

Quick analysis of Quality of Cereals, Oil seeds and pulses using AI

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Abstract:

Cereal grains vitally important in meeting the nutrient needs of the human population. Cereals are an upscale source of vitamins, minerals, carbohydrates, fats, oils, and protein. Legumes are an important source of protein, dietary fiber, carbohydrates and dietary minerals. Oilseeds are wont to make vegetable oils and biodiesel. Grain quality can have different aims to different people depending upon the sort of grain or seed and its intended use. Our objective is to develop a system to analyze the cereals, oilseeds and pulses. Hence, we develop a technique which is used to find the quality of these cereals, oil seeds and the pulses using the deep learning technique which is a CNN based transfer learning method called Dense Net.

Keywords: Computer vision, Image processing, Kernel, Grains, Contour, CNN

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I. Introduction

A cereal is any grass cultivated (grown) for the edible components of its grain (botanically, a type of fruit called a caryopsis), composed of the endosperm, germ, and bran. The term may also refer to the resulting grain itself (specifically "cereal grain"). Cereal grain crops are grown in greater quantities and provide more food energy worldwide than any other type of crop and are therefore staple crops. Edible grains from other plant families, such as buckwheat, quinoa and chia, are referred to as pseudo cereals. In their natural, unprocessed, whole grain form, cereals are a rich source of vitamins, minerals, carbohydrates, fats, oils, and protein. When processed by the removal of the bran, and germ, the remaining endosperm is mostly carbohydrate. In some developing countries, grain in the form of rice, wheat, millet, or maize constitutes a majority of daily sustenance. In developed countries, cereal consumption is moderate and varied but still substantial, primarily in the form of refined and processed grains.

These grains can be processed by using Machine Learning where various kind of neural network algorithms were aided to get the maximum accuracy check in the quality of the seed or any grain. Pulses are the edible seeds of plants in the legume family. Pulses grow in pods and come in a variety of shapes, sizes and colors. The United Nations Food and Agriculture Organization (FAO) recognizes 11 types of pulses: dry beans, dry broadbeans, dry peas, chickpeas, cow peas, pigeon peas, lentils, Bambara beans, vetches, lupins and pulses (not elsewhere specified – minor pulses that don't fall into one of the other categories).

Pulses are annual crops that yield between one and 12 grains or seeds. The term "pulses" is limited to crops harvested solely as dry grains, which differentiates them from other vegetable crops that are harvested while still green. Between 2010 and 2013, 173 different countries grew and exported pulses. Pulses are healthy, nutritious and easy to cook with. Growing pulses also promotes sustainable agriculture, as pulse crops help decrease greenhouse gases, increase soil health, and use less water than other crops.

Oil seeds, the premier source of fat in the Indian diet, are derived from a number of crops like groundnut, rape-seed and mustard, sesamum, linseed, soya bean, sun-flower, castor seed, cotton seed and niger seed etc. These provide oil and oil cake which are utilised in making lubricants, varn medicine, perfumes, candles, soaps, manure cattle feed. Oil seeds belong to edible and non-edible categories. While the former provides fat content the Indian diet the latter meets the demand industrial oil. India is a leading producer of oil seeds in world. Nine main oil seeds (groundnut, rape- and mustard, sesamum, linseed safflower, sun flo soya bean, niger seed and castor seed) together occupy 20.97 per cent of the food grains area, percent of the net

own area and 13.94 percent of gross cropped area and contribute 1.44 percent of the total production of food grains in the country (1997-98).

II. Literature Survey

[1] Neelamma K. Patil, Virendra S. Malemath, Ravi M. Yadahalli: This paper presents the study on identification and classification of food grains using different color models such as L*a*b, HSV, HSI and YCbCr by combining color and texture features without performing preprocessing. The K-NN and minimum distance classifier are used to identify and classify the different types of food grains using local and global features. Texture and color features are the important features used in the classification of different objects. The local features like Haralick features are computed from co-occurrence matrix as texture features and global features from cumulative histogram are computed along with color features. The experiment was carried out on different food grains classes. The non-uniformity of RGB color space is eliminated by L*a*b, HSV, HSI and YCbCr color space.

Summary: This work is the study on identification and classification of food grains using different color models such as L*a*b, HSV, HSI and YCbCr by combining color and texture features without performing preprocessing. The K-NN and minimum distance classifier are used to identify and classify the different types of food grains using local and global features.

[2] Neelamma K. Patil and Ravi M. Yadahalli: The purpose of this paper is to find the percentage purity of hulled rice grain sample by image processing technique. Commercially the purity test of rice sample is done according to the size of the grain kernel (full, half or broken). The food grain types and their quality are rapidly assessed through visual inspection by human inspectors. The decision making capabilities of human inspectors are subjected to external influences such as fatigue, vengeance, bias etc. with the help of image processing we can overcome that. By image processing we can also identify any broken grains mixed. Here we discuss the various procedures used to obtain the percentage quality of rice grains.

Summary: The purpose of this paper is to find the percentage purity of hulled rice grain sample by image processing technique. Commercially the purity test of rice sample is done according to the size of the grain kernel (full, half or broken). The food grain types and their quality are rapidly assessed through visual inspection by human inspectors.

[3] F. Guevara-Hernandez and J. Gomez-Gil: This study presents in detail a machine vision system that classifies objects into two classes. The procedure for the classification comprises two stages: a training stage and a testing stage. A feature vector, which is a sorted list of features that maximize the classification power, is computed in the training stage. Object classification was accomplished in the testing stage by means of discriminant analysis (DA) and K-nearest neighbors (K-NN) algorithms. The system was applied to the classification of wheat and barley grain kernels. Results obtained allow the researchers to conclude that in the classification of wheat and grain kernels with the presented system:

- (i) a high classification accuracy can be obtained;
- (ii) the employment of morphologic, color, and texture feature types together offers better accuracy than the employment of only one feature type;
- (iii) the extraction of the maximum radius, the green mean, and the y mean of the gray level co-occurrence matrix (GLCM) for 90° allows the highest classification accuracy; and
- (iv) the employment of more than three features increases the computational cost and may also reduce the classification accuracy

III. Proposed System

In our proposed system, we are introducing a model that which can classify and shows quality of the type of minerals using the CNN algorithm of deep learning. Here we are considering in either of three classes which are cereals, pulses and oil seeds. After the preprocessing of the considered dataset, we perform the training with the CNN based transfer learning method called Dense Net that which is used for the testing purpose and we will be detecting the type of image that was given as input. Once after the detection of the input image we will perform the image processing for the classified output. The flow of the proposed method is shown in the below block diagram.

IV. System Architecture

Processor:

For the most part, you'll get faster CPU performance from the Core i5 parts over Core i3. Some Core i5 processors like in Fig 4.1.1 are dual-core and some are quad-core. Most of the time, a true quad-core CPU will perform better than a dual-core processor, especially on multimedia tasks like video transcoding or photo editing. All Core i3 processor are dual core. Occasionally, you'll find an older Ivy Bridge processor like the Intel Core i3-3130M in a system that's the same price as system with a newer Haswell CPU like the Intel Core i3-4012Y.

Hard Disk:

A computer's hard drive is a device consisting of several hard disks, read/write heads, a drive motor to spin the disks, and a small amount of circuitry, all sealed in a metal case to protect the disks from dust. In addition to referring to the disks themselves, the term hard disk is also used to refer to the whole of a computer's internal data storage. Beginning in the early 21st century, some personal computers and laptops were produced that used solid-state drives (SSDs) that relied on flash memory chips instead of hard disks to store information

RAM

With 8 GB of RAM, you will have enough memory to run several programs at once. You can open lots of browser tabs at once, use photo or video editing programs, stream content, and play mid-to-high-end games.

Many Windows 10 and macOS computers or laptops come with 8 GB of memory installed these days. So, 8 GB of memory should be more than enough to run most productivity programs. It's also the minimum amount of memory recommended by Adobe to run Creative Cloud programs like Photoshop.

Monitor

A computer monitor is an output device that displays information in pictorial or text form. A monitor usually comprises a visual display, some circuitry, a casing, and a power supply. The display device in modern monitors is typically a thin film transistor liquid crystal display (TFT-LCD) with LED backlighting having replaced cold-cathode fluorescent lamp (CCFL) backlighting as shown in Fig 4.4.1.. Monitors are connected to the computer via VGA, HDMI, DisplayPort, USB-C, low-voltage differential signaling (LVDS) or other proprietary connectors and signals.

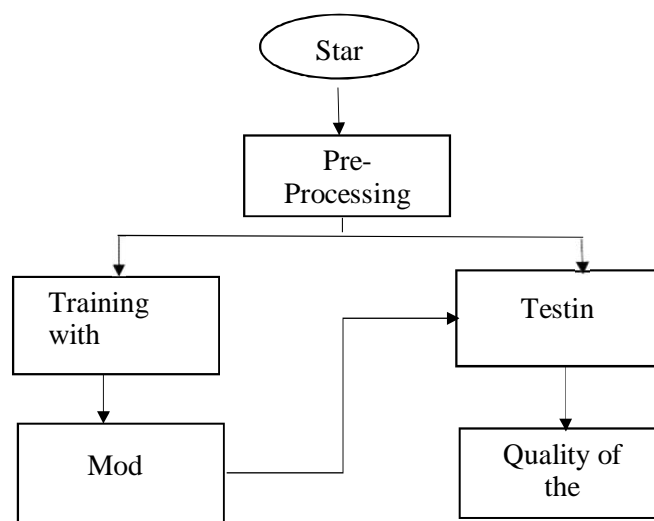


Fig: System architecture block diagram

Python

Python is a high level programming language. It has a rich built in data structures, which has both dynamic binding and dynamic typing making it attractive in the rapid development of applications. It can also be used as a scripting language for combining components together. Python is simple and easy to learn. Python has syntax readability which makes less cost maintenance. Python has a wide range of packages and modules so that the user can perform code reusability. Also one of the major important points is that Python is a free open source, in which you can download and use it from its official website. Programmers usually love Python because of the vast options it provides for the comfortable making of the code.

Python Libraries

Generally Python provides a very large number of modules, packages and libraries with ease of use. In this project we are going to use some of the Python libraries i.e.; Numpy, Flask, io

V. Applications

- To ensure the quality of seeds in the factory while packing
- Post harvest supervision of seed crops.
- Seed sampling and testing
- .Verification of seed source

VI. Result

- This study predicts the quality of a grain based on grayscale values of every pixel in the image
- This study brings out the effectiveness of finding the quality of the grain through image processing technique.

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- [8]. Bhupinder Verma: A relatively faster computer vision system has been discussed to analyze and sort rice kernels. A series of measurements were done using image processing techniques on three varieties of Indian rice namely Markfed Supreme, Markfed Golden (export quality), Hafed Basmati. Area, perimeter, maximum length, maximum width, compactness and elongation were measured. Further, separating the rice varieties by their shape difference was examined. The computer vision system developed has been able to sort rice into sound, cracked, chalky, broken and damaged kernels with an accuracy

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