpenAI、DeepSeek 多种通用模型调用
- 智能体长期、短期记忆植入
- 智能体交互式调试运行
- 多用户与智能体协同



关键技术

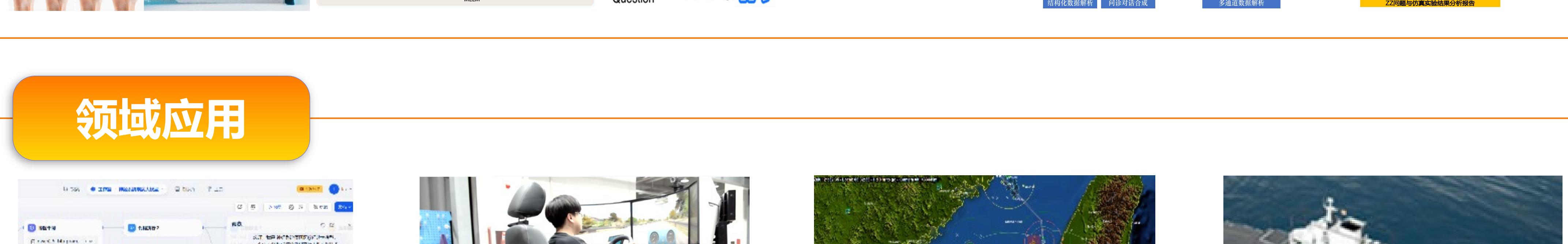
空间计算交互技术：结合大视觉语言模型，物体、视图、交互信息，精准解析指令

Agent长期记忆植入：研究长期记忆存储和提取技术，提升长期记忆的能力

外部知识检索增强等关键技术：使用外部知识库，解决多个知识库知识对齐和冲突问题

神经系统疾病辅助诊断大模型：真实问诊数据微调，结合多通道交互实现类人“望闻问切”

ZZ实验“智渊”大模型：基于大模型的联合ZZ仿真实验智能设计与分析框架



领域应用

