Applications of AI for Energy

-By Ruimeng Shao, Mingda Cai, Keqiao Chen

DeepMind：Electricity Trading

Keqiao Chen

DeepMind：Electricity Trading

Keqiao Chen

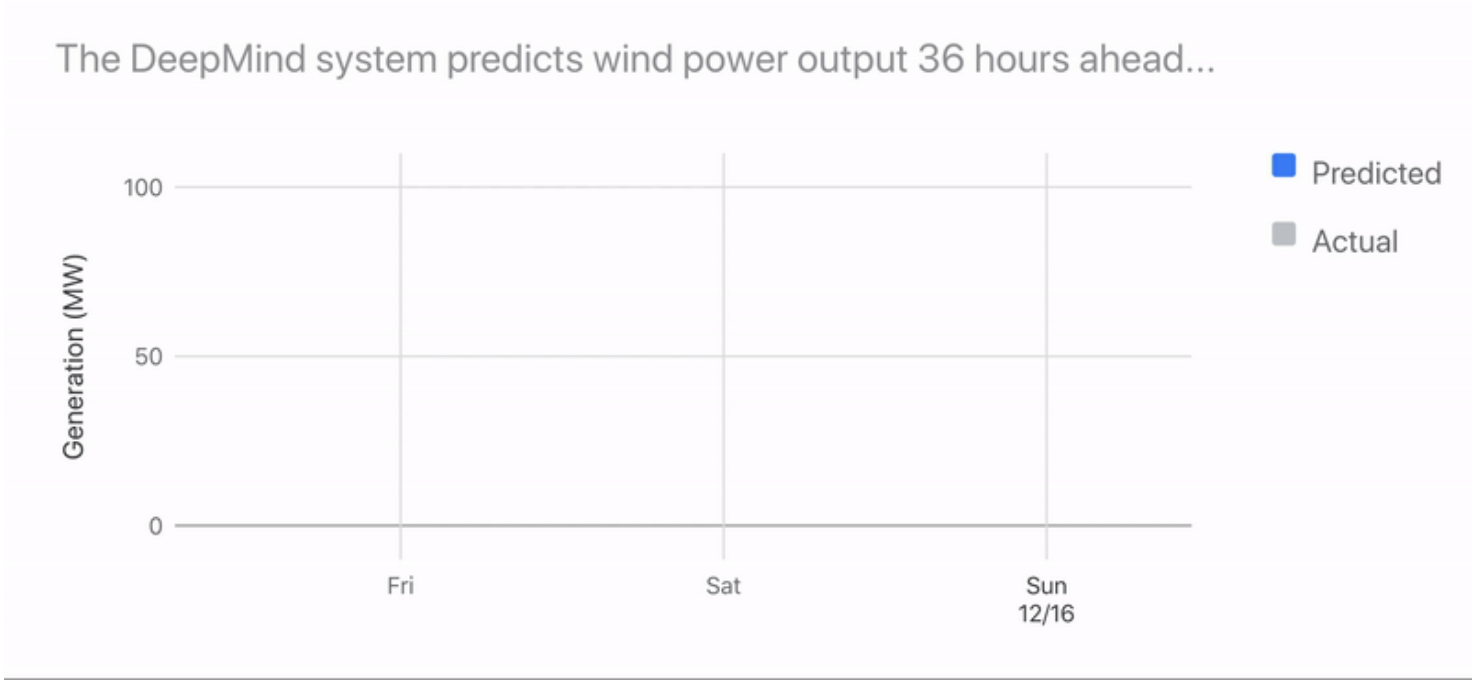
- Wind energy have **not reached its full potential**.

- Wind farms have become an **important source** of carbon-free electricity
  - as the **cost of turbines has plummeted** and **adoption has surged**.

- However, the variable nature of wind itself makes it an **unpredictable energy source**
  - less useful than one that can reliably deliver power at a set time.

DeepMind：Electricity Trading

Keqiao Chen



DeepMind: Electricity Trading

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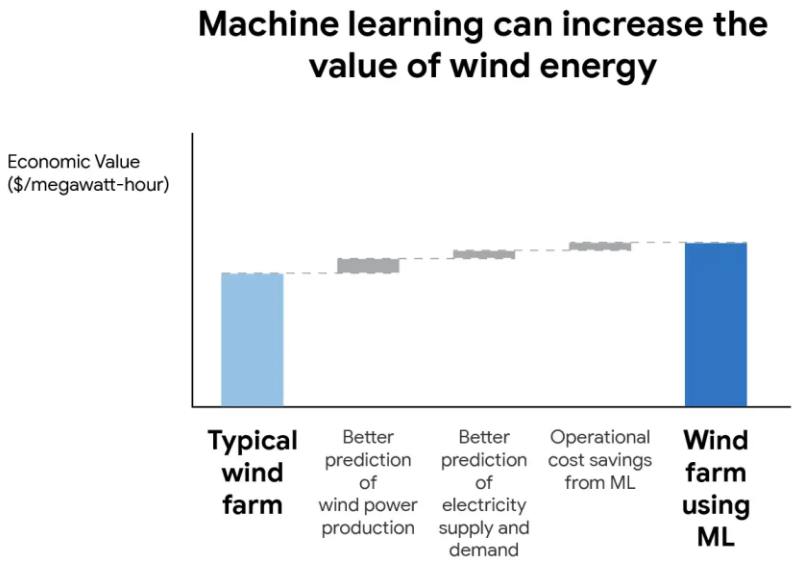
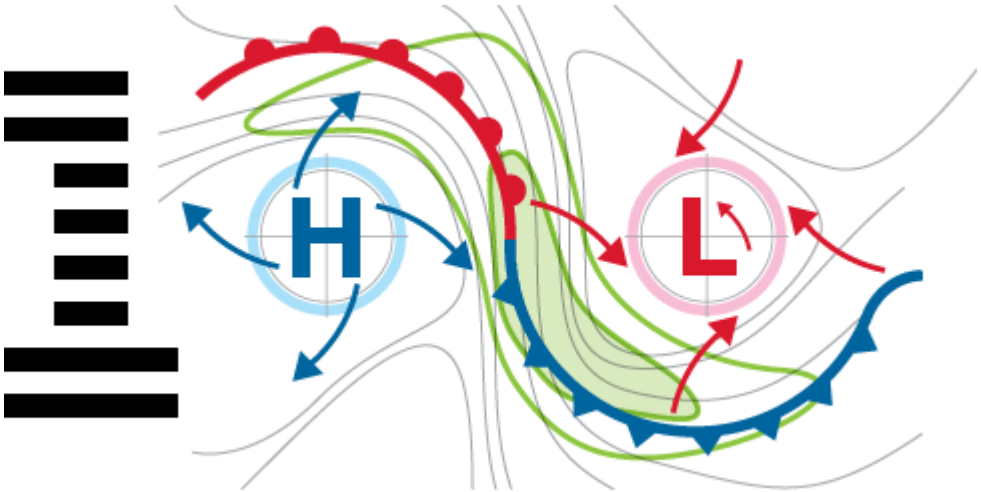


Illustrative results from 2018 Google/DeepMind field study

New energy grid connection problem

Keqiao Chen

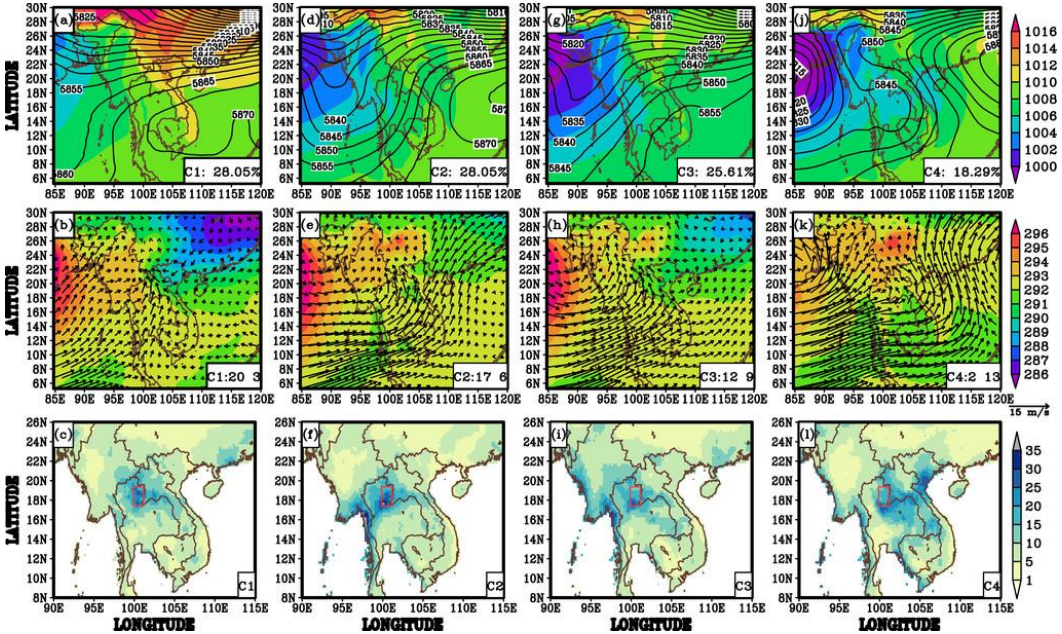


- Meteorological and new energy resources prediction can be effective prediction of wind and light energy resources;

- the consumption problem is mainly the abandoned light rate and abandoned wind rate reduction

Image Recognition for Energy

Keqiao Chen



- Fault identification.
  - Fault identification of transmission and substation equipment lines, through multi-sensors, cameras, infrared devices to bring three-dimensional identification system, intelligent identification of faults or defects;
- Weather prediction.
  - Can be combined with deep learning to predict the weather affecting the power network.

Robot operation and maintenance

Keqiao Chen

- In the case of a major grid outage in Ukraine,
  - for example, this is an incident caused by a malicious attack that breaks through the information security defenses of the grid, causing more damage than ordinary incidents and making it difficult to respond to general maintenance.
- Deep learning can determine the type of scenario and recommend appropriate countermeasures.

Smart Energy & Electric Power System

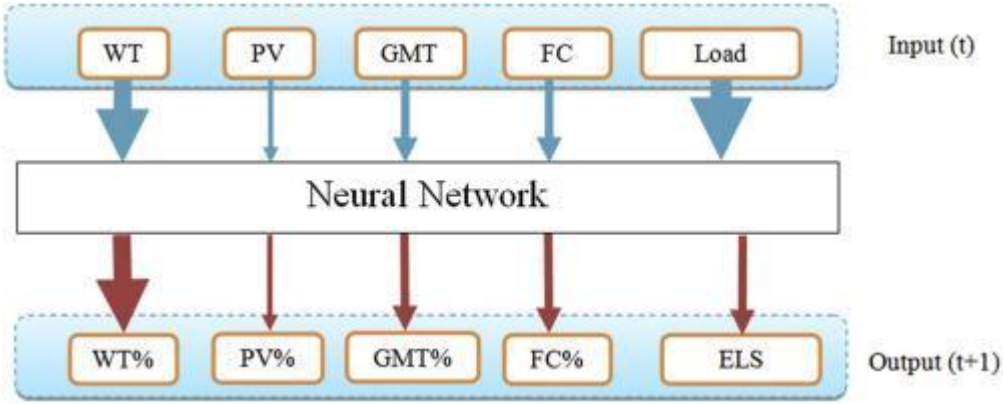
Ruimeng Shao

AI 2.0 & Smart Energy and Electric Power System (Smart EEPS).

- Energy Internet (EI) fields
- Smart Grid (SG)
- Machine Learning(ML)
    - Optimal Decision

Hybrid Power System by using AI

Ruimeng Shao



- Renewable Energy Sources
  - Wind Turbines
  - Photovoltaic
- Neural Networks (NN) and Fuzzy Logic Control
  - Energy production cost
  - Buffer role of HSS

New Future - NEOM City

Ruimeng Shao

- *Solar thermal photovoltaic*
- *Wind*
- *Battery Energy Storage*

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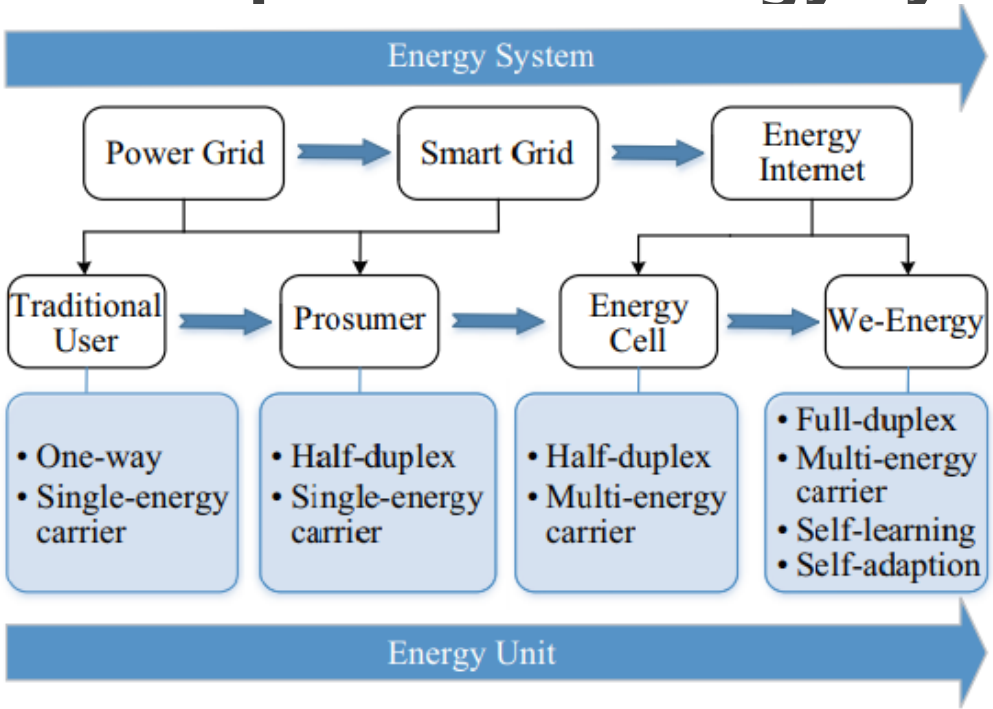
Through AI

The development of energy systems



Advantages of AI

- Strong data analytical capability
- Less dependent on a specific mathematical model
- Self-learning
- Strong ability to handle relatively complex problems.

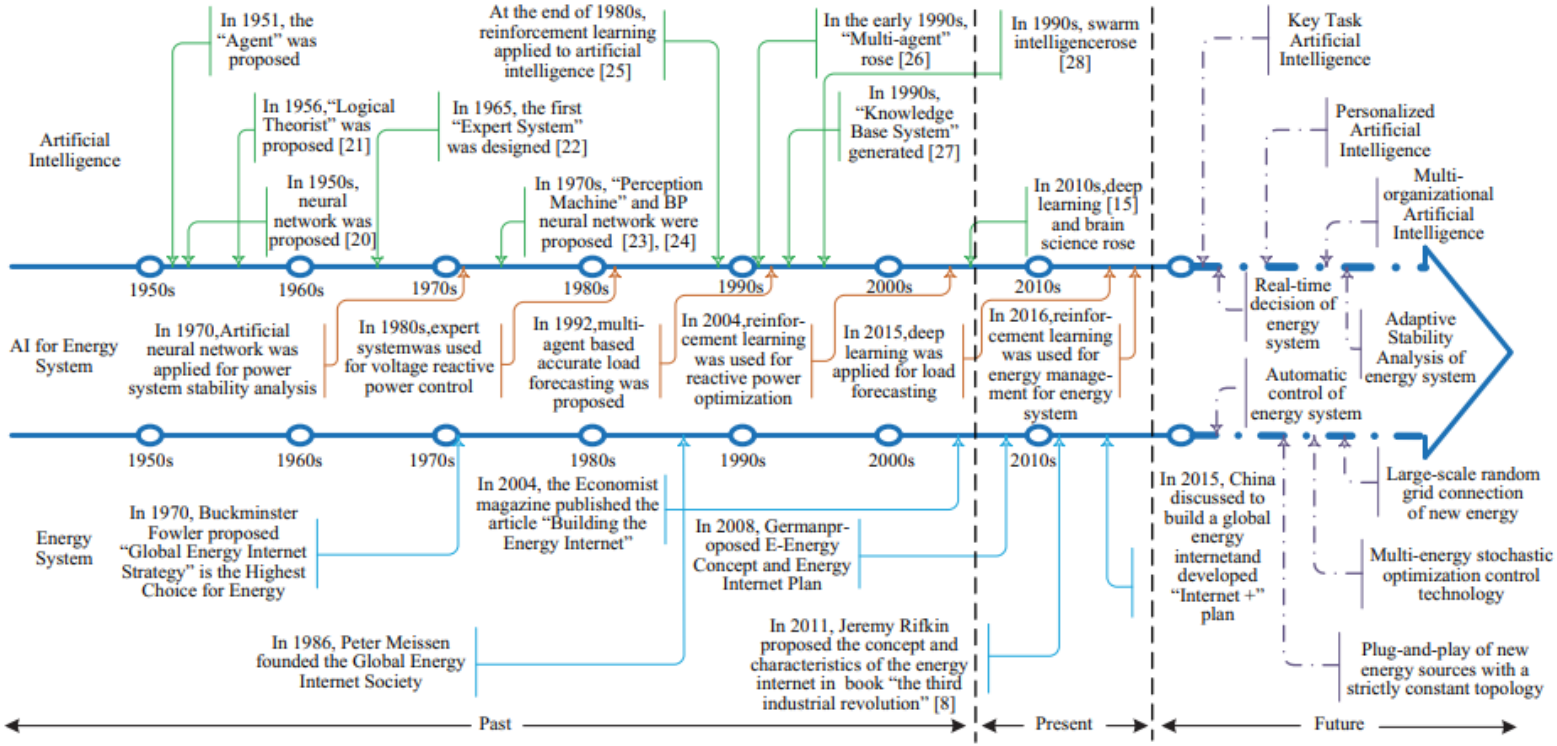
Restrictions of AI

- Highly dependent on data
- An accurate system model for AI methods
- Weak stability in practical applications
- High requirements for computing devices

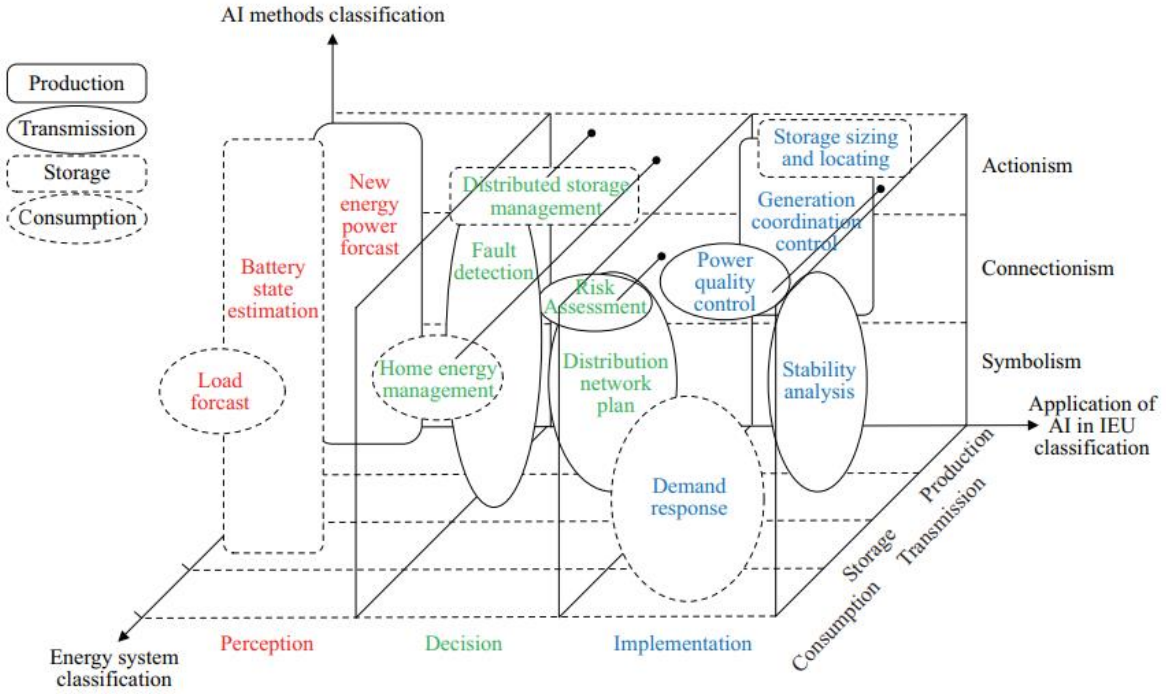
Energy and AI

- Energy and AI research
- Ethics and morality
- Policy and law

AI applications for energy systems



AI applications for energy systems



Reference

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Thank you

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