

Advanced Machine Learning

Jie Tang

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Tsinghua University



Group: AML2024 学习群



Valid until 9/18 and will update upon joining group

A bit about Jie: **Ironman Triathlon** toward AGI



A bit about Jie...

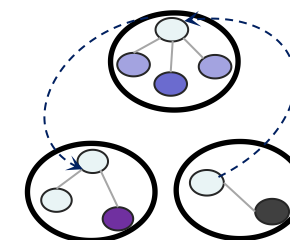
- Jie Tang, WeBank Chair Professor, ACM/AAAI/IEEE Fellow, Computer Science of Tsinghua University. My interest is artificial general intelligence (**AGI**). Recently, I put all efforts into Large Language Models (LLMs): GLM, ChatGLM, CogView, etc.
- My research received the SIGKDD Test-of-Time Award (10-year Best Paper).
- Have published more than 300 paper on international conf/journals, including KDD (30), IJCAI/AAAI (30), NIPS/ICML, IEEE Trans. (30), Machine Learning J
- #Citation: 43,132 and *h*-index: 103
- Have developed several notable systems
 - chatglm.ai, a ChatGPT alternative with over 20,000,000 users
 - AMiner.org, a system for academic researcher network analysis with over 30,000,000 users from 220 countries/regions
- Homepage: <http://keg.cs.tsinghua.edu.cn/jietang/>
 - Or google “Jie Tang”



Research Interest

Artificial Intelligence
Data Mining

Knowledge Graph
Social Network



10 years + 10 years

2006

2008

2015

2018

2021-2023

2024

PhD
Tsinghua U.

My **1st**
Res. Product

A Period of
Confusion

A(G)I
Cognitive
Intelligence

IEEE Fellow
ACM Fellow
AAAI Fellow

My **2nd**
Res. Product



SIGKDD Test-of-Time Award Paper

20,000,000 HF downloads

Contact Information

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 - Open hours: Tuesday/Wednesday afternoon 2:00pm-5:00pm
 - Better to make an appointment in advance



Teaching Assistant

- TA: Wendi Zheng
 - FIT 1-308
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- TA: Jinhua Du
 - FIT 1-308
 - E-mail: dujh22@mails.tsinghua.edu.cn
- TA: Hanyu Lai
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Resources

- **Conferences:**
 - Theory: NIPS, COLT, STOC/FOCS
 - Algorithm: ICML, KDD, UAI, IJCAI/AAAI
 - App: SIGIR, WWW, ACL
- **Journals:**
 - JMLR, JAIR, MLJ, ACM TKDD, IEEE TKDE
- **Handbooks**
 - Yoshua Bengio, Ian J. Goodfellow, Aaron Courville. Deep Learning. 2016.
 - Christopher M. Bishop. Pattern Recognition and Machine Learning. Springer, 2007.
 - Daphne Koller, Nir Friedman. Probabilistic Graphical Models. MIT Press, 2009

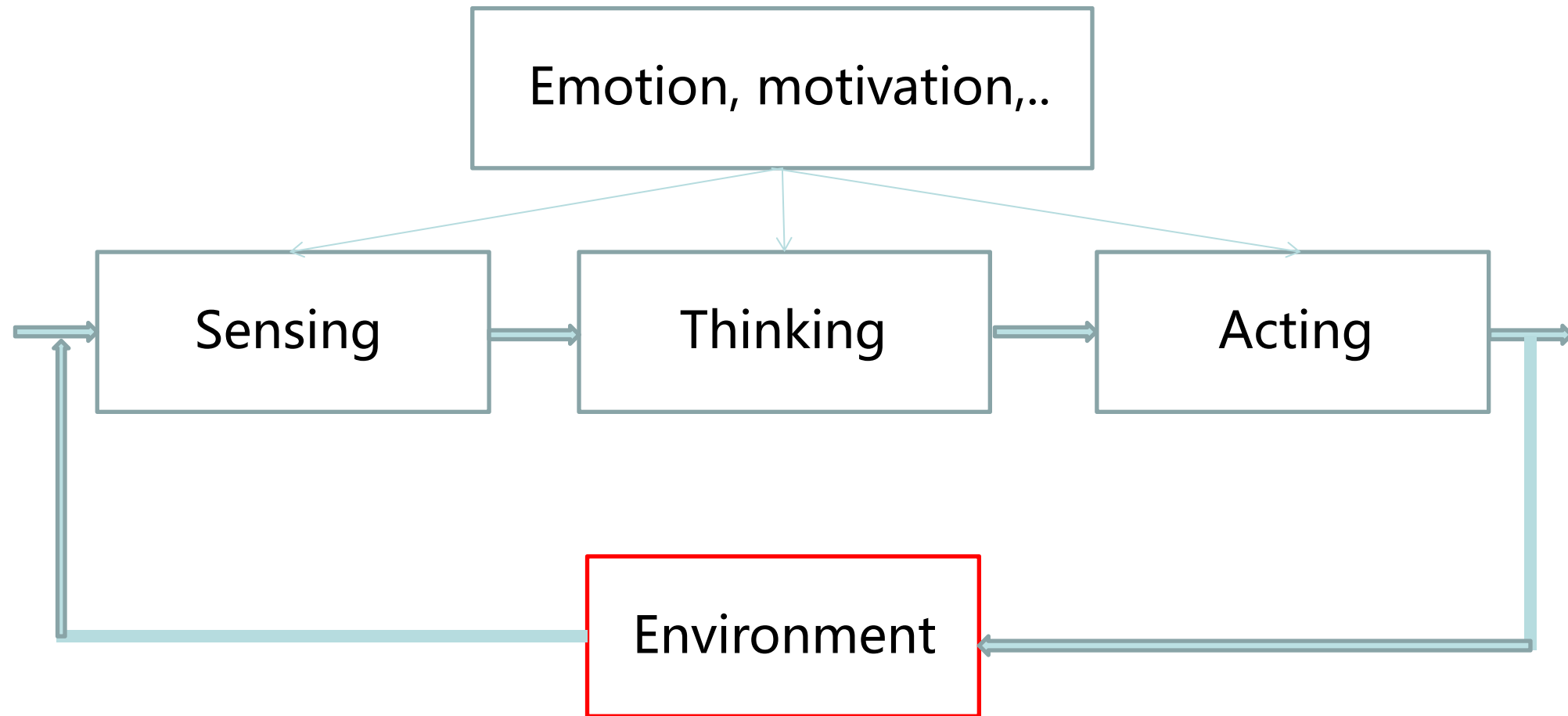
Some Reference Courses (not complete)

- CS189: Introduction to Machine Learning
 - <https://www.eecs189.org/>
- CS285: Deep Reinforcement Learning
 - <http://rail.eecs.berkeley.edu/deeprlcourse/>
- CS 194/294-267 Understanding Large Language Models: Foundations and Safety
 - https://rdi.berkeley.edu/understanding_llms/s24
- LLM course by Maxime Labonne from Liquid AI (UK)
 - <https://github.com/mlabonne/llm-course>
- Recent Advances on Foundation Models
 - <https://cs.uwaterloo.ca/~wenhuche/teaching/cs886/>

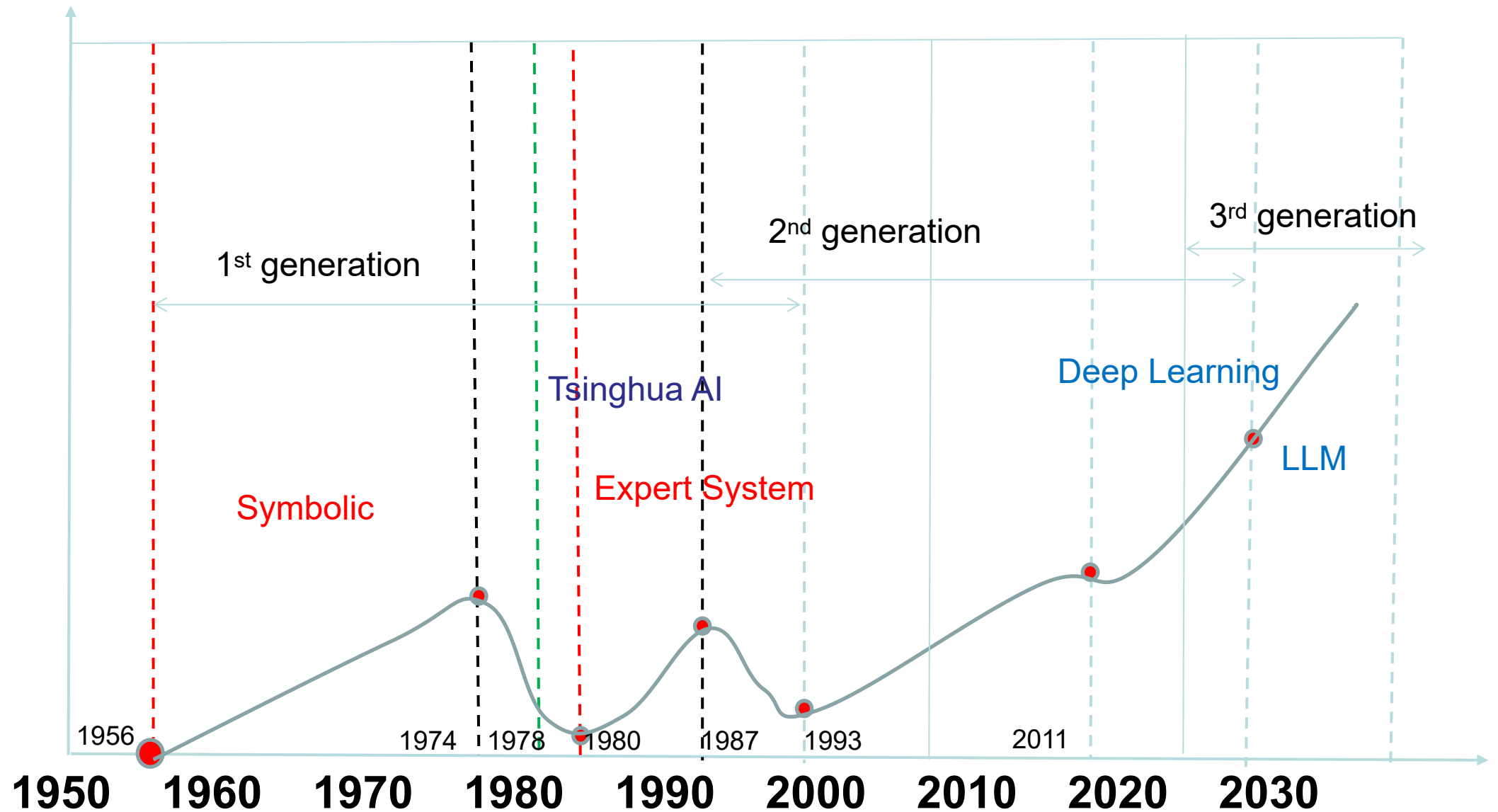


Artificial Intelligence

Agent as AI



AI History



AI in Tsinghua

- In 2019/09, we established Tsinghua AI Institute
 - By Prof. Bo Zhang
- Focus
 - Fundamental theories and methodologies
 - Interdisciplinarity



Foundation Model in Tsinghua

- In 2023/06, we established Foundation Model Research Center in Tsinghua AI Institute
- Focus
 - Fundamental tech for LLM
 - Interdisciplinarity



Beijing AI Institute (BAAI)

- In 2019/11, Beijing launched Beijing AI Institute
 - By Dr. Hongjiang Zhang
- Focus
 - ground-breaking research

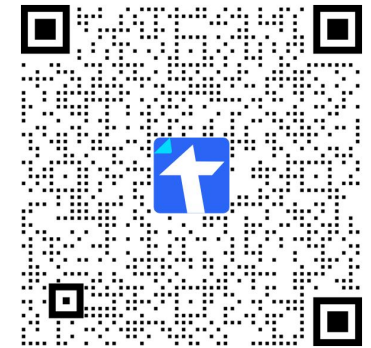




This Course

Overview of Class

- Transformer
- Pretraining Models
- Post-training
- Self-learning
- Chat Models
- Visual Models
- Recent New LLMs
- Applications



Grading

- Homeworks (40%)
 - 4 homeworks (10 points each time)
- Project (60%)
 - 2-3 students to form a team
 - Apply machine learning to solve a real problem
 - Choose one task at Kaggle (<http://www.kaggle.com/competitions>)
 - Submit materials:
 - a proposal (6th week), a mid-term report (9th week), a final report (17th week), and the implementation code (17th week)
 - All reports should be in NIPS format, written in English:
(<http://nips.cc/Conferences/2014/PaperInformation/StyleFiles>)
 - Poster presentation (15th week)

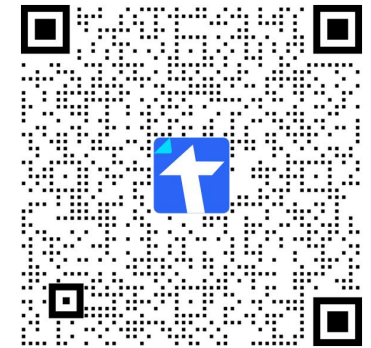
Potential achievements

- Able to **understand** the underlying principles of classical ML algorithms
- Able to **apply** right ML algorithms to the applications at your hand
- Able to **design** effective ML algorithms to solve new problems
- We will try to provide necessary GPU platform for practicing large-scale deep learning...
 - Please apply first...

About final report

- We expect to see
 - Problems (**what?**)
 - Motivations (**why?**)
 - Techniques (**how?**)
 - Results & Analysis (**did you verify what you claimed above?**)
 - Conclusions
- The final report should look like a NeurIPS technical paper
 - Style file: <https://neurips.cc/Conferences/2019/PaperInformation/StyleFiles>

- Any suggestions?
 - Any problems?
 - Anything else you want to learn in class?
-
- Today's homework
 - Share your self-introduction





Thank you !

Jie Tang, KEG, Tsinghua U
Download data & Codes

<http://keg.cs.tsinghua.edu.cn/jietang>
<https://github.com/THUDM>