Project

PROJECT

Develop deep learning detection model of dataset created in the assignment. Experimental work for model performance.

Project Instruction detail

1. Develop a CNN model and Transfer learning model for your fruit/vegetable/flower recognition project. This model will lead to paper. Each group has to submit two papers. So each group will be divided into two teams. E.g.: Your group dataset is rambutan freshness dataset. Your paper title can be (i) Rambutan freshness recognition system using transfer learning. and (ii) Best grade rambutan recognition system using transfer learning.
2. CNN model- Create one CNN model. Create your own architecture. The size of your model roughly say just 4 – 6 convolutional and 2 - 3 classification layers. Train your model with your dataset.
3. Pretrained model – please pick 3 existing models. Such as VGG16, Inception and Alexnet or else. Train your model with your dataset.
4. Do fine-tuning to all your models. Use different configuration such as various epoch, optimizer, and etc, to get best accuracy to all models you have created in item 2 and 3 above.
5. Once complete, write report. The report is a paper publication format. See list of sample papers below for you to follow in writing report.
6. Two papers per group. Submit two version: Pdf and MS-Word.

What to submit?

Paper

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Fresh and Rotten Fruits Classification Using CNN and Transfer Learning

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ABSTRACT

Detecting the rotten fruits become significant in the agricultural industry. Usually, the classification of fresh and rotten fruits is carried by humans is not effectual for the fruit farmers. Human beings will become tired after doing the same task multiple times, but machines do not. Thus, the project proposes an approach to reduce human efforts, reduce the cost and time for production by identifying the defects in the fruits in the agricultural industry. If we do not detect those defects, those defected fruits may contaminate good fruits. Hence, we proposed a model to avoid the spread of rottenness. The proposed model classifies the fresh fruits and rotten fruits from the input fruit images. In this work, we have used three types of fruits, such as apple, banana, and oranges. A Convolutional Neural Network (CNN) is used for extracting the features from input fruit images, and Softmax is used to classify the images into fresh and rotten fruits. The performance of the proposed model is evaluated on a dataset that is downloaded from Kaggle and produces an accuracy of 97.82%. The results showed that the proposed CNN model can effectively classify the fresh fruits and rotten fruits. In the proposed work, we inspected the transfer learning methods in the classification of fresh and rotten fruits. The performance of the proposed CNN model outperforms the transfer learning models and the state of art methods.

1. INTRODUCTION

The recent approaches in computer vision, especially in the fields of machine learning and deep learning have improved the efficiency of image classification tasks [1-6]. Detection of defected fruits and the classification of fresh and rotten fruits represent one of the major challenges in the agricultural fields. Rotten fruits may cause damage to the other fresh fruits if not classified properly and can also affect productivity. Traditionally this classification is done by men, which was labor-intensive, time taking, and not efficient procedure. Additionally, it increases the cost of production also. Hence, we need an automated system which can reduce the efforts of humans, increase production, to reduce the cost of production and time of production.

2. RELATED WORK

A machine vision system was developed for the detection of fruit skin defects in the study [7]. Colour is the major feature used for categorization and a machine learning algorithm called Support Vector Machine (SVM) has been used in classification. Support Vector Machine (SVM) produces adequate results on a small number of datasets. The accuracy in classification using machine learning mostly based on the features drawn out and features that are chosen for passing on to the machine learning algorithm. We can improve performance by using deep learning models. These models help in the classification of images in large datasets.

Image processing [8] can help in the classification of the defect and non-defect fruits. It helps in identifying the defects on the surface of mango fruits. First, the fruits are collected manually and the researchers themselves classified them as fine and defected. Then pre-processing is carried out on the images and is given to a CNN model for the task of classification. This model produced an accuracy of 97.5%. The method based on laser backscattering imaging analysis and CNN theory provides an idea and theoretical basis for efficient, non-destructive, and online detection of fruit quality. This work shows that the method is effective and can non-destructively and automatically identify the defect regions, normal regions, stem regions, and calyx regions of apples, and the overall recognition rate is over 90%. The method can meet the requirements of the detection of apple defects, especially when the defect regions are similar to the stem and calyx regions in gray characteristics and shapes. The effect of defect recognition based on the CNN model is better than the conventional algorithms [9]. Nowadays, deep learning models with CNN are widely used in the classification of images in different problems that arise in the field of agriculture [10].

In our work, the proposed CNN model provides high accuracy in the classification task of fresh and rotten fruits. Here the proposed model's accuracy is compared against the transfer learning models. Three types of fruits are selected from various types of fruits. The dataset is obtained from Kaggle with 6 classes i.e. each fruit is divided as fresh and rotten. We inspected the different pre-trained models of VGG16, VGG19, MobileNet, and Xception of transfer learning (transfer learning models). This paper introduces a powerful CNN model which has enhanced accuracy for fresh and rotten fruits classification task than transfer learning

Paper contains of

Title (5%)
Abstract (5%)
Introduction (10%)
Related Work (5%)
Proposed work
- Dataset preprocessing (10%)
- CNN model (10%)
- Pretrained model (30%)

Experimental (20%)
Conclusion and References (5%)

Title

- Dataset is rambutan freshness dataset.
- Title can be
  - (i) Rambutan freshness recognition system using transfer learning.
  - (ii) Best grade rambutan recognition system using transfer learning.

Look at the label -> fruit freshness, ripe, diseases, etc..

Tomato freshness recognition …

Tomato best freshness recognition

Rotten tomato recognition …

Tomato ripeness level recognition …

Title

- Dataset is rambutan freshness dataset.
- Title can be
  - (i) Rambutan freshness recognition system using transfer learning.
  - (ii) Best grade rambutan recognition system using transfer learning.

Look at the model you want to use.. Eg. CNN, transfer learning, Vit

Tomato freshness recognition using CNN & transfer learning

Tomato freshness recognition using Vision transformer

Abstract

- Introduction -> highlighted the important
  - Make the title very important and you could not avoid it.
  - Tomato ripeness -> 80% people in the world eat tomato and almost 40% in the market is not ripe.
- Problem statement -> what the difficulty for best accuracy
  - Difficult of new propose model that capture feature accurately
- Propose works -> summarize the proposed work

- Result – summarize the result

Introduction

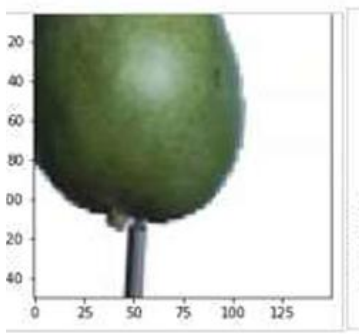
- Make it important
- Problem statement
- Summary of literature review
- Objectives and list down your proposed work
- Results

Related work

- Look at your title -> tomato ripeness
  - Just look at existing work on tomato ripeness, list down them, what model it used (summarize) and the accuracy
  - Or look at other similar fruit ripeness..
- Perhap create taxanomy on tomato ripeness research.
- Focus to the domain. Don’t out of boundary. Tomato ripeness or fruit ripeness.
- Models used in the literature for fruit ripeness.

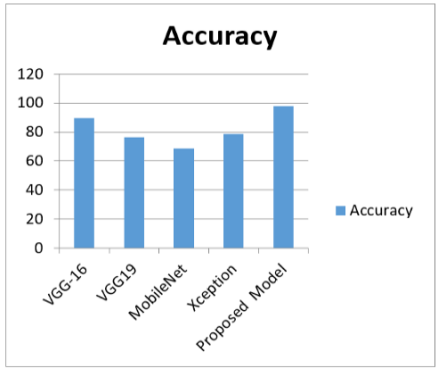
Proposed work

- Dataset preprocessing
  - Describe your dataset info e.g.size
  - Photo of each label
  - Augmentation example
  - Sampel 224 by 224
  - Train and test portion



- CNN model
  - Design your own.
  - Draw exactly the model that you design.
- Pretrained model
  - Pick three transfer learning model
    - Freeze (if any), the architecture, replace the label, etc.. As lecture slide.
    - Dataset used in pretrained (image net) 30- 50 % unfreeze.

Experimental & Result



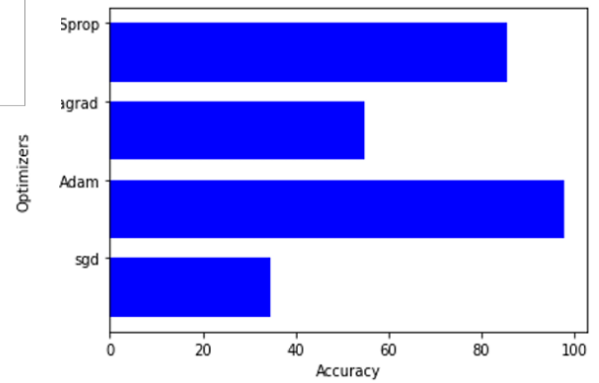


Figure 6. Effects of optimizers

- Look at the objective and title
- Accuracy
  - Accuracy for CNN
  - Accuracy for transfer model. Three of them
  - Accuracy comparison cnn and transfer learning
  - Accuracy to other work. dfdf
- Fine tuning specificaly for your own prorosed work
  - Epoch, learning rate, optimizer. You can draw many variation for x-axis and y-axis
- dsad