

# Data Science and Artificial Intelligence in Indonesia

Challenges and Opportunities

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# Introduction

- Data Science and Artificial Intelligence: two hot-topics in businesses, industries and education.
- Data science tools and techniques analyzed huge amount of data to help managers to make decisions.
  - Data mining as compulsory part helps in finding the relations between data items to discover hidden patterns.
- In order to get useful information, artificial intelligence techniques come to the rescue.
- Nevertheless, mastering the tools and techniques is not an easy task.
- For Indonesia, this is a challenge and at the same time bringing opportunities.

# Introduction

- **Indonesia has 2,595 universities.**

- Number three after India (5,288 universities) and United States (**3,216** universities) (<https://www.statista.com/>)

- Number of university students in Indonesia in 2021 - **8,956,184** (Including state own and private universities) (<https://www.detik.com/>)

- Base salary of senior Civil Lecturer (with doctoral degree and 5 years of experience) is between **Rp 3,044,300** and **Rp 5,901,200**.

(source:

<https://www.detik.com/edu/perguruan-tinggi/d-6261857/daftar-gaji-rektor-dan-dosen-di-perguruan-tinggi-plus-tunjangan-per-bulan>)

Note: USD 1 = Rp 15,000, so, it is approximately only USD 203 – USD 393

# Introduction

- **There are 3 state university status in Indonesia:**
  1. State own legal entities – has full autonomy in management of financial and human resources, including lecturer and administration staffs.
  2. Public service university – has some flexibility in terms of managing its organization especially in budgeting and financial management.
  3. Work unit university – fully dependent on the ministry of education
- **There are many private universities**

# Introduction

- Growing need for Data Scientists
  - In 2022: Indonesia is on Rank 6 in terms of highest number of **startup** with **2,423** startups ([Countries - With the top startups worldwide | Startup Ranking](#)) .
  - As of 2022: 13 unicorns amongst 50 unicorns in Southeast Asia
  - Various sectors: e-commerce, fintech, banking, healthcare, energy, manufacturing and other service industries
    - Digital/Online banking: Jenius
    - e-commerce: Bukalapak, Kopi Kenangan
    - Fintech: Dana, Ajaib, Kredivo, Xendit, OVO, Blibli.com,
    - Travel: Traveloka, Tiket.com
    - Delivery Services: GOTO, JD.id, J&T Express
    - Education: Ruangguru, Luarsekolah
    - Healthcare: Alodokter.com, SehatQ

# Introduction

## Notable Asia-Headquartered IPOs In Q3 2021

Name	Sector	Headquarters	Listing type	Symbol	Money Raised at IPO	Valuation at IPO
Zomato	Food delivery	India		BOM:ZOMATO	\$1.3B	\$12.2B
Bukalapak	E-commerce	Indonesia		IDX: BUKA	\$1.5B	\$6B
Otonomo	Vehicle data	Israel	SPAC	NASDAQ: OTMO	\$ .3B	\$1.3B
Valens Semiconductor	Semiconductor	Israel	SPAC	NYSE: VLN	\$ .2B	\$1.1B

crunchbase news

- Source: [Asia Funding Already Nearly Tops All Of Last Year \(crunchbase.com\)](https://www.crunchbase.com/news/asia-funding-already-nearly-tops-all-of-last-year)

# Data Science and Artificial Intelligence Study Programs in Indonesia

- Unfortunately, the huge need has not been fulfilled by the availability of human resources in data science and artificial intelligence fields.
  - The two study programs are not listed in the nomenclature of the accreditation board of Indonesia.
  - Data Science and Artificial Intelligence are known as field of studies only recently (beginning in 2019)

# Data Science and Artificial Intelligence Study Programs in Indonesia

- Indonesia has only several study programs designed specifically for data science mostly in **Java island** and in **undergraduate level**:
  - **2019**:
    - Universitas Airlangga, Surabaya (Data Science Technology – Undergraduate)
    - Universitas Teknologi Yogyakarta, Yogyakarta (Data Science – Undergraduate)
  - **2020**:
    - IPB University, Bogor (Statistics and Data Science – Undergraduate)
    - Bina Nusantara University, Jakarta (Data Science – Undergraduate)
    - Institut Teknologi Sumatera, Lampung (Data Science – Undergraduate)
  - **2021**:
    - Universitas Nusa Mandiri, Depok (Data Science – Undergraduate)



# Data Science and Artificial Intelligence Study Programs in Indonesia

- Similar matter also happens in Artificial Intelligence field, which is only known or studied in Computer Science related study programs (In Indonesia: there are 91 study programs in Informatics and Computer Science nomenclature, from diploma degree to Doctoral degree).
  - Computer Science
  - Informatics
  - Information Systems
  - Information Technology
  - Computer Engineering
- Just to name a few

# Data Science and Artificial Intelligence Study Programs in Indonesia

- Again, only recently is Artificial Intelligence independently known as a field of study
  - Data Science and Artificial Intelligence (Master's degree)
  - Artificial Intelligence (Master's degree)
  - Mechatronics and Artificial Intelligence (Applied Undergraduate's degree)
  - Robotics and Artificial Intelligence (Undergraduate's degree)
  - Etc.

# Data Science and Artificial Intelligence Study Programs in Indonesia

- Initiative of Erasmus+ CBHE DSAI:
  - USU started a Master's Degree in DSAI
  - USK (Unsyiah) started a Mater's Degree in Artificial Intelligence
  - ITB offers AI and DS concentration in the School of Informatics and Electrical Engineering

# Challenges in DSAI Education in Indonesia

- Late recognition of the study programs in higher education nomenclature
  - Not focusing to specific data science and artificial intelligence
    - Data science is known in the realm of Statistics
    - Artificial intelligence are studied within computer science and information technology, as well as other computer related programs
  - Even the naming is also varied among the Indonesia Erasmus+ CBHE DSAI participants!

# Challenges in DSAI Education in Indonesia

- Nowadays, study programs that has been recognized by the National Accreditation Board of Indonesia (under a variety of names):
  - Data Science (Undergraduate and Master's Degree)
  - Data Science Technology (Undergraduate)
  - Data Science and Artificial Intelligence (Master's Degree)
  - Artificial Intelligence (Master's Degree)
  - Mechatronics and Artificial Intelligence (Applied Undergraduate)
- Confusing?
  - Yes, especially for the perspective students
  - Each university will define the study program differently and with different curriculum and syllabus

# Challenges in DSAI Education in Indonesia

- Language barrier – communication mostly in “Bahasa Indonesia”
  - Fortunately, Bahasa Indonesia is using Latin alphabet
  - Read as it is
- Lack of expertise in data science and artificial intelligence
  - Only a few study programs focusing in data science and artificial intelligence
- Lack of PhD graduates in Information Technology and related fields
  - More intensive works to push the academic instructors to pursue their PhDs
- Lack of supporting laboratory equipment
  - Dedicated server with high performance computing capabilities
  - Should have more of Erasmus+ CBHE DSAI server being utilized: SuperServer 4028GR-TR (USU)

# Knowing USU

- One of the State Own Legal Entity University
- Located at the Northern part of Sumatera island
- North Sumatera population: 14.80 million
- Has at least 11 ethnics



# Knowing USU

- USU has 15 faculties
  - 161 study programs (from diploma degree to doctoral degree)
- DSAI Master's degree program is under:
  - Faculty of Computer Science and Information Technology
- USU Master's Degree in DSAI
  - 3 batch intake:
    - 2020/2021B: 22 February 2021 – 17 Students
    - 2021/2022A: 16 August 2021 – 14 Students
    - 2022/2023A: 5 September 2022 – 16 Students



# Opportunities of DSAI Education in Indonesia (USU Perspective)

- Large number of student body: **42,594**
- Potentially many undergraduate study programs as prospective students:
  - Computer Science
  - Information Technology
  - Mathematics
  - Economics and Business
  - Medicine
  - etc
- Continuously growing education, business and industry sectors

# Opportunities of DSAI Education in Indonesia (USU Perspective)

- Activities to broaden student's knowledge (more experienced lecturer are needed to participate)
  - Guest lectures
  - Industries experts
  - Student exchange in-bound and out-bound
  - Internships
  - Laboratory Workshops
  - Hands-on Training

# Opportunities of DSAI Education in Indonesia (USU Perspective)

- Activities to faculty staff and instructors
  - Sabbatical leave
  - Continuing study to pursue PhD
  - Academic staff exchange
  - Practitioners giving lectures in classes
  - Lecturers enhance their experience in industries
  - Collaborative research

Thank You