From https://en.wikipedia.org/wiki/Radish

School Name	School of Computing
Semester	AY2025/26 Semester 1
Course Name	DAAA
Module Code	ST1504
Module Name	Deep Learning

ST1504 DEEP LEARNING ASSIGNMENT 1

Assignment 1 (CA1: 40%)

The objective of the assignment is to help you gain a better understanding of deep learning for image classification using Convolutional Neural Networks (CNN) and movie review analysis using Recurrent Neural Networks (RNN).

There are two parts in this assignment, Parts A and B.

Guidelines

1.   You are to work on the entire assignment individually.

2.   In this assignment, you will:

    a. Create CNN for image classification and evaluate the performance of the network. You must perform necessary steps to improve the model performance.
    b. Create RNN to analyse movie reviews. You must devise ways to improve model performance and to evaluate the movie reviews, with concrete analysis of your results.

3.   For Parts A and B, you should prepare the following:

    a) Jupyter notebook including your code, comments and visualisations (.ipynb).
    b) In addition, please save a copy of the Jupyter notebook as a .html file.
    c) Include your best neural network weights (.h5 file).
    d) A deck of presentation slides (.pptx file) for your project.

    Submit all materials in a zipped file.

    Any missing files (like missing .h5 file for best weights, missing .html file for your code, etc.) would incur marks deduction.

4.   The normal SP's academic policies on Copyright and Plagiarism applies. Please note that you are to cite all sources. You may refer to the citation guide available at: https://sp-sg.libguides.com/citation

5.   You need to submit your declaration of academic integrity. You may access this document on Brightspace. Without this, your submission is deemed incomplete.

ST1504 DEEP LEARNING ASSIGNMENT 1

Submission Details

Deadline: 26 May 2025, 08:00 AM
Submit through: Brightspace

Late Submission

50% of the marks will be deducted for assignments that are received within ONE (1) calendar day after the submission deadline. No marks will be given thereafter.
Exceptions to this policy will be given to students with valid LOA on medical or compassionate grounds. Students in such cases will need to inform the lecturer as soon as reasonably possible. Students are not to assume on their own that their deadline has been extended.

Neural network models

You must build your own neural network models, with explanations and justifications.

Your neural network models can be improved upon with tweaks to your architectures.

If you wish to implement transfer learning, it is only acceptable after you have done the above (building your own models with justifications).

Otherwise, transfer learning is rejected.

Save the best weights of your neural networks. This is important for reproducibility without having to re-train over some extended duration.

Reminder: Please check that all files are valid, especially after zipping. If files cannot be opened, it would be considered as no submission. It is your responsibility as students to ensure this is properly carried out.

ST1504 DEEP LEARNING ASSIGNMENT 1

PART A: CONVOLUTIONAL NEURAL NETWORK (50 marks)

Task

Implement an image classifier using a deep learning network. You are given colour images of 224 by 224 pixels, containing 11 classes of vegetables.

You must convert the given images into grayscale (i.e. only 1 channel instead of 3). Convert into the following two different input sizes (i.e. downsize the images from the given dataset):

    a) 23 by 23 pixels
    b) 101 by 101 pixels

Do not use the original size of 224 by 224 pixels.

Build two types of neural networks, one for each input size. **Compare and discuss** the classification accuracies for each input size.

Dataset

You must use the dataset that is provided.

You **cannot use any external data** to train your model.

Nevertheless, you are allowed to apply augmentation on the provided data, if you wish. If you choose to do so, you must concretely explain why you make such a choice, as well as investigate whether this is actually beneficial.

Submission requirements for Part A

1.   Submit a zip file containing all the project files (source code, Jupyter notebook .ipynb file, .html file, and best neural network weights .h5, slides).
2.   Submit online via the Assignment link.

Evaluation criteria:

Background research and exploratory data analysis	10 marks
Feature engineering or data augmentation	10 marks
Modelling and evaluation	10 marks
Model improvement	10 marks
Demo/Presentation and quality of report (Jupyter)	10 marks

ST1504 DEEP LEARNING ASSIGNMENT 1

PART B: RECURRENT NEURAL NETWORK (50 marks)

Task

Build an appropriate deep neural network that can provide an analysis of movie reviews. The dataset is provided for you.

Come up with a plan on what model(s) you want to build, how you want to pre-process the data, whether you want to do **regression or classification** architectures with the given data, etc. **Explain your decision-making process carefully**.

In the given dataset, there are other languages included, apart from English. Would you only consider English and discard other languages?

Summarise your analysis clearly.

Dataset

You must use the dataset that is provided.

You **cannot use any external data** to train your model. Nevertheless, you may use external libraries, after you have built your basic models without them.

You should consider ways to **engineer the given data** to produce more training data.

Submission requirements for Part B

1. Submit a zip file containing all the project files (source code, Jupyter notebook .ipynb file, .html file, and best neural network weights .h5, slides).
2. Submit online via the Assignment link.

Evaluation criteria:

Background research and exploratory data analysis	10 marks
Feature engineering	10 marks
Modelling and evaluation	10 marks
Model improvement	10 marks
Demo/Presentation and quality of report (Jupyter)	10 marks

— End of Assignment —