International Journal of Academic Engineering Research (IJAER)
ISSN: 2643-9085
Vol. 4 Issue 1, January – 2020, Pages: 1-5

Analyzing Types of Cherry Using Deep Learning

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Abstract: *A cherry is the fruit of many plants of the genus Prunus, and is a fleshy drupe (stone fruit), Michigan's Northwest Lower Peninsula is the largest producer of tart cherries in the United States. In fact, grow 75% of the country's variety of mighty Montmorency cherries. We use these Ruby Red Morsels of Joy in over 200 cherry products like Salsas, Chocolate Covered Cherries, Cherry Nut Mixes, and much more. Cherry fruits are rich in vitamins and minerals, and it is one of the natural sources that can supply the body with abundant amounts of potassium and energy. There are two types of sour cherries, sour or tart, with a little acidity, and the red cherries have a blackish color. Cherry blossoms are very beautiful and in Japan cherry trees are celebrated in bloom. In this paper, machine learning based approach is presented for identifying type Cherry with a dataset that contains 7,002 images use 3,444 images for training, 2,410 images for validation and 1,148 images for testing. A deep learning technique that extensively applied to image recognition was used. 70% from image for training and 30% from image for validation. Our trained model achieved an accuracy of 100% on a held-out test set, demonstrating the feasibility of this approach.*

Keywords: Types of Cherry, Deep Learning, AI, Expert System.

INTRODUCTION

Cherries contain many minerals and vitamins in addition to anti-certainty, all of which give it special properties and benefits, which include:

1- **Enhancing immunity and fighting diseases:** Cherry contains a distinct group of antioxidants that have the ability to fight free radicals and prevent cancer and heart disease. These antioxidants, especially carotenoids, slow down the signs of aging and aging. All types of cherries contain antioxidants, but they may differ in their concentration according to the color of cherries. Sour cherries are the richest types of cherries with antioxidants.
2- **Regulating sleeping hours and its cycle:** According to a study published in the journal Agricultural and Food Chemistry, cherries naturally contain melatonin, a substance secreted by the brain that helps regulate sleep hours and its cycle. This substance is produced in the dark and is affected by several factors, including artificial lighting that we are exposed to, which limits the production of melatonin, and therefore eating foods such as cherries contributes to increasing their levels in the body.
3- **Lose weight:** Cherry contains more than 75% water. In addition to a high percentage of dietary fiber and low levels of calories, thus cherries are a special food for those who aspire to lose weight as they enhance the feeling of satiety and fullness of the stomach, and reduce meals eaten later, and its sweet taste is a distinctive snack as a substitute for sweets and high-energy foods.
4- **Promote heart health:** Eating cherries helps reduce cholesterol levels in the blood by slowing its absorption into the blood. Consequently, it contributes to promoting heart health, as its potassium and magnesium content works to regulate blood pressure levels, which protects against heart diseases and strokes. Its powerful antioxidant content fights heart infections.
5- **Pain reliever and anti-inflammatory:** Cherries contain substances known as anthocyanins - the pigments responsible for cherry color. These compounds, according to the NYU Langone Medical Center, reduce inflammation-related pain. Especially pain in arthritis and gout.

DEEP LEARNING

It is a new field of research dealing with finding theories and algorithms that allow the machine to learn on its own by simulating neurons in the human body. And one of the branches of science that deals with artificial intelligence. Is one of the branches of machine learning science, most of the in-depth learning research focuses on finding methods of deriving a high degree of abstraction by analyzing a huge data set using linear and nonlinear variables.

Discoveries in this field have proven significant, rapid and effective progress in many areas, including facial recognition, speech recognition, computer vision, and natural language processing. The machine learns from big data using different designs for deep learning networks, among them: frequent networks (RNN) frequently used with texts and continuous data, and a bypass neural network (CNN) that draws its inspiration from biological processes in the visual lobe and other designs.

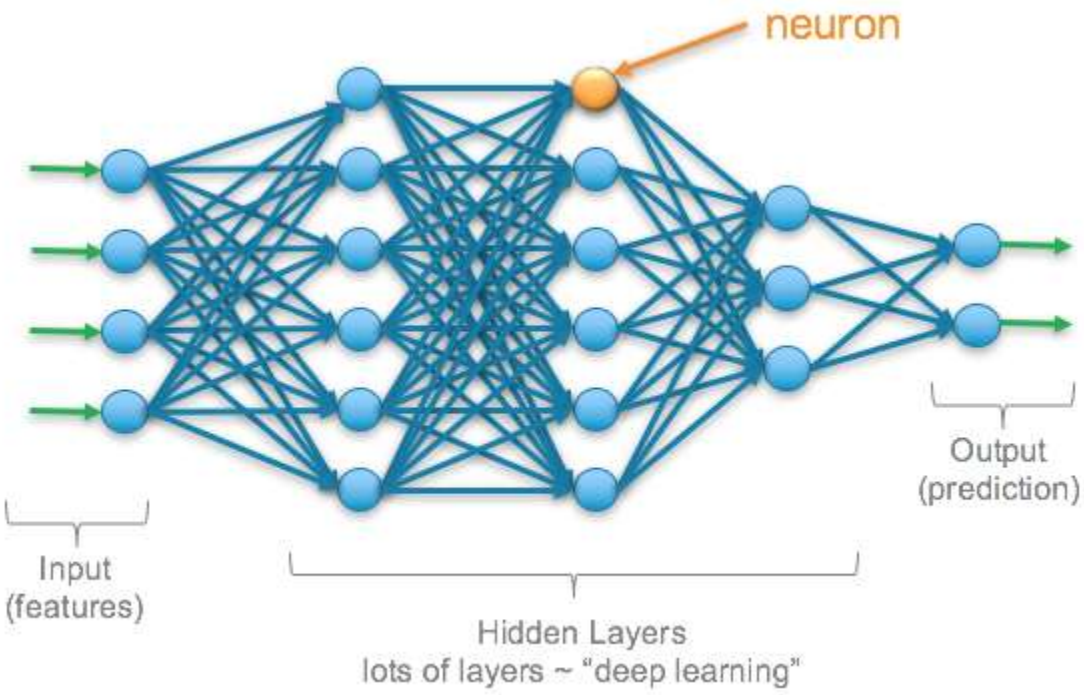


Figure 1: Architecture of deep learning

Why Deep Learning Works: solving a farmer's problem
In the beginning was the neuron: understanding gradient descent, back propagation, linear regression, logistic regression, autoencoders, convolutional neural networks and VGG16. With visual aids and practical hands-on coding in Python & Keras.

This article is for those who miss a painless journey through the black box of deep learning. We motivate and engage the readers with a story about a farmer who cared a bit too much about the future. We start looking at his problems by solving a simple linear and logistic regression using an artificial neural network. We gradually build up our understanding by looking at gradient descent, chain rule and back propagation. We later get deeper by building an autoencoder and adding up convolutional layers to denoise MNIST hand-written digits. We further extract features from the pre-trained VGG16 network after explaining why such networks are so successful in computer vision.

PAPER OBJECTIVES

- Demonstrating the feasibility of using deep convolutional neural networks to classify Types of Cherry.

- Assisting farmers or even ordinary people in identifying the cherry anu with absolute ease and working to develop this system to be better.

DATASET

The dataset used, provided by Kaggle, contains a set of 7,002 images use 3,444 images for training, 2,410 images for validation and 1,148 images for testing belonging to 6 species from cherry.

figure 2: types of cherry

The output 6 classes as follow:

- Class(0): **Cherry 1**
- Class(1) : **Cherry 2**
- Class(2): **Cherry Rainier**
- Class(3): **Cherry Wax Black**
- Class(4): **Cherry Wax Red**
- Class(5): **Cherry Wax Yellow**

The images were resized into 150×150 for faster computations but without compromising the quality of the data.

METHODOLOGY

In this section we describe the proposed solution as selected convolutional network (ConvNet) architecture and discuss associated design choices and implementation aspects.

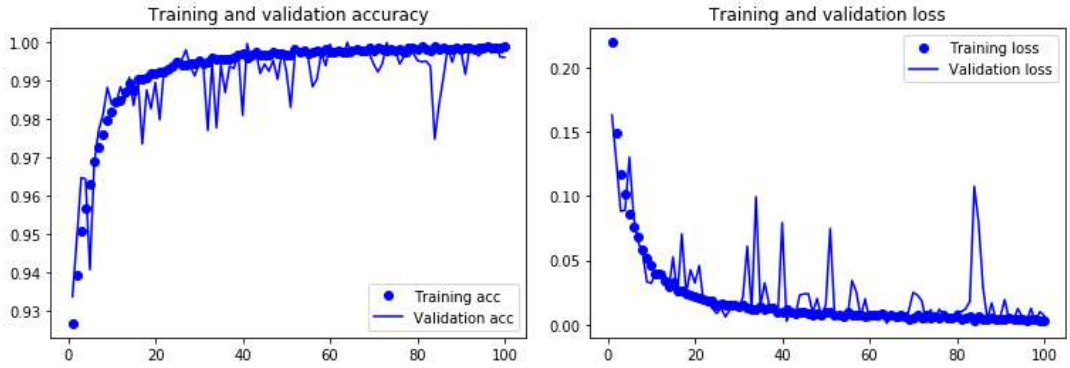
MODEL

Our model takes raw images as an input, so we used Convolutional Nural Networks (CNNs) to extract features, in result the model would consist from (features extraction), which was the same for full-color approach and gray-scale approach, it consist of 4 Convolutional layers with Relu activation function, each followed by Max Pooling layer.

Layer (type)	**Output Shape**	**Param #**
input_1 (InputLayer)	(None, 128, 128, 3)	0
block1_conv1 (Conv2D)	(None, 128, 128, 64)	1792
block1_conv2 (Conv2D)	(None, 128, 128, 64)	36928
block1_pool (MaxPooling2D)	(None, 64, 64, 64)	0
block2_conv1 (Conv2D)	(None, 64, 64, 128)	73856
block2_conv2 (Conv2D)	(None, 64, 64, 128)	147584
block2_pool (MaxPooling2D)	(None, 32, 32, 128)	0
block3_conv1 (Conv2D)	(None, 32, 32, 256)	295168
block3_conv2 (Conv2D)	(None, 32, 32, 256)	590080
block3_conv3 (Conv2D)	(None, 32, 32, 256)	590080
block3_pool (MaxPooling2D)	(None, 16, 16, 256)	0
block4_conv1 (Conv2D)	(None, 16, 16, 512)	1180160
block4_conv2 (Conv2D)	(None, 16, 16, 512)	2359808
block4_conv3 (Conv2D)	(None, 16, 16, 512)	2359808
block4_pool (MaxPooling2D)	(None, 8, 8, 512)	0
block5_conv1 (Conv2D)	(None, 8, 8, 512)	2359808
block5_conv2 (Conv2D)	(None, 8, 8, 512)	2359808
block5_conv3 (Conv2D)	(None, 8, 8, 512)	2359808
block5_pool (MaxPooling2D)	(None, 4, 4, 512)	0

SYSTEM EVALUATION

We used the original apples dataset that consists of 6,416 images after resizing the images to 150x150 pixels. We divided the data into training (70%), validation (30%). The training accuracy was 99.99% and the validation accuracy was 100%.



CONCLUSION

We proposed a solution to help people determine the type of apples more accurately, 100% accurately for the best model. We have built a model using deep learning convolutional neural networks and uses this model to predict the type of (previously unseen) images of cherry with a network from 4 layers and a dropout of 0.2 , that takes cherry images with 6 different species an input.

REFFERENCES

1. https://cherryrepublic.com/?gclid=Cj0KCQiA6IHwBRCJARIsALNjViUfxO4cGYf8_iNqFD64q3XFSOCNtGMuwpjeT1g2kgSh-h-TXjjvIuUaAkuHEALw_wcB