



CAI's workshop on DL

- The Application of Deep Learning



UNIVERSITY
OF WOLLONGONG
AUSTRALIA



About the Presenter

Professor Lei Wang

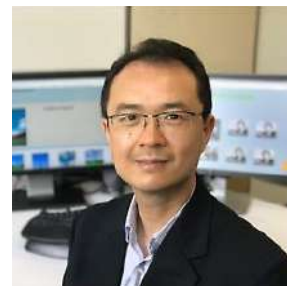
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Research areas

- Computer Vision, Machine Learning, Artificial Intelligence



Generated by

https://huggingface.co/spaces/aravinds1811/n_ural-style-transfer

CSCI218: Foundations of Artificial Intelligence (Spring 2022)

Contact: leiw@uow.edu.au

- This subject introduces the history of AI, its recent development, and representative topics. For each topic, it introduces fundamental concepts, classic methods, and important applications.
- Pre-requisites: CSIT110 or CSIT111

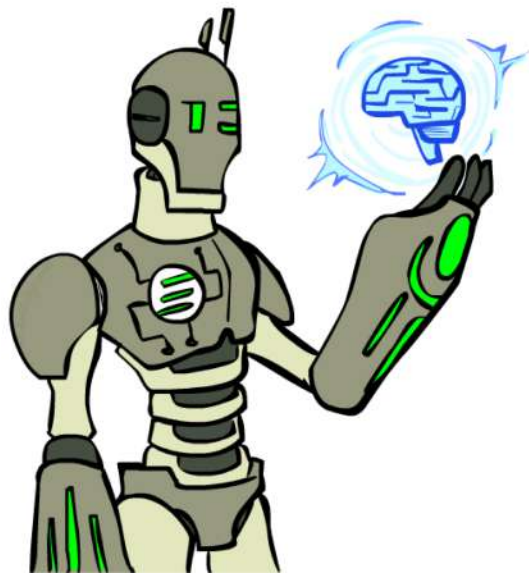


Welcome!

- Why do you take this subject?
- What is your experience on AI?
- What are you going to do with AI?

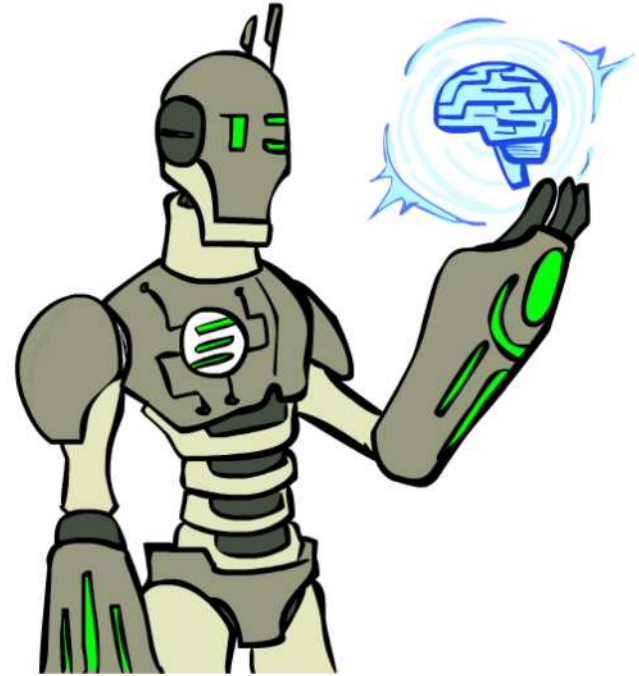
Today

- What is artificial intelligence?
- What are the applications of deep learning ?
- What do we do in our center and school?

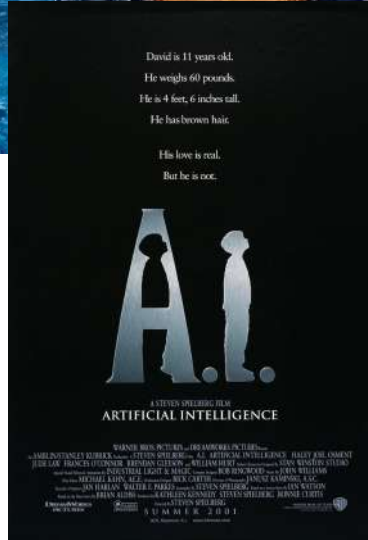
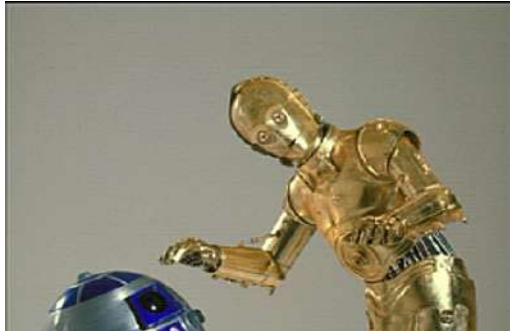


Definition

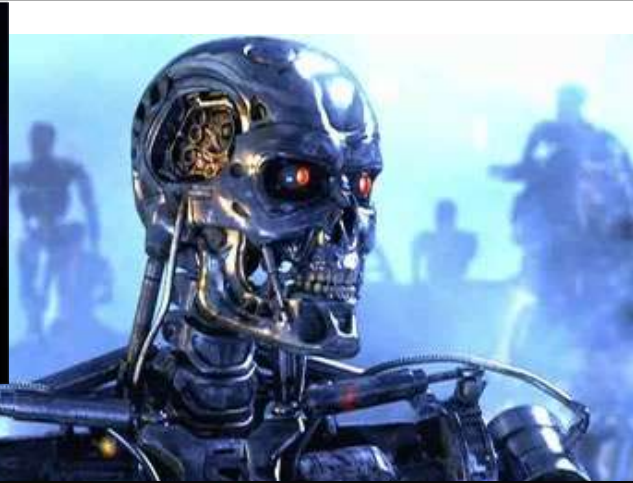
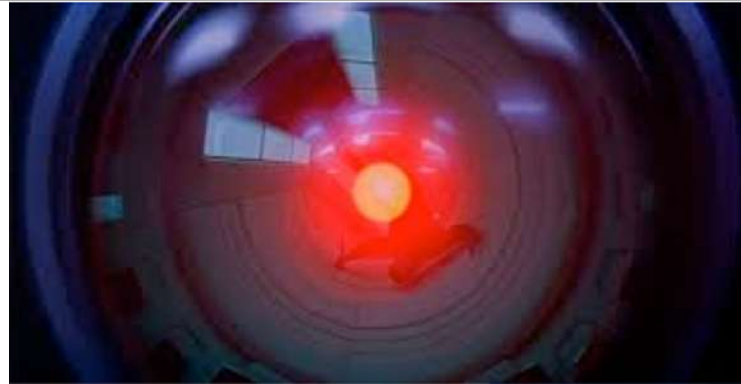
- **Artificial**
 - made by people, often as a copy of something natural
 - Synthetic, man-made
- **Intelligence**
 - the ability to **learn**, **understand**, and make **judgments** or have **opinions** that are based on **reason**



Movie AI



Movie AI



News AI

AI is the biggest risk we face as a civilisation, Elon Musk says



4

Billionaire burn: Musk says Zuckerberg's understanding of AI threat 'is limited'

BY PETER HOLLEY / THE WASHINGTON POST

Published: Tuesday, July 25th, 2017 at 4:11pm

Updated: Tuesday, July 25th, 2017 at 4:45pm

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MORE INFO:

▶ AP Explains: Should you be worried about the rise of AI?



HOME > FINANCE > FINANCE TOPICS > DAVOS

'Sociopathic' robots could overrun the human race within a generation

Computers should
human race, says

LIVESCIENCE

NEWS TECH HEALTH PLANET EARTH

Live Science > Tech

Lifelike 'Sophia' Robot Granted Citizenship to Saudi Arabia

By Mindy Weisberger, Senior Writer | October 30, 2017 03:39pm ET

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News AI

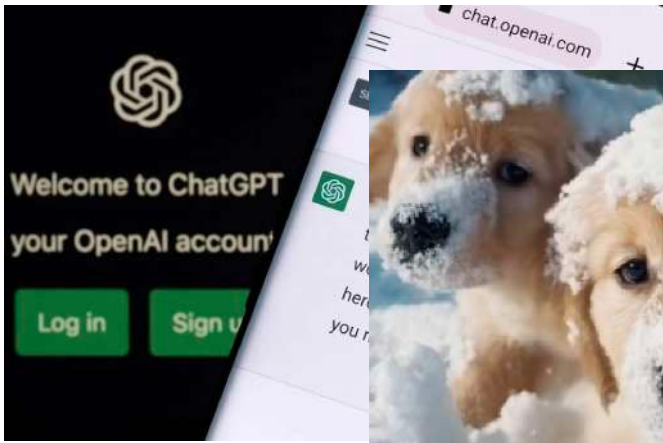
THE WALL STREET JOURNAL.

TECHNOLOGY | ARTIFICIAL INTELLIGENCE

Sam Altman Seeks **Trillions of Dollars** to Reshape Business of Chips and AI

OpenAI chief pursues investors including the U.A.E. for a project possibly requiring up to **\$7 trillion**

By *Keach Hagey* and *Asa Fitch*
Feb. 8, 2024 9:00 pm ET



Introducing Gemini 1.5

Our next-generation model



News AI

TECH • ARTIFICIAL INTELLIGENCE

United Kingdom Plans \$1.3 Billion Artificial Intelligence

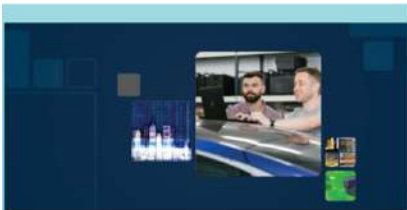
EU wants to invest £18bn in AI development

France to spend \$1.8 billion to compete with U.S., China

China's Got a Huge Artificial Intelligence Plan

Australia's Artificial Intelligence Action Plan

News AI



Developing and adopting AI to transform Australian businesses



Creating an environment to grow and attract the world's best AI talent



Using cutting edge AI technologies to solve Australia's national challenges



Making Australia a global leader in responsible and inclusive AI



Applications of AI

What can I help you with?



Gift shop

Items such as caps, t-shirts, sweatshirts and other miscellanea such as buttons and mouse pads have been designed. In addition, merchandise for almost all of the projects is available.

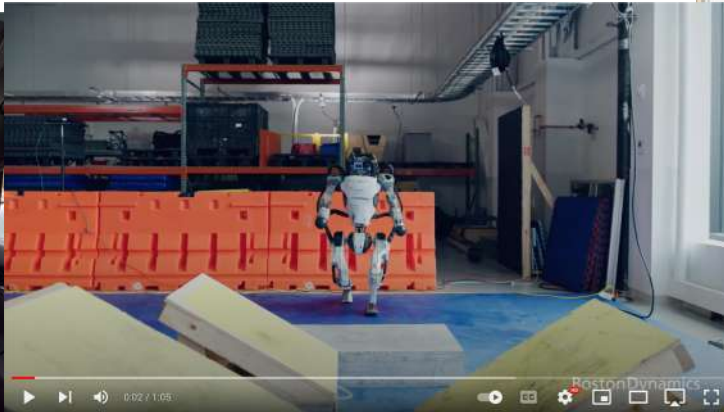


CD or DVD

There is a series of CDs/DVDs with selected Wikipedia content being produced by Wikipedians and SOS Children.



Downloading



What is Artificial Intelligence (AI)?

- Make computers **think** in the full and literal sense
- Realize computers that can **perceive, reason, plan and act** rationally.

Problem
Solving

Knowledge
Representation

Reasoning
and Planning

Learning

Communication
(Natural language)

Perception
(Computer vision)

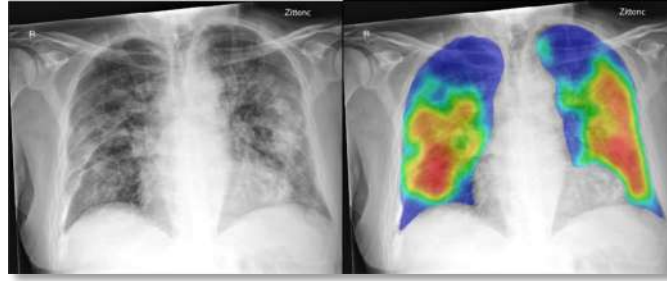
Robotics
(Act)

Enormous
applications

What can AI do?



BBC News: Coronavirus: AI steps up in battle against Covid-19



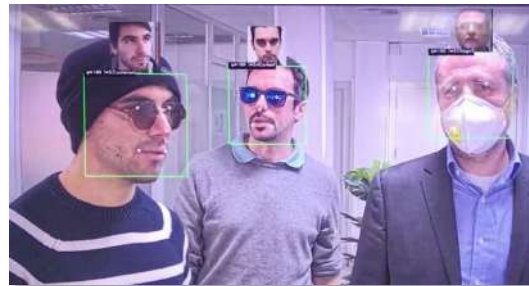
Murphy K. Published Online: May 08, 2020
<https://doi.org/10.1148/radiol.2020201874> (COVID-19 on Chest Radiographs)



SciTech Daily: New Artificial Intelligence Diagnostic can predict COVID-19 without testing



The conversation: predict which COVID-19 patients are going to get the sickest



HospiMedia: New technology allows identification through a mask



Towardsdatascience: Monitor social distancing in a public area

What can AI do?



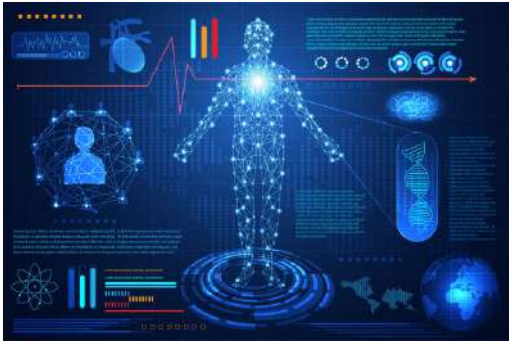
<https://www.callcentrehelper.com/ways-to-improve-chatbots-boost-satisfaction-124375.htm>



<https://www.roboticsbusinessreview.com/unmanned/consumer-acceptance-of-self-driving-cars-soars-study-says/>



<https://techstartups.com/>



<https://www.engineering.com/DesignerEdge/DesignerEdgeArticles/ArticleID/17664/A-Healthy-Future-for-Artificial-Intelligence-in-Healthcare.aspx>



<https://www.youtube.com/watch?v=WXuK6gekU1Y>



<https://futureofsourcing.com/the-silent-and-steady-takeover-of-artificial-intelligence-in-financial-institutions>

What content can AI create?

Look at the two pictures below. Can you tell which is a photograph and which was generated by AI?



Napoleon Bonaparte as a cat with a piece of cheese in his hand instead



Router: A Methodology for the Typical Unification of Access Points and Redundancy

Jeremy Stribling, Daniel Aguayo and Maxwell Krohn

ABSTRACT

Many physicists would agree that, had it not been for congestion control, the evaluation of web browsers might never have occurred. In fact, few hackers worldwide would disagree with the essential unification of voice-over-IP and public-private key pair. In order to solve this riddle, we confirm that SMPs can be made stochastic, cacheable, and interoperable.

I. INTRODUCTION

Many scholars would agree that, had it not been for active networks, the simulation of Lamport clocks might never have occurred. The notion that end-users synchronize with the

The rest of this paper is organized as follows: we motivate the need for fiber-optic cable work in context with the prior work in this dress this obstacle, we disprove that even a tautologous algorithm for the construction of analog converters by Jones [10] is NP-complete. Along these same lines, to accomplish concentrate our efforts on showing that the algorithm for the exploration of robots by Sussman $\Omega(n + \log n)$ time [22]. In the end, we conclude

II. ARCHITECTURE

寂寞春风鸟自狂，
In the lonely spring breeze, birds are violently
fluttering their wings,
秋风吹雨满庭香。
The autumn wind blows the rain with delicate fragrance,
overflowing the courtyard lightly.
欲识故为归来晚，
You'd like to know the old things
in order to come back late,
只有幽香伴钓芳。
Only the flowers and the happiness of fishing.

寂寞春风鸟自狂，
In the lonely spring breeze, birds are violently
fluttering their wings,
秋风吹雨满庭香。
The autumn wind blows the rain with delicate fragrance,
overflowing the courtyard lightly.
欲知故国归来晚，
You'd like to know the news from homeland
while come back late,
只有幽香伴众芳。
Only the flowers and their fragrance remaining.

Sold for US\$432,000



What content can AI create?

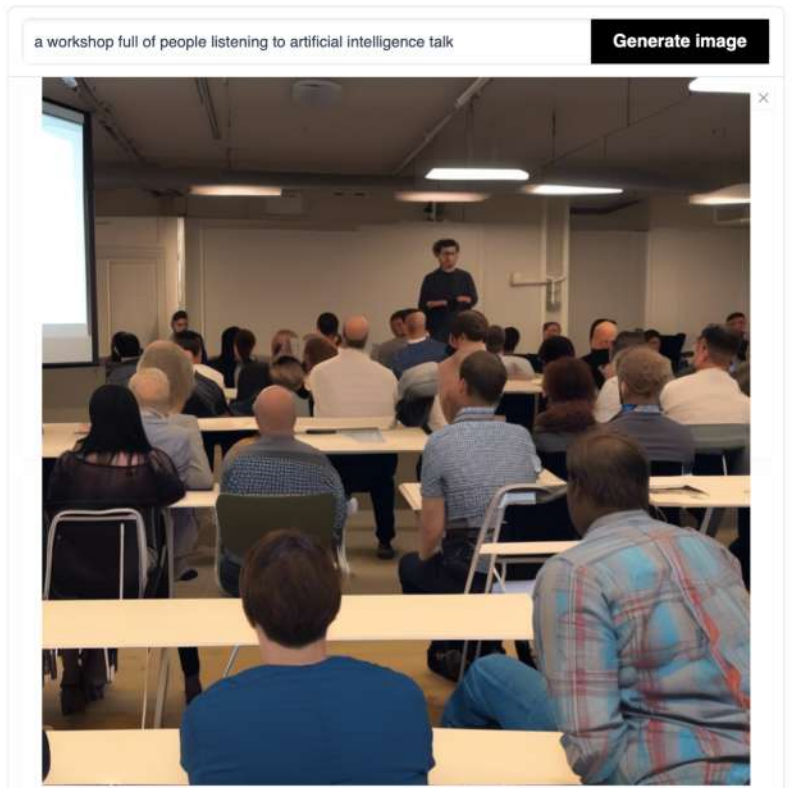


With the press of a button, the Doodle then uses machine learning to harmonize the custom melody into Bach's signature music style.

What content can AI create?



Jason Allen's A.I.-generated work, "Théâtre D'opéra Spatial," took first place in the digital category at the Colorado State Fair. Credit...via Jason Allen



<https://huggingface.co/spaces/stabilityai/stable-diffusion>

What Can AI Do?

Quiz: Which of the following can be done at present?

- ✓ Play a decent game of table tennis?
- ✓ Play a decent game of Jeopardy?
- ✓ Drive safely along a curving mountain road?
- ✗ Drive safely along Crown Street in Wollongong?
- ✓ Buy a week's worth of groceries on the web?
- ? Buy a week's worth of groceries at IGA UOW?
- ? Discover and prove a new mathematical theorem?
- ✗ Converse successfully with another person for an hour?
- ? Perform a surgical operation?
- ✓ Translate spoken Chinese into spoken English in real time?
- ? Fold the laundry and put away the dishes?
- ✗ Write an intentionally funny story?



AI Ethics

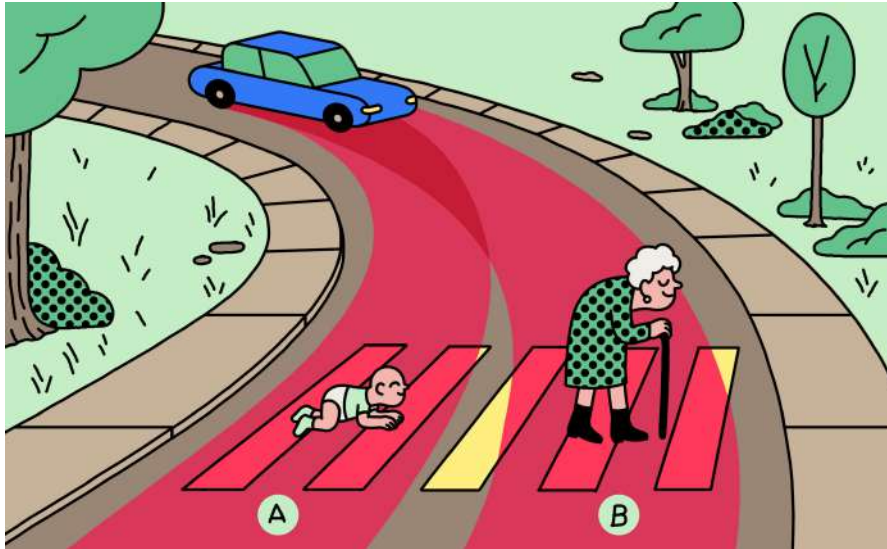


AI Ethics

- Banking
- Medical diagnosis
- Self-driving cars
- Law enforcement or jurisdiction
- Recruitment and selection
- Military
- ...

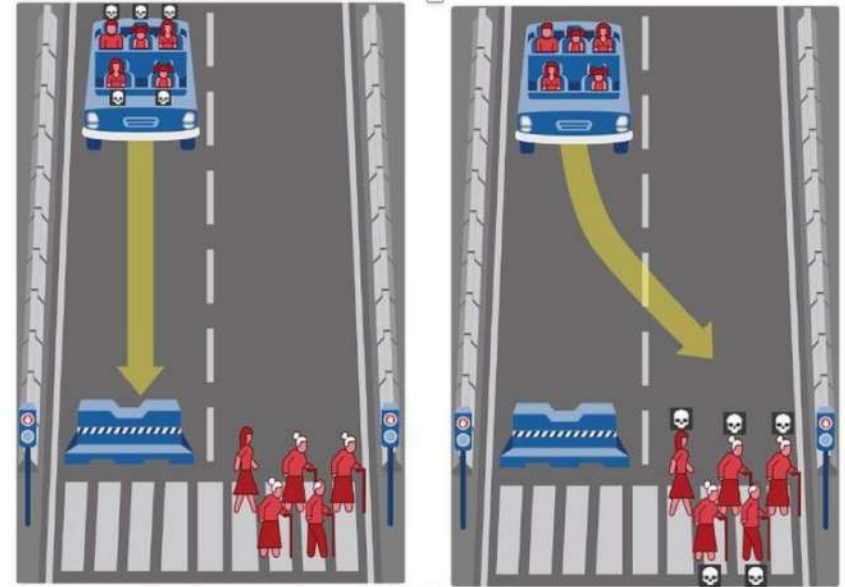


The dilemma of self-driving car



When it becomes possible to program decision-making based on moral principles into machines, will self-interest or the public good predominate?

<https://www.science.org/doi/10.1126/science.aaf2654>



- Q1: What are the potential ethical impact?
- Q2: Who is to blame for the ethical issues?
- Q3: How to improve this situation?

What do we teach for AI in UOW?

Machine Learning
Algorithms and
Applications

Computer Vision
Algorithms and
Systems

Reasoning and
Learning

Perception and
Planning

Computational
Intelligence

Big Data Analytics
and Management

Virtual and
Augmented Reality
Game Development

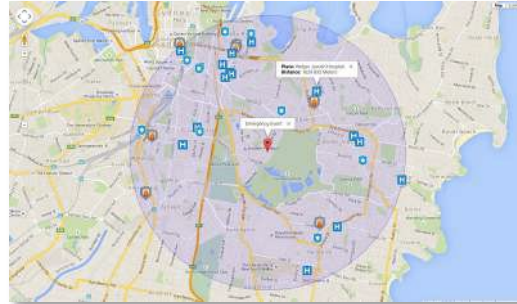
Programming Skills

Capstone Projects

What do we research for AI in UOW?



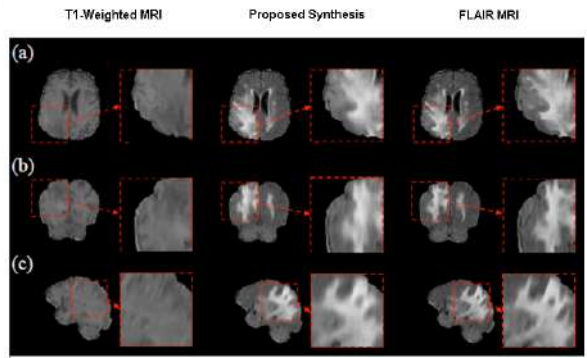
Institute of Cybersecurity and Cryptology



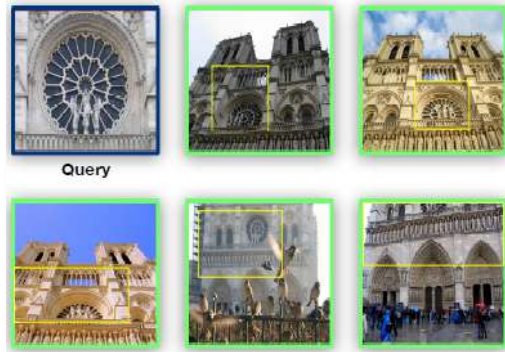
Intelligent Agent: Adaptive Resource Allocation Strategies for Emergency Management



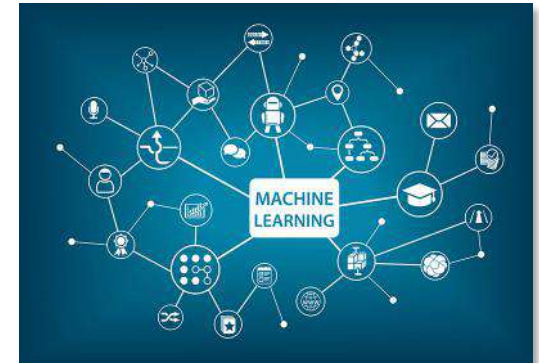
Virtual and Augmented Reality



AI in Medical Imaging Analysis



Computer Vision and Multimedia Analysis



Machine Learning Research

CAI research focus

Computer
Vision

Machine
Learning

Multimedia
Signal
Analysis

Natural
Language
Processing

Multi-agent
Systems

Distributed
Computing

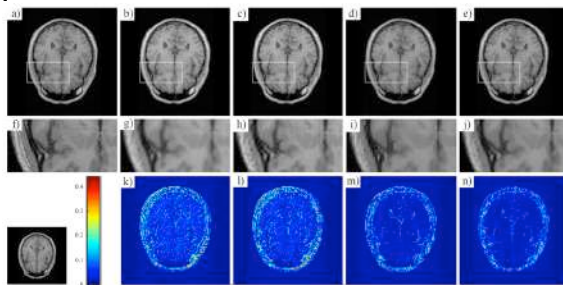
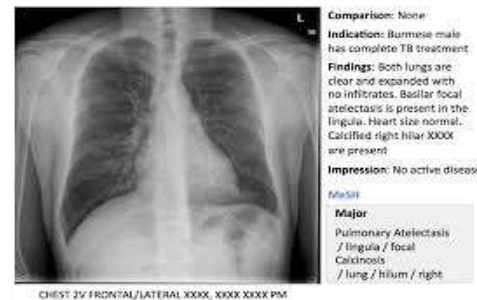
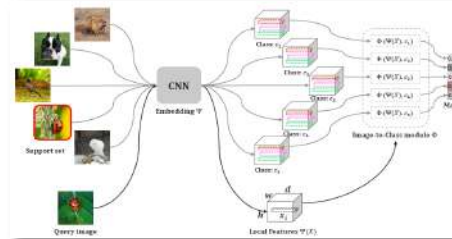
Probabilistic
model
checking

Big data
and
applications

CAI research focus (Computer Vision & Machine Learning)

- Image recognition, detection, and retrieval
- 3D Computer Vision
- Human action and gesture recognition
- Multimedia Signal Processing & Understanding
- Medical image processing and analysis
- Natural Language Processing

- Deep learning and the beyond
- Graph Neural Networks
- Few-shot machine learning
- Transfer learning and domain adaptation
- General machine learning theory
- And more...



CAI research focus (Multi-agent Systems & Big Data Analytics)

- Distributed artificial intelligence
- Agent-based grid computing & service-oriented computing
- Agent-based negotiation, coordination, reasoning, and decision-making
- Multi-agent learning in open and complex environment
- Smart grid systems

- Pattern and knowledge mining for IoT Data
- Big-data platform for usage behavioral analysis
- Knowledge discovery
- And more...

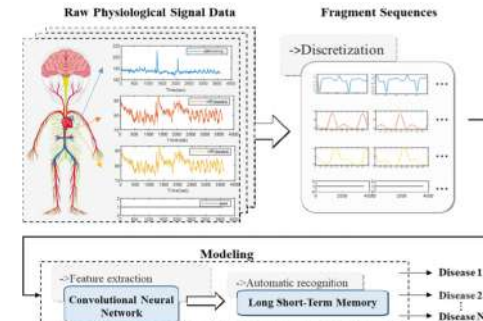
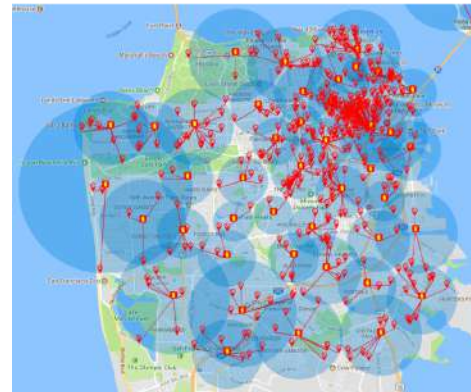
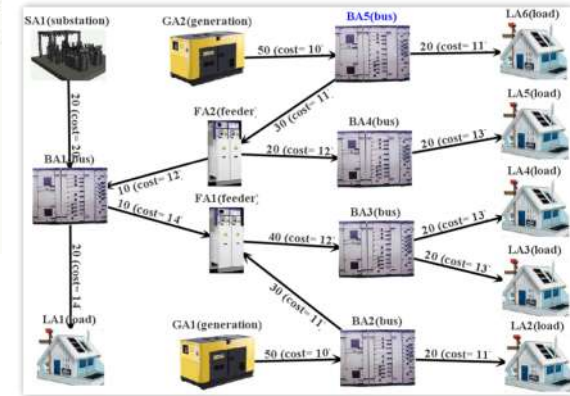


Fig. 1 The overall framework of our DeepCNN-LSTM model



8 Job Skills To Succeed In A Post-Coronavirus World

On The Post-COVID Skills

(Bernard Marr on Apr 26, 2020)

- **Adaptability and Flexibility**
 - Be better prepared to embrace accelerated changes
- **Tech Savviness**
 - **Artificial intelligence, big data, IoT, VR and AR**, etc.
- **Creativity & Innovation**
 - Make new things in a new way to respond to changes
- **Data Literacy**
 - The ability to understand data gives you big advantages



8 Job Skills To Succeed In A Post-Coronavirus World

On The Post-COVID Skills

(Bernard Marr on Apr 26, 2020)

- **Critical Thinking**
 - Understand data correctly to make wise decisions
- **Digital and Coding Skills**
 - Use your digital skills to keep the digital world running
- **Leadership**
 - Achieve targets and goals in challenging working environments
- **Emotional Intelligence**
 - Be aware, be calm, and connect with people emotionally



8 Job Skills To Succeed In A Post-Coronavirus World

On The Post-COVID Skills

(Bernard Marr on Apr 26, 2020)

Commit to a Lifetime of Learning

“Only those who have prepared will be able to see the opportunities”

A futuristic, glowing blue robot head is shown in profile, facing left. The head is semi-transparent, revealing internal mechanical and electronic components, including a large fan-like structure on the back. The background is a dark blue gradient with a pattern of binary code (0s and 1s) and glowing hexagonal shapes. The overall aesthetic is high-tech and digital.

You and AI: Our Future

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Thank you. Questions?

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