Emerging Trends in Data Science Assignment 1

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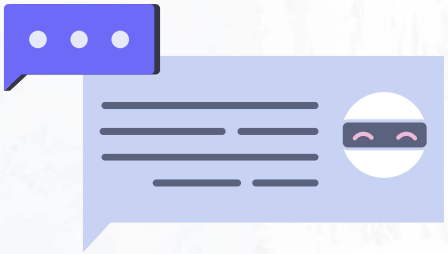

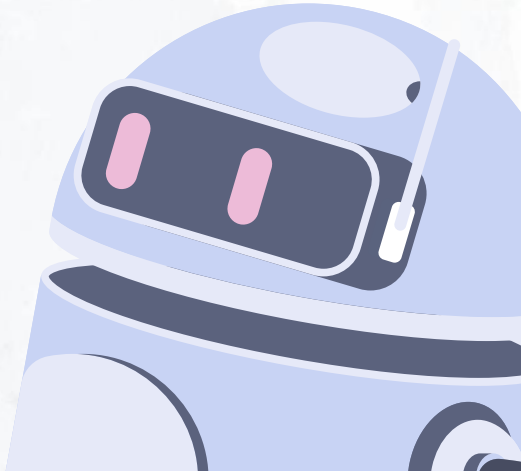

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Declaration of Academic Integrity

I hereby declared that this assignment was completed with my own effort and was not plagiarised* from another source or done by another person.

Signed: Lim Wee Liang Kelven, 3 June 2023

* **Plagiarism** - Which means submitting the work of others as your own (or allowing someone else to copy and submit your work as their own)

Definition taken from NP Plagiarism Policy, found at
https://www1.np.edu.sg/clte/antiplagiarism/policy.htm

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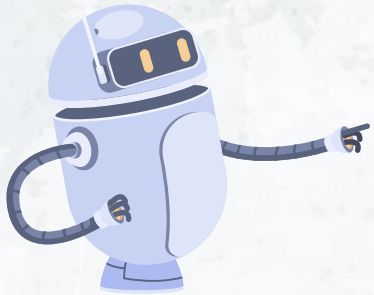
Chosen Scenrio



Scenario C: Enrolment Screening Assistant

Your Data Science programme has received a massive 2,000 applications for the available 50 positions. Your organisation has opted to utilise an AI system to determine which applicants should be admitted. The AI will assess the relevant profiles of students, including application data and academic performance from the previous five cohorts, to offer admission to those who are projected to excel once enrolled in the programme.

The AI-based decision-making system will assess the applicant's personal information (such as age, gender, race, parental occupation and income, and educational history), academic records (including grades in both preliminary and national-level exams), and a 200-word essay submitted as part of their application. The system will weigh these factors and evaluate the applicants based on their predicted potential for high performance in the programme.

Scenario C: Enrolment Screening Assistant

Assumptions:
There is currently no AI solution to screen applicants for the enrolment process across all schools in the polytechnic and across all institutions of further studies (ITEs, Polytechnics, Junior Colleges, Universities)

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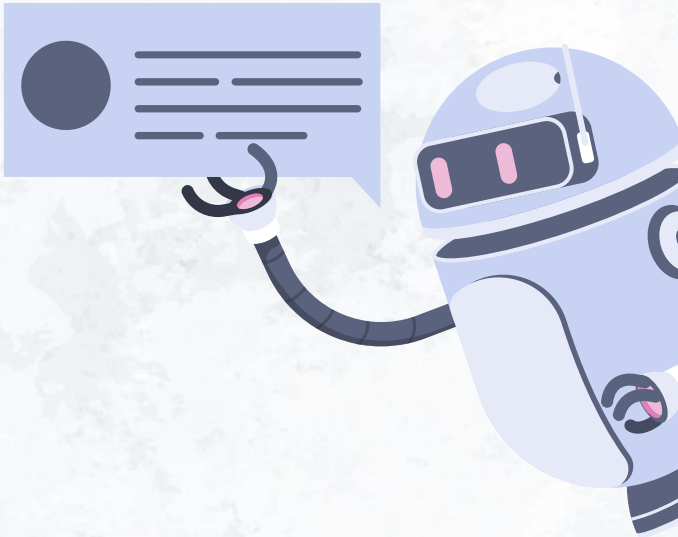
Chosen Organisation



Chosen Organisation

(a) **Organisation**

Ngee Ann Polytechnic

(b) **Core Values**

Respect, Responsibility, Resilience, Integrity, Compassion, Gratitude

(c) **Relevant values**

Responsibility, Integrity

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Justifications for Deployment of AI Solution

Justifications for Deployment of AI Solution

(+) Improves quality and objectivity

Different human recruiters have different values. For example, one may value mathematics more than another. An AI recruiter will be unbiased when accepting applicants.

(+) Increases efficiency

Sifting through 2000 applications for 50 positions creates mental fatigue which hinders the humans' decision-making. Introducing an AI to automate the screening process will save time and allow humans to focus on more complicated tasks like interviewing and shortlising the final 50.

Justifications for Deployment of AI Solution

(+) Cost-effective

Hiring new staff is costly, from job posting to training them, and they make mistakes However, an AI recruiter is consistent and scalable to meet high demand. The AI will reduce the need to hire additional staff and ensure more resources can be allocated in hiring the right staff.

(+) Fewer wasted talents

When scanning their essays, the AI can look for keywords, relevant skills, and past experiences which humans might miss. This lookout feature will highlight passionate students and prevent them from joining another programme.

Sample Essay:

I am passionate and eager to join this course to acquire the necessary skills and knowledge in this rapidly growing field. With a passion for extracting meaningful **data insights**, I aim to unlock its potential to drive informed **decision-making** and contribute to solving complex business problems.

Data analytics is growing demand in this ever-changing world. With **digitalisation** becoming a forefront in all businesses, I want to help companies unlock the meaning in **data**. I was self-taught in basic **Python** programming and a **self-starter** in my learning. To survive in a VUCA world, I am **adaptable**, and an **independent** learner.

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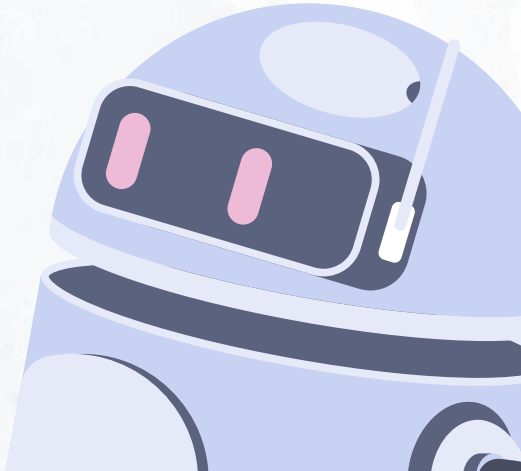
Potential AI Risks



Risk 1: Human intervention

(-) Description

When developing the model, we may apply our judgement to **adjust or add data points** to improve performance. While this may be beneficial within specific contexts, we **may introduce unwanted bias against a minority group, untraceable errors, instability**, and various other mistakes which **affects the credibility and integrity** of the model.

(-) Ethical Principle(s) violated

Justice, Explicability

Risk 2: Poor performance

(-) Description

The **training data** of the AI model is **valid in specific environments**, and any **changes to the environments** could result in **erroneous outcomes, implementation errors, and random failures**. The model could also be **insufficiently stressed-tested** to handle the large number of applications.

(-) Ethical Principle(s) violated

Beneficence, non-maleficence

Risk 3: Poor security

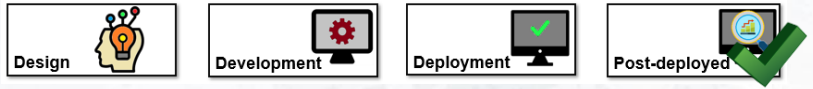
(-) Description

Having **poor security** such as weak firewalls, no anti-virus software, no identity and access management (IAM), or using open-source code allow **external hackers** to **exploit security vulnerabilities** and **malicious insiders** to **alter configurations**, data or hide access logs. These threats may **leak personal information** which may be **used for marketing or spam**. This poses legal challenges under Singapore's Personal Data Protection Act (PDPA).

(-) Ethical Principle(s) violated

Non-maleficience

Risk 4: Management mistakes



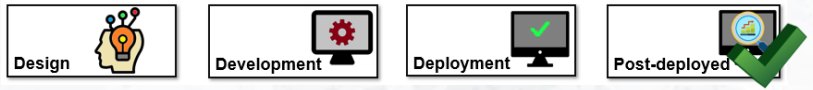
(-) Description

Mistakes from internal users might be **indistinguishable from those of malicious actors**. Internal users may also **misreport/misrepresent** the performance of the systems. These mistakes can happen due to insufficient training, bad UI/UX, or not knowing the context to explain the output.

(-) Ethical Principle(s) violated

Non-maleficience, explicability

Risk 5: Reduced critical thinking



(-) Description

Without proper training and guidance, the human staff will **rely too heavily** on the AI solution for decision-making and problem-solving . This **reduces** their **critical thinking and creativity** skills which could **limit** their ability to **innovate and adapt** to new situations.

(-) Ethical Principle(s) violated

Autonomy, explicability

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Risk Assessment and Mitigation

Risk Assessment

Risk	Severity	Likelihood of occurrence	Level of human involvement
Human intervention	Moderate	Occasional	Human In-of-the-loop
Poor performance	Minor	Rare	Human Out-of-the-loop
Poor security	Major	Rare	Human In-of-the-loop
Management mistakes	Minor	Frequent	Human Over-of-the-loop
Reduced critical thinking	Moderate	Frequent	Human Over-of-the-loop

Risk Mitigation

Risk	Mitigation
Human intervention	Document the changes and share them with another team to ensure no discrimination or weightage towards superficial attributes.
Poor performance	Use the entire dataset, perform data profiling and exploratory analysis, test the model in different environments, test with numerous data.
Poor security	Enforce network security with firewalls and install anti-virus software to deter external hackers and implement IAM to deter malicious insiders.
Management mistakes	Have routine meetings to teach staff what to do, and improve the UI/UX.
Reduced critical thinking	Have the AI perform a primary screening to reduce the number of applicants, then have humans perform a secondary screening for the final 50.

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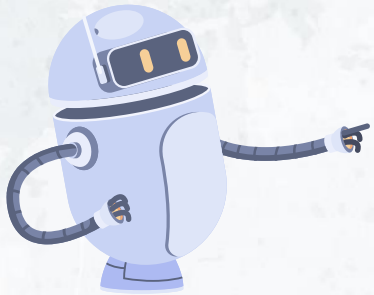
Conclusion



(a) Why implement the AI solution?

1. Improves quality and objectivity
2. Improves efficiency
3. Cost-effective
4. Fewer wasted talents

(b) What are the risks?

1. Human intervention
2. Poor performance
3. Poor security
4. Management mistakes
5. Reduced critical thinking

(c) How do I mitigate the risks?

1. Document the changes and share them with another team to ensure no discrimination or weightage towards superficial attributes.
2. Use the entire dataset, perform data profiling and exploratory analysis, test the model in different environments, test with numerous data
3. Enforce network security with firewalls and install anti-virus software to deter external hackers. And implement IAM to deter malicious insiders
4. Have routine meetings to teach staff what to do, and improve the UI/UX
5. Have the AI perform a primary screening to reduce the number of applicants, then have humans perform a secondary screening for the final 50

Thanks!

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