  
  
(crew\_env) C:\Users\USER\Downloads\Test\_Agent\Test\_5>python run\_redel.py

✅ ReDel 啟動！直接輸入你的總任務，Ctrl+C / exit 可退出。

USER: 請撰寫一篇報告，分析 AI 在醫療、金融、教育三產業的應用，每產業包含 技術應用、倫理挑戰與未來發展。

AI: 要撰寫一篇全面的報告，分析 AI 在醫療、金融、教育三個產業中的應用，我們可以將工作分成多個子任務。每個產業都需要涵蓋以下三個方面：

1. 技術應用：描述目前 AI 在該產業中的具體應用。

2. 倫理挑戰：討論 AI 應用所帶來的倫理問題。

3. 未來發展：展望 AI 在該產業的未來可能發展方向。

以下是我的計劃：

1. \*\*醫療產業\*\*

- 技術應用：調查 AI 在醫療診斷、個性化醫療、醫療影像分析等方面的應用。

- 倫理挑戰：分析 AI 在隱私保護、數據安全等方面的倫理問題。

- 未來發展：預測 AI 在醫療研究、遠程醫療中的潛力。

2. \*\*金融產業\*\*

- 技術應用：研究 AI 在風險評估、算法交易、欺詐檢測等方面的應用。

- 倫理挑戰：考慮 AI 在數據偏見、決策透明性等問題。

- 未來發展：探討 AI 在金融監管、自動化服務中的未來影響。

3. \*\*教育產業\*\*

- 技術應用：探討 AI 在個性化學習、教育資源管理、輔助教學等方面的應用。

- 倫理挑戰：審視 AI 在教育公平性、數據隱私等問題。

- 未來發展：想像 AI 在虛擬學習環境、終身學習中的角色。

為了高效地完成這些分析，我將把這些子任務委派給其他代理人。這樣可以確保每個方面都能得到深入研究。接下來，我將進行委派。

AI: Thinking... [delegate(instructions='Investigate the current technical applications of AI in healthcare, including areas like diagnostics, personalized medicine, and medical imaging analysis.', who='Healthcare AI Expert')]

[✅ 任務指派] Agent: alpha

📄 被指派的任務：

Investigate the current technical applications of AI in healthcare, including areas like diagnostics, personalized medicine, and medical imaging analysis.

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AI: Thinking... [delegate(instructions='Analyze the ethical challenges of AI in healthcare, focusing on privacy protection, data security, and related ethical concerns.', who='Healthcare Ethics Specialist'); delegate(instructions='Forecast the future development of AI in healthcare, especially its potential in medical research and telemedicine.', who='Healthcare Futurist')]

[✅ 任務指派] Agent: beta

📄 被指派的任務：

Analyze the ethical challenges of AI in healthcare, focusing on privacy protection, data security, and related ethical concerns.

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[✅ 任務指派] Agent: gamma

📄 被指派的任務：

Forecast the future development of AI in healthcare, especially its potential in medical research and telemedicine.

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AI: Thinking... [delegate(instructions='Research the technical applications of AI in the financial industry, focusing on areas such as risk assessment, algorithmic trading, and fraud detection.', who='Finance AI Specialist')]

[✅ 任務指派] Agent: delta

📄 被指派的任務：

Research the technical applications of AI in the financial industry, focusing on areas such as risk assessment, algorithmic trading, and fraud detection.

----------------------------------------

AI: Thinking... [delegate(instructions='Examine the ethical challenges of AI in finance, particularly concerning data bias, decision transparency, and related ethical issues.', who='Finance Ethics Analyst'); delegate(instructions='Explore the future development of AI in finance, including its impact on financial regulation and automated services.', who='Finance Futurist')]

🔁 已建立 4 個 sub-agent，啟動自動統整機制...

[✅ 任務指派] Agent: epsilon

📄 被指派的任務：

Examine the ethical challenges of AI in finance, particularly concerning data bias, decision transparency, and related ethical issues.

----------------------------------------

[✅ 任務指派] Agent: zeta

📄 被指派的任務：

Explore the future development of AI in finance, including its impact on financial regulation and automated services.

----------------------------------------

AI: Thinking... [delegate(instructions='Explore the technical applications of AI in the education sector, such as personalized learning, educational resource management, and teaching assistance.', who='Education AI Specialist')]

[✅ 任務指派] Agent: eta

📄 被指派的任務：

Explore the technical applications of AI in the education sector, such as personalized learning, educational resource management, and teaching assistance.

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AI: Thinking... [delegate(instructions='Investigate the ethical challenges of AI in education, focusing on educational equity, data privacy, and related ethical issues.', who='Education Ethics Analyst'); delegate(instructions='Speculate on the future development of AI in education, including its role in virtual learning environments and lifelong learning.', who='Education Futurist')]

[✅ 任務指派] Agent: theta

📄 被指派的任務：

Investigate the ethical challenges of AI in education, focusing on educational equity, data privacy, and related ethical issues.

----------------------------------------

[✅ 任務指派] Agent: iota

📄 被指派的任務：

Speculate on the future development of AI in education, including its role in virtual learning environments and lifelong learning.

----------------------------------------

AI: 我已經將工作委派給專家代理人，讓他們分別負責分析 AI 在醫療、金融、教育三個產業中的技術應用、倫理挑戰和未來發展。我們將等待所有代理人完成任務後，匯總他們的研究結果，從而撰寫出一篇全面的報告。請稍等片刻，我會在有進展時通知您。

USER: delta-1 encountered an exception!

Traceback (most recent call last):

File "C:\Users\USER\Downloads\Test\_Agent\Test\_5\delegation\delegate\_and\_wait.py", line 87, in \_task

async for token in stream:

File "C:\Users\USER\anaconda3\envs\crew\_env\Lib\site-packages\kani\streaming.py", line 73, in \_stream\_impl\_outer

async for elem in self.\_stream\_impl():

File "C:\Users\USER\anaconda3\envs\crew\_env\Lib\site-packages\kani\streaming.py", line 84, in \_stream\_impl

async for elem in self.\_stream\_iter:

File "C:\Users\USER\Downloads\Test\_Agent\Test\_5\base\_kani.py", line 107, in \_impl

async for token in stream:

File "C:\Users\USER\anaconda3\envs\crew\_env\Lib\site-packages\kani\streaming.py", line 73, in \_stream\_impl\_outer

async for elem in self.\_stream\_impl():

File "C:\Users\USER\anaconda3\envs\crew\_env\Lib\site-packages\kani\streaming.py", line 84, in \_stream\_impl

async for elem in self.\_stream\_iter:

File "C:\Users\USER\Downloads\Test\_Agent\Test\_5\base\_kani.py", line 77, in get\_model\_stream

async for elem in super().get\_model\_stream(include\_functions=include\_functions, \*\*kwargs):

File "C:\Users\USER\anaconda3\envs\crew\_env\Lib\site-packages\kani\kani.py", line 399, in get\_model\_stream

async for elem in stream:

File "C:\Users\USER\anaconda3\envs\crew\_env\Lib\site-packages\kani\engines\openai\engine.py", line 184, in stream

async for chunk in stream:

File "C:\Users\USER\anaconda3\envs\crew\_env\Lib\site-packages\openai\\_streaming.py", line 147, in \_\_aiter\_\_

async for item in self.\_iterator:

File "C:\Users\USER\anaconda3\envs\crew\_env\Lib\site-packages\openai\\_streaming.py", line 174, in \_\_stream\_\_

raise APIError(

openai.APIError: The server had an error while processing your request. Sorry about that!

📦 所有 sub-agent 統整回報如下：

alpha:

📌 Five AI Innovations That Will Redefine Healthcare In 2025 - Forbes

🔗 https://www.forbes.com/councils/forbestechcouncil/2025/02/28/five-ai-innovations-that-will-redefine-healthcare-in-2025/

📝 In 2025, AI innovations look set to transform healthcare by facilitating precision medicine, improving diagnostic accuracy, enhancing patient experience and streamlining clinical workflows.

📌 How AI is improving diagnostics and health outcomes

🔗 https://www.weforum.org/stories/2024/09/ai-diagnostics-health-outcomes/

📝 Effective and ethical AI solutions in healthcare and diagnostics require collaboration across stakeholders, democratizing healthcare access. ... May 23, 2025. Bridging the gap in women's health research, policy and innovation: Kearney. May 22, 2025. 2:31. Doctors are training an AI on 57 million anonymized patient records.

📌 AI Diagnostics: Revolutionizing Medical Diagnosis in 2025

🔗 https://www.scispot.com/blog/ai-diagnostics-revolutionizing-medical-diagnosis-in-2025

📝 In 2025, AI diagnostics has evolved from an emerging technology to an essential component of modern healthcare systems. By leveraging machine learning and deep learning algorithms, AI diagnostic tools can process vast amounts of medical data swiftly and accurately, providing healthcare providers with invaluable insights for better patient care.📌 Artificial intelligence in personalized medicine: transforming ...

🔗 https://link.springer.com/article/10.1007/s42452-025-06625-x

📝 The concept of personalised medicine, which adapts care to each patient based on their specific characteristics, has been a long-sought dream in the health field. Artificial intelligence (AI) has made this dream a reality with the advent of technology, promising to enhance diagnosis and cure. AI algorithms, such as machine learning and deep learning, can find patterns and correlations in ...

📌 10 Groundbreaking Ways AI is Revolutionizing Medicine in 2025

🔗 https://healthprep.com/articles/living-healthy/10-groundbreaking-ways-ai-is-revolutionizing-medicine-in-2025/

📝 Personalized Medicine: Tailoring Treatments with AI Concept for AI artificial intelligence medical diagnosis, diagnostics in medicine. Photo Credit: Envato @MargJohnsonVA ... As we have explored, the top ten groundbreaking impacts of AI in medicine in 2025 are transforming diagnostics, treatment, and patient care, offering new possibilities for ...

📌 How AI Could Put Personalized Medicines In Reach At Last - Forbes

🔗 https://www.forbes.com/sites/davidprosser/2025/05/20/how-ai-could-put-personalised-medicines-in-reach-at-last/

📝 Artificial intelligence technologies hold huge promise for the biotechnology industry, which hopes analysis of massive datasets could unlock incredible breakthroughs in disease treatment.📌 Future of Medical Imaging in 2025 - blog.medicai.io

🔗 https://blog.medicai.io/en/future-of-medical-imaging/

📝 In 2025, medical imaging will undergo transformative advancements driven by artificial intelligence (AI), novel imaging modalities, and a growing emphasis on sustainability and accessibility.. Key developments include the widespread adoption of 4D imaging for dynamic anatomical visualization, AI-powered diagnostic tools achieving unprecedented accuracy in detecting conditions like stroke and ...

📌 Medical Imaging in 2025: Precision Medicine | Open Medscience

🔗 https://openmedscience.com/vision-2025-transforming-healthcare-through-the-future-of-medical-imaging/

📝 Summary: Medical imaging stands on the cusp of a revolutionary change, driven by rapid advancements in artificial intelligence, data interoperability, sensor technologies, and patient-centric innovations. By 2025, radiological departments will see diagnostics refined with unprecedented detail, merging high-resolution modalities with real-time data analysis.

📌 AI in Medical Imaging Informatics: Current Challenges and Future ...

🔗 https://pmc.ncbi.nlm.nih.gov/articles/PMC8580417/

📝 Typical medical imaging examples. (a) Cine angiography X-ray image after injection of iodinated contrast; (b) An axial slice of a 4D, gated planning CT image taken before radiation therapy for lung cancer; (c) Echocardiogram - 4 chamber view showing the 4 ventricular chambers (ventricular apex located at the top); (d) First row - axial MRI slices in diastole (left), mid-systole (middle ...I've gathered information on the current technical applications of AI in healthcare for diagnostics, personalized medicine, and medical imaging analysis. Here's a summary of the findings:

### AI in Diagnostics

1. \*\*AI Innovations\*\*: AI is transforming healthcare by improving diagnostic accuracy and streamlining clinical workflows. It facilitates precision medicine and enhances patient experience ([Forbes](https://www.forbes.com/councils/forbestechcouncil/2025/02/28/five-ai-innovations-that-will-redefine-healthcare-in-2025/)).

2. \*\*Improving Health Outcomes\*\*: Effective AI solutions require collaboration across stakeholders to democratize healthcare access. AI diagnostics can process vast amounts of medical data swiftly and accurately, providing invaluable insights for better patient care ([World Economic Forum](https://www.weforum.org/stories/2024/09/ai-diagnostics-health-outcomes/), [SciSpot](https://www.scispot.com/blog/ai-diagnostics-revolutionizing-medical-diagnosis-in-2025)).

### AI in Personalized Medicine

1. \*\*Transformative Potential\*\*: AI in personalized medicine adapts care to each patient based on specific characteristics. AI algorithms, such as machine learning and deep learning, find patterns and correlations to enhance diagnosis and treatment ([Springer](https://link.springer.com/article/10.1007/s42452-025-06625-x)).

2. \*\*Revolutionizing Medicine\*\*: AI is transforming diagnostics, treatment, and patient care, offering new possibilities for personalized medicine ([HealthPrep](https://healthprep.com/articles/living-healthy/10-groundbreaking-ways-ai-is-revolutionizing-medicine-in-2025/), [Forbes](https://www.forbes.com/sites/davidprosser/2025/05/20/how-ai-could-put-personalised-medicines-in-reach-at-last/)).

### AI in Medical Imaging Analysis

1. \*\*Future Transformations\*\*: Medical imaging is undergoing transformative advancements driven by AI, novel imaging modalities, and a focus on sustainability and accessibility. AI-powered diagnostic tools achieve unprecedented accuracy in detecting conditions like stroke ([Medicai](https://blog.medicai.io/en/future-of-medical-imaging/)).

2. \*\*Precision Medicine\*\*: Radiological departments are refining diagnostics with unprecedented detail, merging high-resolution modalities with real-time data analysis ([Open Medscience](https://openmedscience.com/vision-2025-transforming-healthcare-through-the-future-of-medical-imaging/

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gamma:

📄 \*\*A Perspective for Adapting Generalist AI to Specialized Medical AI Applications and Their Challenges\*\*

The integration of Large Language Models (LLMs) into medical applications has

sparked widespread interest across the healthcare industry, from drug discovery

and development to clinical decision support, assisting telemedicine, medical

devices, and healthcare insurance applications. This perspective paper aims to

discuss the inner workings of building LLM-powered medical AI applications and

introduces a comprehensive framework for their development. We review existing

literature and outline the unique challenges of applying LLMs in specialized

medical contexts. Additionally, we introduce a three-step framework to organize

medical LLM research activities: 1) Modeling: breaking down complex medical

workflows into manageable steps for developing medical-specific models; 2)

Optimization: optimizing the model performance with crafted prompts and

integrating external knowledge and tools, and 3) System engineering:

decomposing complex tasks into subtasks and leveraging human expertise for

building medical AI applications. Furthermore, we offer a detailed use case

playbook that describes various LLM-powered medical AI applications, such as

optimizing clinical trial design, enhancing clinical decision support, and

advancing medical imaging analysis. Finally, we discuss various challenges and

considerations for building medical AI applications with LLMs, such as handling

hallucination issues, data ownership and compliance, privacy, intellectual

property considerations, compute cost, sustainability issues, and responsible

AI requirements.

🔗 http://arxiv.org/abs/2411.00024v3

📄 \*\*PrediHealth: Telemedicine and Predictive Algorithms for the Care and Prevention of Patients with Chronic Heart Failure\*\*

The management of chronic heart failure presents significant challenges in

modern healthcare, requiring continuous monitoring, early detection of

exacerbations, and personalized treatment strategies. This paper presents the

preliminary results of the PrediHealth research project conducted in this

context. Specifically, it aims to address the challenges above by integrating

telemedicine, mobile health solutions, and predictive analytics into a unified

digital healthcare platform. We leveraged a web-based IoT platform, a

telemonitoring kit with medical devices and environmental sensors, and

AI-driven predictive models to support clinical decision-making. The project

follows a structured methodology comprising research on emerging CPS/IoT

technologies, system prototyping, predictive model development, and empirical

validation.

🔗 http://arxiv.org/abs/2504.03737v4

📄 \*\*Privacy-Preserving in Medical Image Analysis: A Review of Methods and Applications\*\*

With the rapid advancement of artificial intelligence and deep learning,

medical image analysis has become a critical tool in modern healthcare,

significantly improving diagnostic accuracy and efficiency. However, AI-based

methods also raise serious privacy concerns, as medical images often contain

highly sensitive patient information. This review offers a comprehensive

overview of privacy-preserving techniques in medical image analysis, including

encryption, differential privacy, homomorphic encryption, federated learning,

and generative adversarial networks. We explore the application of these

techniques across various medical image analysis tasks, such as diagnosis,

pathology, and telemedicine. Notably, we organizes the review based on specific

challenges and their corresponding solutions in different medical image

analysis applications, so that technical applications are directly aligned with

practical issues, addressing gaps in the current research landscape.

Additionally, we discuss emerging trends, such as zero-knowledge proofs and

secure multi-party computation, offering insights for future research. This

review serves as a valuable resource for researchers and practitioners and can

help advance privacy-preserving in medical image analysis.

🔗 http://arxiv.org/abs/2412.03924v1❌ 搜尋失敗：https://html.duckduckgo.com/html 202 RatelimitBased on the recent literature and research on the future development of AI in healthcare, particularly in medical research and telemedicine, here are some insights:

1. \*\*Integration of Large Language Models (LLMs) in Healthcare\*\*:

- LLMs are being integrated into various medical applications such as drug discovery, clinical decision support, telemedicine, medical devices, and healthcare insurance.

- There is a focus on developing specialized medical AI applications using LLMs, which involves breaking down complex medical workflows, optimizing model performance, and system engineering.

- Challenges include handling hallucination issues, data ownership, privacy, intellectual property, compute cost, sustainability, and responsible AI requirements. [Read more](http://arxiv.org/abs/2411.00024v3)

2. \*\*Telemedicine and Predictive Algorithms\*\*:

- Projects like PrediHealth are leveraging telemedicine, mobile health solutions, and predictive analytics for managing chronic conditions like heart failure.

- These systems integrate IoT platforms, telemonitoring kits, and AI-driven predictive models to support clinical decision-making. [Read more](http://arxiv.org/abs/2504.03737v4)

3. \*\*Privacy-Preserving in Medical Image Analysis\*\*:

- The use of AI in medical image analysis is improving diagnostic accuracy but also raises privacy concerns.

- Techniques such as encryption, differential privacy, homomorphic encryption, federated learning, and generative adversarial networks are being explored to preserve privacy.

- Emerging trends like zero-knowledge proofs and secure multi-party computation are also being considered for future research. [Read more](http://arxiv.org/abs/2412.03924v1)

Unfortunately, I encountered a rate limit issue with the search engine, so I couldn't retrieve additional information from other sources. However, the articles above provide a comprehensive overview of current trends and future directions in AI for healthcare.

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delta:

encountered an exception: The server had an error while processing your request. Sorry about that!

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beta:

Analyzing the ethical challenges of AI in healthcare involves considering multiple factors, particularly those related to privacy protection, data security, and other ethical concerns. Here's an overview of these challenges:

1. \*\*Privacy Protection\*\*:

- \*\*Patient Confidentiality\*\*: AI systems often require access to large datasets, which may include sensitive patient information. Ensuring that patient confidentiality is maintained is crucial. There is a risk that personal health information could be improperly accessed or disclosed.

- \*\*Consent and Autonomy\*\*: Obtaining informed consent for data use is a complex issue. Patients may not fully understand how their data will be used, which can lead to ethical concerns about autonomy and the right to control personal information.

2. \*\*Data Security\*\*:

- \*\*Cybersecurity Threats\*\*: Healthcare data is a prime target for cyberattacks. AI systems must be robust against hacking and unauthorized access to protect sensitive information.

- \*\*Data Integrity\*\*: Ensuring that data is accurate and has not been tampered with is essential for AI systems to function correctly. Inaccurate data can lead to incorrect diagnoses or treatments.

3. \*\*Bias and Fairness\*\*:

- \*\*Algorithmic Bias\*\*: AI systems can perpetuate or even amplify existing biases present in the data they are trained on. This can lead to unfair treatment recommendations or misdiagnoses, particularly for underrepresented groups.

- \*\*Equity in Access\*\*: There is a risk that AI technologies may not be equally accessible to all patients, potentially widening health disparities.

4. \*\*Transparency and Accountability\*\*:

- \*\*Black Box Nature\*\*: Many AI systems operate as "black boxes," making it difficult to understand how decisions are made. This lack of transparency can be problematic for accountability, especially if an AI system makes an error.

- \*\*Responsibility\*\*: Determining who is responsible for AI-driven decisions—whether it's the developers, healthcare providers, or the AI itself—poses a significant ethical challenge.

5. \*\*Impact on Healthcare Workforce\*\*:

- \*\*Job Displacement\*\*: The integration of AI into healthcare can lead to concerns about job displacement for certain roles, which raises ethical considerations about workforce transition and retraining.

- \*\*Human Oversight\*\*: Ensuring that AI complements rather than replaces human decision-making is essential to maintain trust in healthcare systems.

Addressing these ethical challenges requires a multi-faceted approach, including robust regulatory frameworks, ethical guidelines, and ongoing dialogue among stakeholders in the healthcare and AI communities.