THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

HKUST VIS

AI-Human Teaming for Decision Making

Huamin Qu

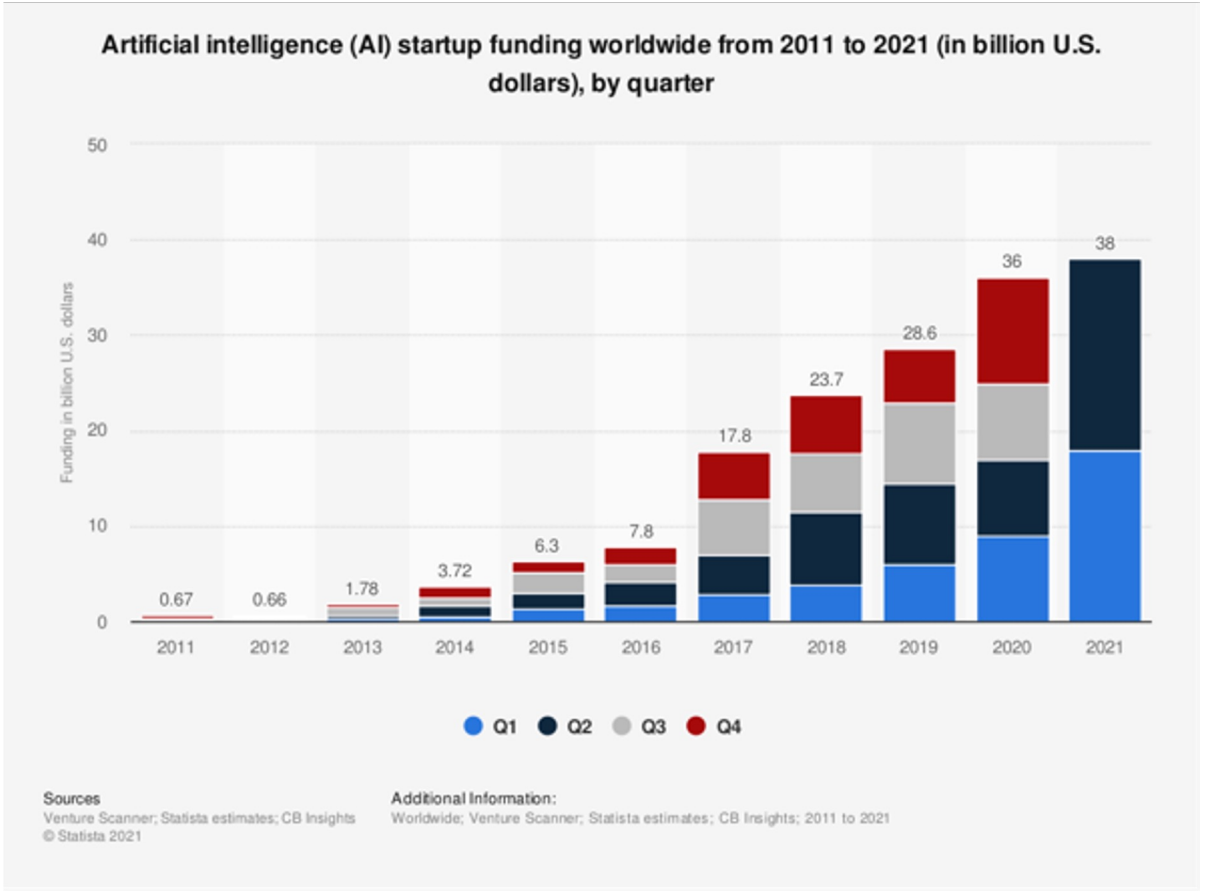
Hong Kong University of Science and Technology

HKUST VisLab

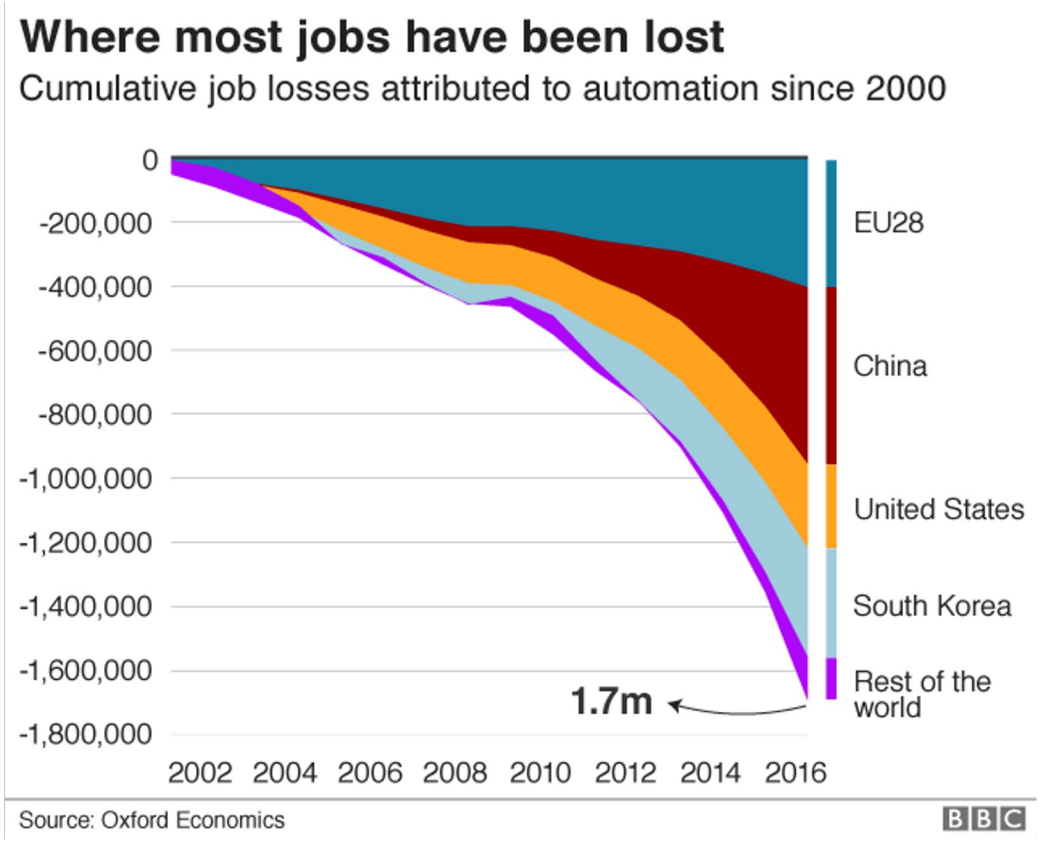
Lab Achievements

- **Awards**
  - 13 best paper/honorable mention awards
  - Distinguished Collaborator Award 2016 from Huawei Noah's Ark Lab, IBM Faculty Award 2009
  - 2014 Higher Education Scientific and Technological Progress Award; 2019 CCF Nature Science Award
  - HKICT Awards and APICTAs; Yelp Dataset Grand Prize; IEEE VAST Challenge awards
  - AI2000 most influential scholar award; Inductee to IEEE VIS academy
- **Research**
  - No 1 visualization group in the world based on the output in the top journal of the field (more than 100 IEEE TVCGs)
  - The largest visualization group in Asia and one of the largest in the world (30 members including 24 PhDs)
  - 3 times paper co-chairs for IEEE VIS
  - Technologies adopted by Microsoft, IBM, Huawei, Tencent, Bosch, etc.
- **Alumni**
  - More than 100 (40 PhDs+30 Mphils+…)
  - Working in industry:MSRA, IBM Watson, AWS AI, Facebook AI, AirBnb, Bloomberg AI, Siemens, Google, Huawei, etc.
  - Working in academia: Zhejiang University, Tongji University, University of Electronic Science and Technology of China , Shenzhen University, Singapore Management university
  - Working in government: Office of the Government Chief Information Officer (OGCIO) Hong Kong
- **Media**
  - More than 30 media coverages: NHK TV, MIT News, Guardian, SCMP, TechinAsia, IEEE Spectrum ACM Tech, 新华网,人民网, 明报, 文汇报, 香港电台 大公报，星岛日报， 中联办，新智元, …

AI's funding keeps growing amid Covid-19 and economic recession



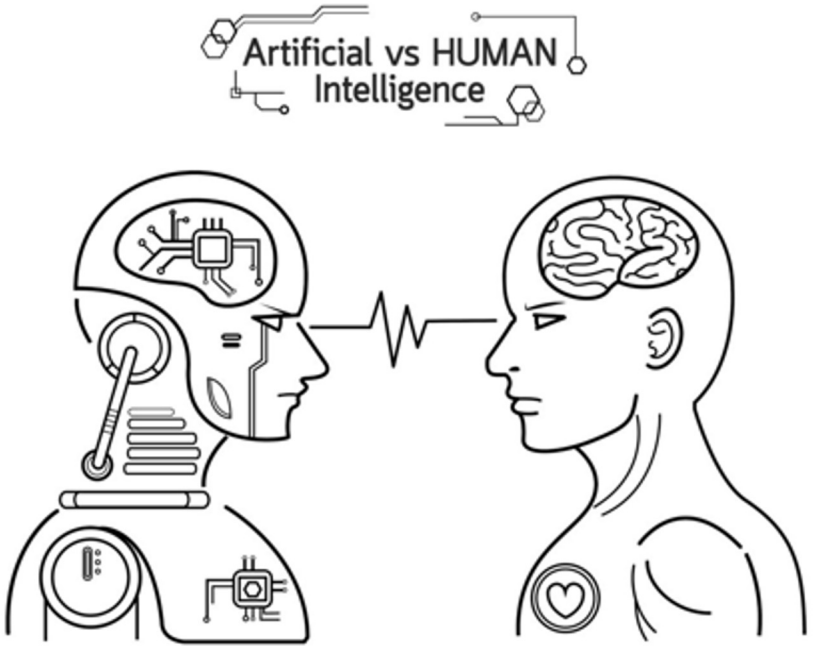
Superhuman AI is emerging ...

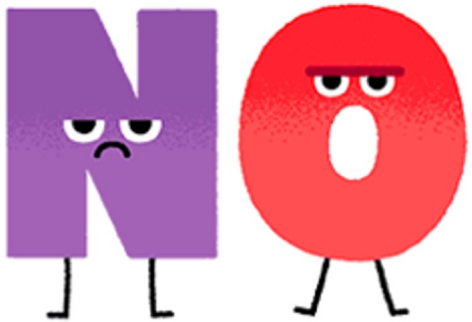


AI is taking human jobs ...

Image src: https://www.bbc.com/news/business-48760799

A zero-sum game between AI and human?



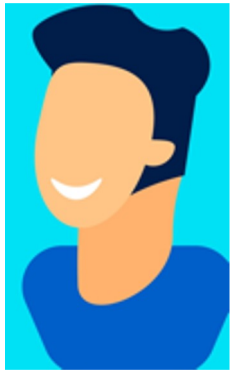


Img src: https://skywell.software/blog/artificial-intelligence-vs-human-intelligence/

AI Intelligence v.s. Human Intelligence

- Processing information fast
- Repetitive
- Perform one or two tasks
- Cannot make valuable decisions or use common sense
- Generally perform poorly to unknown situations

- Processing information slow
- Creative
- Multi-tasking
- Make valuable decisions based on past experience
- Think and reason abstractly
- Have empathy



Strong AI
Weak HI

Strong HI
Weak AI

Human-AI Teaming

We need human-AI teaming when

AI is limited, biased, and intransparent

Decision-makings are multi-criteria and context-dependent

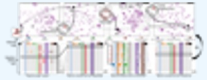
Requiring creative activities such as designing

Computational art

Data storytelling

Human-AI Teaming: How?

VisLab's Work on Human-AI Teaming

Human Assist AI	Training AI	Improving AI: *ATMSeer* (ACM CHI'19), *ProtoSteer* (ACM KDD'19, IEEE VIS'19) Model Debugging: *DeepTracker* (ACM TIST'18)  
	Explaining AI	Open the blackbox: *iForest* (IEEE VAST'18), *EmbeddingVis* (IEEE VAST'18) Treat as blakbox: *RuleMatrix (IEEE VAST'18), HypoML (IEEE VAST'20) , DECE (IEEE VAST'20), M2Lens (IEEE VIS'21)*   
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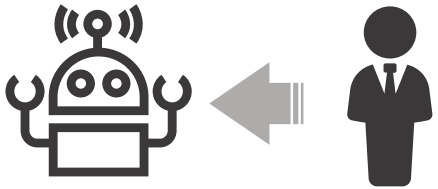
Human assisting AI

With human knowledge and inspirations, we could create better AI.



ATMSeer:
Increasing Transparency and Controllability in Automated Machine Learning

Qianwen Wang, Yao Ming, Zhihua Jin, Qiaomu Shen, Dongyu Liu,
Micah J. Smith, Kalyan Veeramachaneni, Huamin Qu

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浙江大学 1897 ZHEJIANG UNIVERSITY

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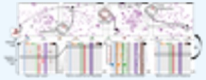
	Explaining AI	Open the blackbox: *iForest* (IEEE VAST'18), *EmbeddingVis* (IEEE VAST'18) Treat as blakbox: *RuleMatrix (IEEE VAST'18), HypoML (IEEE VAST'20) , DECE (IEEE VAST'20), M2Lens (IEEE VIS'21)*   
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DFSeer: A Visual Analytics Approach to Facilitate Model Selection for Demand Forecasting

ACM CHI Conference on Human Factors in Computing Systems 2020

Dong Sun[1], Zezheng Feng[1], Yuanzhe Chen[2], Yong Wang[1], Jia Zeng[2], Mingxuan Yuan[2], Ting-Chuen Pong[1], and Huamin Qu[1]

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2 HUAWEI

VBridge: Connecting the Dots Between Features and Data to Explain Healthcare Models

Accepted to IEEE Transactions on Visualizations and Computer Graphics (TVCG) (IEEE VIS'21)

Furui Cheng[1], Dongyu Liu[2], Fan Du[3], Yanna Lin[1], Alexandra Zytek[2], Haomin Li[4], Huamin Qu[1], and Kalyan Veeramachaneni[2]

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2

3 Adobe

4 浙江大学 ZHEJIANG UNIVERSITY 1897

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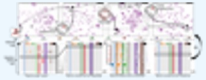
	Explaining AI	Open the blackbox: *iForest* (IEEE VAST'18), *EmbeddingVis* (IEEE VAST'18) Treat as blakbox: *RuleMatrix (IEEE VAST'18), HypoML (IEEE VAST'20) , DECE (IEEE VAST'20), M2Lens (IEEE VIS'21)*   
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CHI 2021

A Visual Analytics Approach to Facilitate the Proctoring of Online Exams





Haotian Li[1] Min Xu[1] Yong Wang[2] Huan Wei[1] Huamin Qu[1]

https://haotian-li.com/project/online-proctoring.html

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SINGAPORE MANAGEMENT UNIVERSITY

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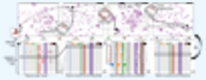
	Explaining AI	Open the blackbox: *iForest* (IEEE VAST'18), *EmbeddingVis* (IEEE VAST'18) Treat as blakbox: *RuleMatrix (IEEE VAST'18), HypoML (IEEE VAST'20) , DECE (IEEE VAST'20), M2Lens (IEEE VIS'21)*   
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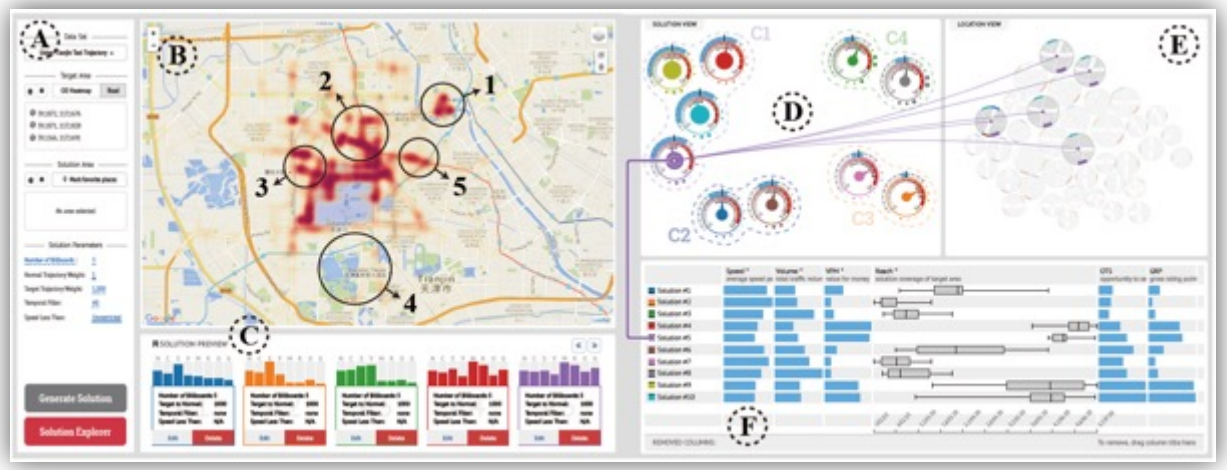

SmartAdP: Visual Analytics of Large-scale Taxi Trajectories for Selecting Billboard Locations

Liu et al. IEEE TVCG 2017 (IEEE VIS'16)

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Microsoft Research
微软亚洲研究院

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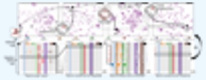
	Explaining AI	Open the blackbox: *iForest* (IEEE VAST'18), *EmbeddingVis* (IEEE VAST'18) Treat as blakbox: *RuleMatrix (IEEE VAST'18), HypoML (IEEE VAST'20) , DECE (IEEE VAST'20), M2Lens (IEEE VIS'21)*   
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Visual Analytics for Engagement Analysis

Exploring students' emotion can help both teachers and parents know about students' learning status and further help teachers improve teaching.

It is not easy for teachers to quickly capture and explore many students' emotions in the classroom.

How to carry out ***efficient, informative, reliable*** emotion analysis?

AI ✚ VIS ✚ Human

Haipeng Zeng, Xinhuan Shu, Yanbang Wang, Yong Wang, Liguo Zhang, Ting-Chuen Pong, and Huamin Qu. "EmotionCues: Emotion-oriented visual summarization of classroom videos." *IEEE transactions on visualization and computer graphics* 27, no. 7 (2020): 3168-3181.

Visual Analytics for Engagement Analysis

The role of **AI**

AI recognizes many students' emotion evolutions

Teachers can't simultaneously take care of many students

The role of **VIS**

Visualization enhances understanding for insight discovery

The role of **Human**

Teachers explore students' engagement status

AI recognition results have uncertanties

Teachers improve teaching

Haipeng Zeng, Xinhuan Shu, Yanbang Wang, Yong Wang, Liguo Zhang, Ting-Chuen Pong, and Huamin Qu. "EmotionCues: Emotion-oriented visual summarization of classroom videos." *IEEE transactions on visualization and computer graphics* 27, no. 7 (2020): 3168-3181.

Questions?

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