

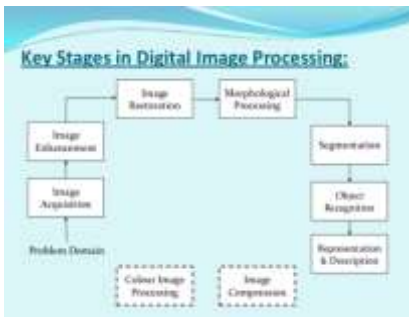
## Measuring The Levels Of Liquid Using Artificial Intelligence

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**Abstract:** In this paper, I have proposed an idea of segmentation of bottles as under filled, overfilled moderately filled using special image processing algorithm and artificial neural network as a step towards artificial intelligence. Confusion matrix table is used to arrive at the result. A series of ninety images were analyzed and manipulated successfully using MATLAB.

### Background of study:

Today, there is almost no area of technical behavior that is not impacted in some way by digital image processing. We can cover only a few of these application in the context and space of current discussion. The area of application of digital image are so varied that form of organization is desirable in attempting to capture the breadth of this field. One of the simplest ways to develop a basic understanding of the extent of image processing applications is to categorize images according to their source. Synthetic images, used for modeling and visualization, are generated by computer. The principle energy source for images in use today is the electromagnetic spectrum. A major area of imaging in the visible spectrum is in automated visual inspection of manufactured goods.



### Statement of problem:

During the manufacturing process, the inspection on quality of products are dually check by

the inspectors. However human are more sensitive in checking dot errors. So in order to avoid the above situation. Image analysis tools are widely used for sense control. Filling a bottle can be subjected to various potential issues like the human inspectors can't able to focus the filling of bottles (normal vision time:10 – 25 minutes). More cost required for the human source. In order to avoid above drawbacks. consistent evaluation of filling bottle process is required for this mean time with advanced digital image processing principles.

### Objectives of study

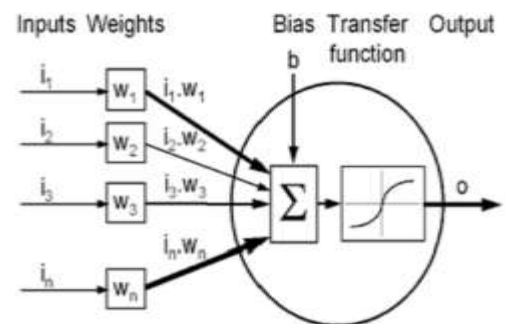
- a. Otsu segmentation technique to analyse the inner content of bottle
- b. Classify the bottle based on its density according to image extraction

### Scope of study

A suitable visual inspection system is developed to see the appropriate faults. Such that sometimes in the production branch There will be a gap between many bottles. By using proper fault deducing system this fault should be properly picturised.

### Significance of study:

(i) It



will be a substitute to manual inspection method

(ii) Time saved and labour force considerably reduced

**Literature survey:**

Modern manufacturing process is an interesting concept. Product inspection is a challenging one in any industries like electrical or automotive etc..Machinevision technology is not the technical approach. There are other methods to devise this model. Image segmentation and labeling are the popular methods.

**Related works**

Prasad and Jadav (2013), have devised vision system, in which the camera continuously captures images and to decide which bottle is empty, partially \_ filled or completely\_ filled using proposed image processing algorithm.

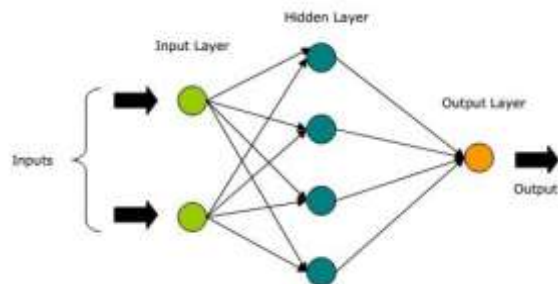
Quality control is an important issue in the ceramic tile industry. On the other hand maintaining the rate of production with respect to time is also a major issue in ceramic tile manufacturing. Again, price of ceramic tiles also depends on purity of texture, accuracy of color, shape etc. Considering this criteria, an automated defect detection and classification technique has been proposed in a report that can ensure the better quality of tiles in manufacturing process as well as production rate (Rahman and Hossain, 2009).

**SEQUENCE OF IMAGE PROCESSING:**

**segmentation:**

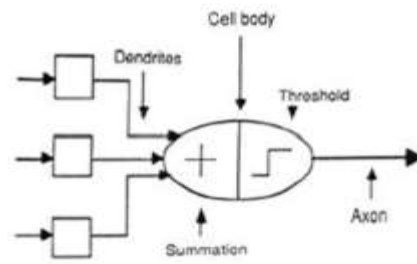
Process of dividing a single image into multiple fragments. Which are majorly used to mark the boundaries and appropriately locate the objects. There are numerous image processing algorithms are implemented to bring high efficient image segmentation with unique quality.

**NEURAL**



**Real Neuron:**

The working of brain is still an unsolved mystery. The complicated and most sensitive part of the human body is the BRAIN. The word Brain simply elucidates the word rain. The rain is the collection of water drops similarly brain is the collection of the enormous amount of the functional units called **neuron**. Each neuron connected with multiple neuron such that it's approximately 10 billion. Stimulus passing done by the neurons



**FIG 1: structure of neuron**

**Artificial Neural networks:**

**FIG 2: Artificial neural network**

These artificial networks are simply constructed based on the working of real neurons in the brain.

**FIG 3:Neural Network**

In above network. Each stimulus is separately weighted and given as input to the transfer function and the final output is processed. Artificial neural networks are generally termed as neural networks. The neural network simply a composite of Simple nodes and processing elements and are combined to form the integrated unit

**Image acquisition:**

A process of obtaining a real image from real world. A typical example is image captured by the camera and the further processing done by the computer unit



**FIG 4: Simple example of leveled, overfilled and under filled bottle**

**IMAGE ENHANCEMENT:**

To make the image further clear this technique is used  
**Contrast stretching**

$$O(x,y) = I(x,y) - \min \left( \frac{n_i}{max-min} \right) + i$$

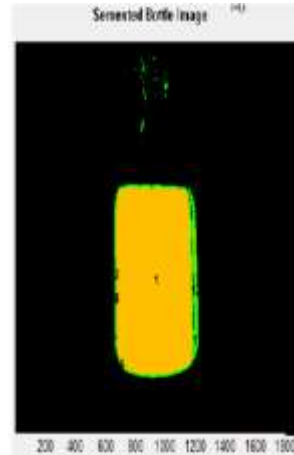
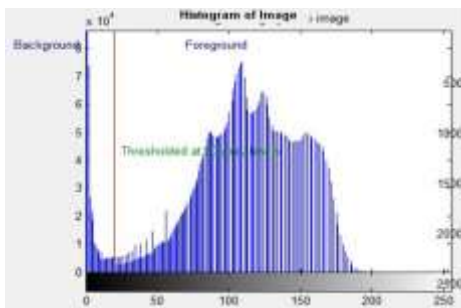
Enhancing gray scale image:

**G= INTRANS (F', stretch', M, E)**

**Data acquisition and analysis:**

Image of ninety bottles are captured and classified into three groups. Image segmentation algorithm along with ANN model implemented **Matlab R2010a** under windows7.

**RESULTS AND DISCUSSION**



**FIG 6: Segmented Bottle image**

The method required for implementing a system based in the proposed method is simple and cheap, because a personal computer and standard digital color camera can be used. In addition to this, it is possible to extend for other technologies. Increasing the size of estimation samples may increase the result of the accuracy and may find more discriminating features.

**REFERENCES:**

- [1] “**Video Based Bottle visualization**” by Research India Publications, 2015 limited, all rights
- [2] “**Design of Automatic vision based system**” by Aldelhedi
- [3] [www.ijsr.net/archive/v4i4/SUB153219.pdf](http://www.ijsr.net/archive/v4i4/SUB153219.pdf)