COMP39/9900 Computer Science/IT Capstone Project
School of Computer Science and Engineering, UNSW
Course Convenor: Dr. Basem Suleiman(b.suleiman@unsw.edu.au)

Project Number: 23

Project Title: Predicting the freshness and "best-before" of foods using AI-based analysis of color and shape change

Project Clients: Yong Wang, Rishi Naik

Project specializations: Software Development;Computer Science and Algorithms;Artificial Intelligence (Machine/Deep Learning, NLP);Big data Analytics and Visualization;Computer Vision;Human Computer Interaction (HCI);Bioinformatics/Biomedical

Number of groups: 2 group

Background:

The project involves developing a software application that can:

- Record and collect data on color and shape changes of fruits under different accelerated conditions.
- Analyze the media to quantify the color and surface changes over time.
- Train a machine learning model to predict the time to reach unacceptable color and texture.
- Validate the model's accuracy in predicting the "best before" date based on real-time observations.
- Create a database to store results and improve AI models through continuous training.

Project Goals:

This project aims to develop an AI model that predicts the shelf life of fruits by analyzing changes in color and shape under accelerated conditions. By subjecting fruits to varying temperature and humidity levels, we will collect data on the rate of color and shape changes over time. This dataset will be used to train a machine learning model to understand the correlation between these changes and the time it takes for the fruit to reach an unacceptable color and texture. The trained model will be capable of predicting the "best before" date of fruits by simply analyzing their current color and shape. This innovative

approach will provide a quick and accurate method for determining the freshness of fruits, potentially reducing food waste and improving inventory management in the food industry.

Requirements and Scope:

- **Software/Application Development:** Create an application for recording and analyzing videos.
- **Computer Vision:** Implement algorithms to detect and quantify color and shape changes
- **Data Analysis:** Generate color and shape database.
- **AI/Machine Learning:** Develop and train models to classify the freshness. Create a feedback loop for continuous improvement of the models based on human-marked data.
- **Testing:** Validate the software using realtime testing of color and shape/texture.
- **Documentation:** Prepare user guides and technical documentation for the application.

Required Knowledge and skills:

- Software development (especially in video processing and computer vision)
- Machine learning and data analysis
- Familiarity with image processing libraries and tools (e.g., OpenCV, TensorFlow)
- Experience with AI/machine learning frameworks (e.g., scikit-learn, PyTorch)
- Basic understanding of food science (preferable but not essential)

Expected outcomes/deliverables:

- Functional software application for video recording and analysis
- A robust dataset of color and shape changes in fruits under various conditions.
- An AI model that accurately predicts the shelf life of fruits.
- Practical applications in reducing food waste and enhancing food quality control.
- Comprehensive user guide and technical documentation
- Source code repository with proper version control

Supervision:

Yong Wang, Rishi Naik