Counting Apples and Oranges with Deep Learning: A Data Driven Approach

ABSTRACT:

Fruit counting is an important task for growers to estimate yield and manage orchards. An accurate automated fruit detection and counting algorithm gives agricultural enterprises the ability to optimize and streamline their harvest process. Through a better understanding of the variability of yield across their farmlands, growers can make more informed and cost-effective decisions for labor allotment, storage, packaging, and transportation. Smart sensor suites as well as autonomous robots such as unmanned aerial vehicles (UAVs) will benefit from data-driven fruit counting algorithms that enable growers to estimate yield at scale.

EXISTING SYSTEM

Estimation of fruit count from images is a challenging task for a number of reasons including appearance variability due to illumination, and occlusion due to surrounding foliage and fruits. Previous fruit counting algorithms relied on traditional computer vision methods involving hand crafted features that exploited the shape, color, texture or spatial orientation of various fruit [2]. While these methods work well under specific conditions, they are usually fruit specific, require careful control of the environment, and cannot handle heavily occluded fruits. An additional challenge to fruit counting that is not present in fruit detection is distinguishing multiple overlapping fruits. Most algorithms either ignore this problem, or use simple heuristics based on shape and size, which do not generalize to natural settings that feature heavy occlusion and high variability of depth in fruit location [3].

DISADVANTAGES

- Previous fruit counting algorithms relied on traditional computer vision methods.
- It cannot handle heavily occluded fruits.
- Simple heuristics based on shape and size, which do not generalize to natural settings that feature heavy occlusion and high variability of depth in fruit location

PROPOSED SYSTEM

The proposed approach utilizes a pipeline of deep learning algorithms to detect and count fruit in unstructured environments that traditional computer vision methods have difficulty with [4]. This paper presents a novel pipeline that accurately estimates counts across different fruit types, illumination, and occlusion levels.

The broad steps of the pipeline are:

- Collect human-generated labels from a set of fruit images;
- Train a blob detection fully convolutional network to perform image segmentation;
- Train a count convolutional network to take the segmented image and output an intermediate estimate of the fruit count; and
- Train a linear regression to map intermediate fruit count estimates to final counts using human-generated labels as ground truth.

ADVANTAGES

- A pipeline of deep learning algorithms to detect and count fruit in unstructured environments
- A novel pipeline that accurately estimates counts across different fruit types, illumination, and occlusion levels.

MODULES:

1. Accuracy of labels
2. Efficiency of labels
3. Preparing labels for blob detector
4. Preparing labels for counting

SYSTEM REQUIREMENTS

H/W System Configuration:-

Processor	-	Pentium –III
RAM	-	256 MB (min)
Hard Disk	-	20 GB
Key Board	-	Standard Windows Keyboard
Mouse	-	Two or Three Button Mouse
Monitor	-	SVGA

S/W System Configuration:-

Operating System	:	Windows95/98/2000/XP
Application Server	:	Tomcat5.0/6.X
Front End	:	HTML, Jsp
Scripts	:	JavaScript.
Server side Script	:	Java Server Pages.
Database	:	MySQL 5.0
Database Connectivity	:	JDBC