Fruit Identification and Ripeness Detection

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Abstract

In this project we introduce a new, high-quality, dataset of images containing fruits. We also present the results of some numerical experiment for training a neural network to detect fruits. We discuss the reason why we chose to use fruits in this project by proposing a few applications that could use such classifier. The aim is to build an accurate, fast and reliable fruit detection system. And in addition to it we are also aiming to develop a system which will detect the quality of fruit in the category ofedible or inedible. We will be checking the ripeness of the fruit using the images we will be collecting in the database. We will be detecting the fruit in the first step and thename of the fruit will be displayed. Then the fruits will be categorized on the basis of their outer appearance. If there is some fault on the outer part of the fruit it will be categorized inedible. And if the colour of fruit and the outer appearance is without anyfault it will be categorized as edible. It will also have some extra features like where were the fruits packed. How many days did it take to reach the seller. We will be adding the details of the date of packaging and how many days it will be fresh so that the customer can easily understand whether to buy the fruits or not. The customer will also get the information of how many days the fruits will be available and if the stock of a particular fruit is not available then at what date it will be again in the market for the customer to buy at that time. In this we will also be doing the billing of quantities i.e. we will be process a total bill of how many fruits were delivered to a particular vendor or shop which will give us an idea whether the sale is upto the markor not.

Keywords: *Deep learning · Convolutional Neural Networks · Fruit Identificationand ripeness.*

1 Introduction

Fruit identification and ripeness detection is a system which will help the customer in identifying the specific fruit and will also provide the price of the fruit. Along with it the system will also provide the report of the quality of the fruit. Which will give a clear idea to the customer whether the fruit is riped or unriped and if there is some kind of fault in the fruit. The store manager will generate the bill once the customer selects the fruits to be bought i.e the manager will generate BOQ(Billing of quantity) which will help him keep thetrack of the stock available in the store.

2 Related Work

There are several research works for fruit identification and ripeness detection with different goals and applications. One of this applications refers to detect the freshness quality of fruit before buying from the store. Fruit identification and ripeness detection is a Faster Region-based CNN. Their model employs transfer of images of fruits from the datatset input images: color (RGB). The images correspond to various fruits so this application is oriented to customer so that they can select fruits they want to buy . The images were taken by the group mambers and some were taken from google search.

3 Application of the Proposed Method

The proposed Fruit Identification and ripeness detection intends to identify the specific fruit and also detect the quality of the fruit. It helps the customer to select a proper fruit with the price given and the system also notifies the customer about the quality of the fruit. If the customer is notified of any fault in the fruit the system also notifies the same to the store manager which helps the manager to gather the information about the faulty fruits in the store and can remove it.Billing Of quantity is done by the manager i.e calculation of bill of the quantity bought by the customer and also keeping the track of stock available in the store.

3.1 Dataset

Data is an essential part of Deep Learning. Therefore, it is important to select the correct input data according to our goals. For fruit classification, there exists a dataset created called fruitimages and it contains all the various images of the fruits which also consists various varities of some particular fruit.

Therefore, we decided to create our own dataset. Our main goal is to create a similar kind of environment,.

3.2 Purpose

Fruit Identification and Ripeness Detection is important to detect a specific fruit andin addition with that we also provide information about whether the fruit is fully riped or in unriped and will also detect if there are some faults

3.3 Intended Audience and Reading Suggestions

The intended audience for this Defect Management System document is the internalteam of the organizatio where the project is developed. Further modifications and reviewing will be done by the organization and deliver a final version to the customer
i.e company. The final version of this document is reviewed by the Internal Guides ofthe college.

3.4 Product Scope

The main purpose of this project is to identify the specific fruit and also check the

ripeness and the quality of the fruit and to calculate the total bill of the quantity that were packed and delivered to the store. This software will provide User-friendly Graphical User Interface in which the customers will be able to perform various activities. If the customer wish to buy a particular fruit the system will notify the customer about the quality of the fruit. And then the customer can decide whether tobuy the fruit or not.

4. Result

As discussed previously the main aim of Fruit Identification And Ripeness Detection is to identify the particular fruit and to check the freshness quality of that fruit. This is one of theeasy method for the customer to select particular fruit before buying it. One more concept that has been used in the project is the BOQ i.e. billing of quantity. It include various operations like calculating the number of fruits available in the store and will also calculate thebill for the customer and will save a copy for the store manager as well. If a particular fruit is not in the stock our system will notify the store manager so that the store manager can order it from the main distributor. So the overall result of the project will be like the customer visits the store and identifies the fruit and then will be provided with the freshness quality of the fruit and if the customer is willing to buy they will be provide with all the details of the fruit like when it was packed till how many days it will be edible and then the final step is to generate the bill of the fruits bought by the customer.

References

1. Abadi, M., Agarwal, A., Barham, P., Goodfellow, I., et. al.: TensorFlow: Large- scale

machine learning on heterogeneous systems (2015). https://www.tensorflow. org/, software available from tensorflow.org

2. Bargoti, S., Underwood, J.: Deep fruit detection in orchards. In: 2017 IEEE Inter- national Conference on Robotics and Automation (ICRA), pp. 3626–3633 (2017)
3. Femling, F., Olsson, A., Alonso-Fernandez, F.: Fruit and vegetable identification using machine learning for retail applications. In: 14th International Conference on Signal-Image Technology & Internet-Based Systems (SITIS), pp. 9–15. IEEE (2018)
4. Hameed, K., Chai, D., Rassau, A.: A comprehensive review of fruit and vegetable classification techniques. Image Vis. Comput. **80**, 24–44 (2018)
5. He, K., Zhang, X., Ren, S., Sun, J.: Deep residual learning for image recognition. In: Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, pp. 770–778 (2016)
6. Hossain, M.S., Al-Hammadi, M., Muhammad, G.: Automatic fruit classification using deep learning for industrial applications. IEEE Trans. Ind. Inf. **15**(2), 1027– 1034 (2018)
7. Katarzyna, R., Pawe-l, M.: A vision-based method utilizing deep convolutional neu- ral networks for fruit variety classification in uncertainty conditions of retail sales. Appl. Sci. **9**(19), 3971 (2019)
8. Koirala, A., Walsh, K.B., Wang, Z., McCarthy, C.: Deep learning for real-time fruit detection and orchard fruit load estimation: benchmarking of 'MangoYOLO'. Precis. Agric. **20**(6), 1107–1135 (2019)
9. Krizhevsky, A., Sutskever, I., Hinton, G.E.: Imagenet classification with deep con- volutional neural networks. In: Pereira, F., Burges, C., Bottou, L., Weinberger, K. (eds.) Advanced in Neural Information Processing Systems, vol. 25, pp. 1097–1105 (2012)
10. Mure¸san, H., Oltean, M.: Fruit recognition from images using deep learning. Acta Universitatis Sapientiae Informatica **10**(1), 26–42 (2018)
11. Rahnemoonfar, M., Sheppard, C.: Deep count: fruit counting based on deep sim- ulated learning. Sensors **17**(4), 905 (2017)
12. Russakovsky, O., Deng, J., et al.: Imagenet large scale visual recognition challenge. Int. J. Comput. Vis. **115**(3), 211–252 (2015)
13. Sa, I., Ge, Z., Dayoub, F., Upcroft, B., Perez, T., McCool, C.: A fruit detection system using deep neural networks. Sensors **16**(8), 1222 (2016)
14. Sandler, M., Howard, A., Zhu, M., Zhmoginov, A., Chen, L.C.: MobileNetV2: inverted residuals and linear bottlenecks. In: Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, pp. 4510–4520 (2018)
15. Shin, H.C., Roth, E.A.: Deep convolutional neural networks for computer-aided detection: CNN architectures, dataset characteristics and transfer learning. IEEE Trans. Med. Imaging **35**(5), 1285–1298 (2016)
16. Sze, V., Chen, Y.H., Yang, T.J., Emer, J.S.: Efficient processing of deep neural networks: a tutorial and survey. Proc. IEEE **105**(12), 2295–2329 (2017)
17. Tan, L., Jiang, J.: Fundamentals of analog and digital signal processing. Author- House (2007)