Take Home Test AI/ML 2024

Hi there! If you have made it this far, I would first like to congratulate you! We have a very rigorous selection process here in the Artificial Intelligence/ Machine Learning team.

The following take home challenge is meant to gauge your technical and analytical ability. Don't worry if you are unable to complete them all (we do not expect you to, this is a diversified challenge designed to find out which roles fit you best). That being said, we do encourage you to at least attempt them all. Each section can be answered relatively independently from one another, and so, if you find yourself stuck with one section, try to answer all the other sections to the best of your ability.

Please be prepared to provide a clear, step-by-step explanation to your answers. We are also trying to see how well you present your ideas and logic.

Do feel free to use all resources available to you (this is an open book challenge!). If you think you can provide a much better set of answers given extra time, please contact us, and do reach out to us if you have any questions or clarifications.

If you feel like you have better suggestions to expand this challenge, we are open to feedback, and to changing it to better suit you. Good luck, and most importantly, have fun coding!

Challenge 1: Traffic Analysis

Use case: As a township operator, traffic congestion is a significant challenge we face. We are exploring the use of AI to address this issue and assist our management in making informed decisions to alleviate traffic congestion.

Produce an algorithm that is able to take in video stream and perform vehicle tracking/counting. The video stream will preferably be a video footage taken from an angle of a CCTV (top-down view). Before you start with the challenge, do make sure that you are clear with the difference between vehicle tracking/counting and vehicle detection. For example, of top-down view see below:

By the end of the challenge, your should:

- Be able to provide an analysis of traffic trend collected from the CCTV footage that you have selected.
- Have bounding boxes around a detected vehicle and be able to explain the difference between vehicle detection and vehicle tracking.
- Have a near real time inference speed.

Some additional feature to consider:

- What are some value added data points that can be added to provide a more comprehensive traffic analysis?
- How can the traffic analysis data be used to alleviate traffic congestion?

Please list down your assumptions & caveats of the system that you have developed.

Challenge 2: Image Processing

Get a sample image of your choice which is overexposed, underexposed, grainy or blurry. Work towards improving the quality of image so that the overall image composition is drastically improved.

By the end of the challenge, your image processing algorithm should:

- Be able to improve the image quality.

Challenge 3: Generative AI

Build a RAG chatbot with any open source or free LLM model and knowledge base of your own. Create a user interface like ChatGPT for your user to interact with the chatbot.

By the end of the challenge, you should:

- Have a user interface for user to interact with the chatbot.
- Understand what is RAG.
- Identify different types of LLM available.

Bonus Challenge: Open-Ended!

Come up with your own idea of a use-case for AI, machine-learning, data science, data engineering, automation, IoT etc that you think would be useful, based on Sunway Group's many diversified businesses, including but not limited to hotels, education, retail, property, theme parks, digital, branding, marketing, manufacturing, hospitals.

Create a simple algorithm or proof-of-concept of your idea, and test it! We would love to hear from you, and help develop it together with you if there is huge potential.

Submission Instructions

1. Write down the answers in a document. Share the document in pdf format with these emails:

- noellethw@sunway.com.my
- khairulhka@sunway.com.my
- ivanbek@sunway.com.my

CC:

- tingky@sunway.com.my
- elaynehel@sunway.com.my

when you are done.

1. Create a GitHub account if you don't have one already.
2. Create a GitHub public repository for this test and paste the link in the take home test email.
3. Upload the answers to your GitHub public repository by doing Git Push.
4. A short (less than 5 slides) presentation deck to explain your work would be great (but not strictly neccesary)