



Tokopedia-UI
Artificial Intelligence
Center of Excellence





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Artificial Intelligence has always been an important area of research for Faculty of Computer Science, Universitas Indonesia. The importance of AI is even more pronounced with the fact that AI is now increasingly more accepted and adopted by businesses and industries as a key enabler in the next industrial revolution. From Indonesia's perspective, this trend makes it more apparent that a collaborative effort in research and development is necessary to keep us at the forefront of the technological advances related to AI, while also contribute impactful solutions to challenging problems the nation is facing.

It is thus to our great pleasure to welcome the founding of Tokopedia-UI Artificial Intelligence Center of Excellence at the Faculty of Computer Science, Universitas Indonesia. The AI Center is established from the collaboration between Universitas Indonesia and Tokopedia, which exemplifies a close partnership between an academic institution and industry. Combination of strengths from both partners: in-depth expertise from academic community and application domain know-how from industry, can bring synergy accelerating AI technological advances in Indonesia.

Finally, we extend our utmost appreciation, first and foremost, to our primary partner, Tokopedia for their generous support to the AI Center. We are also thankful to the support of the university leadership, the Indonesian government through the Ministry of Higher Education, Research and Technology, and our other industry partners, NVIDIA and Epsindo Prima Sinergi, for their support so that the AI Center is now established at Universitas Indonesia.

Petrus Mursanto

Dean, Faculty of Computer Science, Universitas Indonesia

Board of Advisors



Dr. Petrus Mursanto

Dean, Faculty of Computer Science, Universitas Indonesia



Herman Widjaja

Chief Technology Officer Tokopedia



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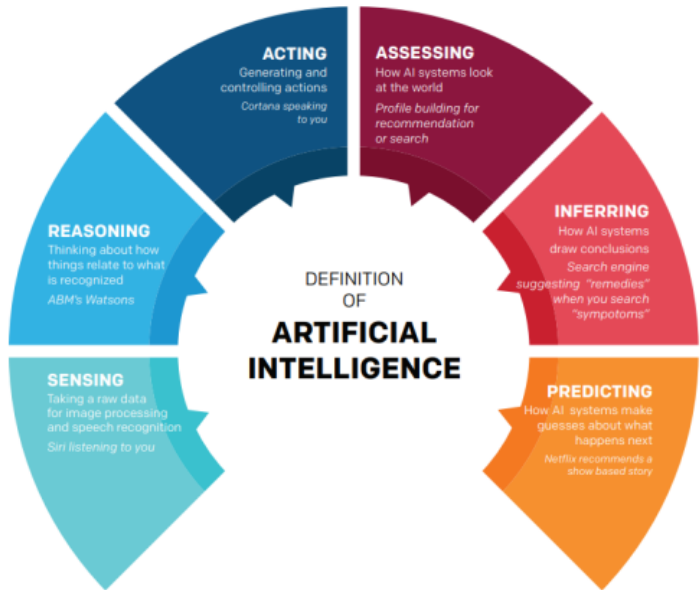
Professor in Artificial Intelligence, Faculty of Computer Science,

Introduction: What is AI and Why?



Artificial Intelligence (AI) is a subfield of computer science whose aim boils down to achieving “intelligence exhibited by machines” in contrast to the natural intelligence demonstrated by human and other animals. As an academic discipline AI embraces ideas from various disciplines such as

- philosophy,
- mathematics (including logic, algebra, theory of computation, and statistics)
- economics
- neuroscience
- psychology
- computer
- engineering, and control theory

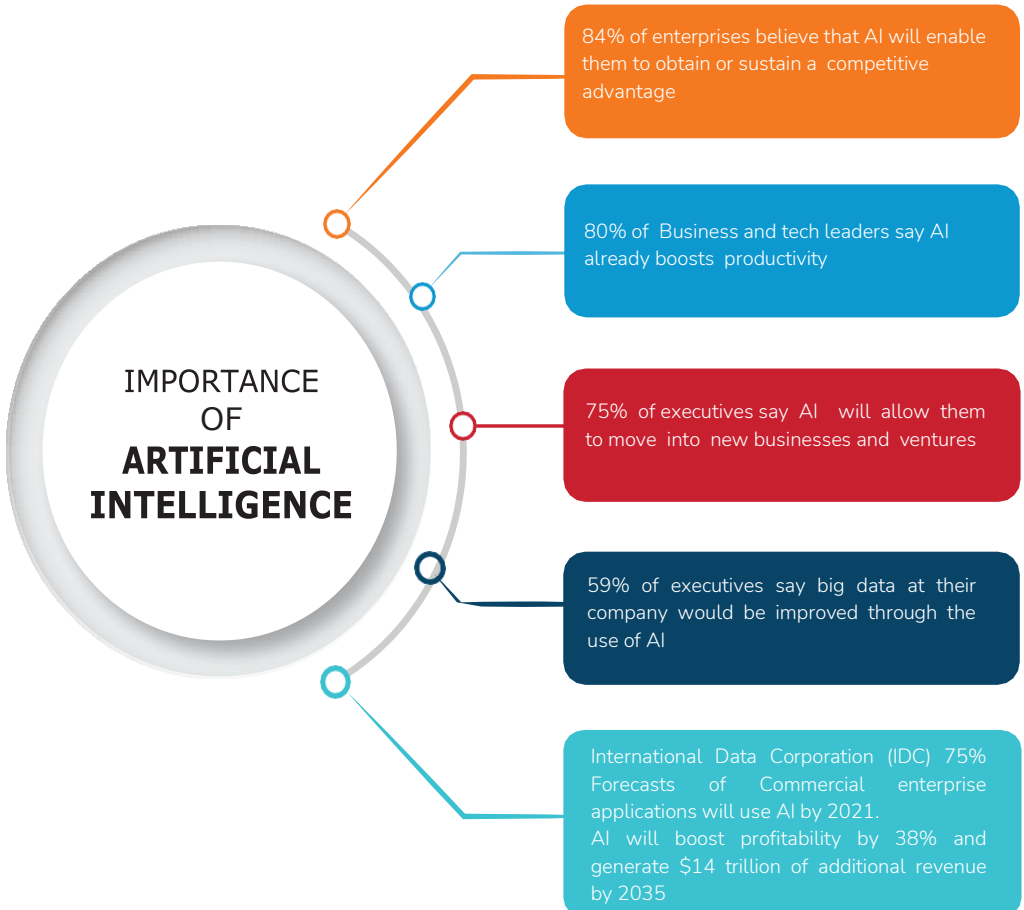


Going through ups and downs since its inception as an academic discipline

in the 1950s, AI has truly flourished since the turn of the century due to the availability of huge amount of data, significantly higher computing power, and better understood machine learning techniques. Rapid development of AI has brought advances that allow machines not only to match but also surpass human performance in various tasks, such as beating human world champions in the game of Go, driving through highways without human guidance, spotting pneumonia from X-ray images, or creating musical hits.

In Indonesia, AI is in high demand than ever, both by the academic and industry world. Universitas Indonesia as Indonesia’s No 1 university, and Tokopedia as one of the largest online market platforms in Indonesia, share the same vision to pioneer and promote the use of AI in strategic, multi-disciplinary life aspects, contributing solutions to national and global problems. To this end, Universitas Indonesia and Tokopedia have collaborated to establish Tokopedia-UI AI Center of Excellence.







POLITICS & GOVERNMENT

- Targeted campaigning
- Public opinion monitoring
- Anticipating infrastructure failures and maintenance



BANKING & PERSONAL FINANCE

- Fraud prevention as AI learns what types of transactions are fraudulent
- Credit decisions
- Client segmentation



HEALTHCARE

- Autonomous surgical robots
- Automatic disease identification and diagnosis
- Personalised treatment
- Drug discovery
- Identifying candidates for clinical trials
- Epidemic outbreak prediction
- Automation of routine tasks like X-Rays, CT scans, data entry
- Health monitoring/wearable health trackers
- Virtual doctors



e-COMMERCE

- Search recommendations
- Customer service and sales chatbots
- 3D modelling



EDUCATION

- Plagiarism checkers
- Automate grading
- Customised digital learning interfaces
- Virtual teachers or lectures
- Adaptive learning



COMMUNICATION

- Spam filters on your emails
- Text and email reply suggestions
- Real time transition
- Emotion analytics

USAGES
OF
ARTIFICIAL
INTELLIGENCE

The AI Center



The official name of the Center is Tokopedia-UI Artificial Intelligence (AI) Center of Excellence and colloquially is named the AI Center. It is established through a solid collaboration between Universitas Indonesia and Tokopedia.

Such a close collaboration between the expertise of UI researchers in AI and the application domain know-how from industry, which is represented, foremost, by Tokopedia.

The AI Center is physically located at the Faculty of Computer Science, Universitas Indonesia (Fasilkom UI) and fully equipped with collaborative working space and the NVIDIA DGX-1, Indonesia's fastest AI and Deep Learning computing infrastructure.



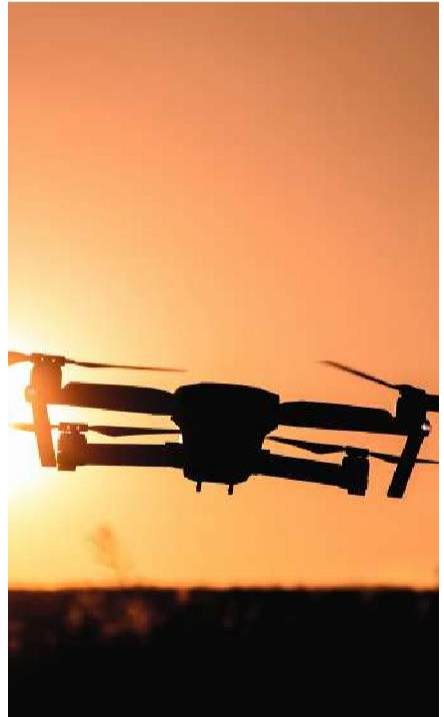
From an organization perspective, the AI Center is not just another research lab, but rather, it is a hub of activities where researchers from various research labs at Fasilkom UI can work together among themselves as well as external partners to solve real-life problems using AI approaches.

Through this collaboration, the AI Center focuses on theoretical foundations as well as useful applications of AI technologies, taking into account both product and human-aspect of AI.



Research

Equipped with the latest AI technologies, the AI Center commits to conduct excellent AI research, advancing the state-of-the-art and shaping the national AI strategies.



Product Development

The AI Center develops innovative products, systems, and services with AI as the core component. The AI Center focuses on unleashing the full potential of AI end-to-end products to improve various aspects of human lives.

Partnership and Collaboration

As a result of partnership between UI and Tokopedia, the AI Center serves as a role model for collaboration in the area of AI research and development between academia and industry. Furthermore, the AI Center aims to foster other forms of partnerships with industry and government, delivering concrete AI solutions for real-world problems.



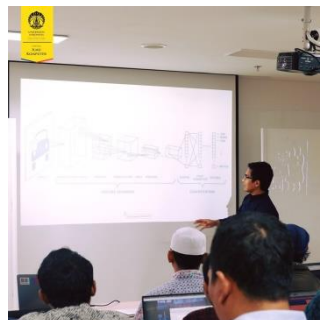
Talent Pool Expansion

The AI Center aims to expand the national talent pool in AI through training programs for students, researchers, practitioners, and general public in collaboration with Pusat Ilmu Komputer (Pusilkom) UI. In addition, relevant courses in Fasilkom UI can make use of computing facilities at the AI Center to provide hands-on experience to students.



AI Research Dissemination and Technology Evangelism

The AI Center can play a role in increasing public awareness about AI. This is done through formal scientific publication in journals and conferences, promotion of its products, special events, as well as student and public AI-themed competitions.





The main research theme of the AI Center is applying AI in e-commerce, inline with the partnership between Tokopedia and UI, having a particular focus on the following topics.

Digital Payment



The recent wide adoption of digital payment in urban communities has created demands for more personalized and more dynamic use cases. In rural areas, the penetration of digital payment can be made higher. AI technologies provide analytics to revolutionize digital payment applications in Indonesia

Merchant Analytics and Buyer Recommender Systems



What items can be best to sell for merchants? What is the right time to buy products for buyers? Such questions can benefit from recommendation systems, where AI serves as the enabler and game-changer for both merchants and buyers to make crucial decisions on whether to sell and buy products, respectively.

In addition, the AI Center intends to explore other research areas beyond the two main topics, both utilizing the expertise within the faculty as well as the powerful computing infrastructure in the AI Center. These include, but are not limited to, the following topics.

Logistics



Logistics, supply chain, and transfer of goods and services are becoming more and more complex nowadays, yet they serve as the bread-and-butter in e-commerce. The use of AI can untangle such complexity, giving a clear view of what is going on in every logistic step, what is the source of logistic problems should they occur, and what can be done to prevent such problems from happening.

Urban Mobility



As society inevitably is increasingly more urbanized, mobility becomes a huge challenge due to traffic congestion and public transport inadequacy. AI offers a way to develop smarter and more efficient urban transport systems through realistic modeling and adaptive traffic management.



AI-enabled Healthcare

AI can help the development of solutions to health service inequality challenges in Indonesia and supporting the provision of more accurate and personalized health services. Combined with remote health service infrastructure, AI can be employed to alleviate uneven distribution of medical specialists in Indonesia through remote diagnosis using multi-faceted and multi-modal data from a variety of medical observations.



Fraud Detection & Prevention

Fraud is an act of deliberate misuse or misapplication of resources or assets. AI can be employed as a core of fraud detection systems, due to its capability to identify useful information and patterns to determine why and when frauds happen, and to reveal and even predict frauds before they even happen.



Public Services

Providing satisfactory public services remains a big challenge for Indonesian public institutions due to inefficiencies in paperwork handling, convoluted regulation, and subpar service quality by public officials. AI can at least partly automate and speed up the delivery of public services, hence reducing or even eliminating such inefficiencies.



The AI Center is provided with a 99 m² newly renovated working space located on the 5th floor of the new building of Faculty of Computer Science within the UI's Depok campus. The working space is designed to foster exciting and innovative research within a collaborative environment. Its location is also surrounded with the working space of research labs in the faculty to further spur cross-fertilization of ideas by researchers at the faculty.

Research in the AI Center is also supported with various computing resources including GPU-capable CUDA servers with NVIDIA GTX 780, 970, 980, and 1080 cores as well as NVIDIA DGX-1 server as the crown jewel.

The NVIDIA DGX-1 server at the AI Center is the first AI supercomputing infrastructure deployed in Indonesia, generously donated by Tokopedia to the AI Center. The server is equipped with NVIDIA Tesla V100 GPU architecture, that is capable of up to 1 peta FLOPS (i.e., 1000 teraFLOPS) computing performance. This is 800 times more powerful than the TitanXP architecture that is usually used as a standard of AI and Deep Learning computing infrastructure in Indonesia.

Contact



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