## UNIT 5

## COMPUTER VISION SYSTEM

Food preparation automation: Computer vision can be used to automate food preparation processes, helping to reduce labor costs and increase efficiency. For example, computer vision can be used to automatically cut vegetables or measure ingredients, freeing up workers to focus on other tasks.

Computer vision systems inspect food quickly, objectively, reliably and non-destructively, and they have a potential to take on many monotonous tasks traditionally performed by human inspectors. Apart from quality control, they show great results in product grading and counting.

### Quality check

Today, it is possible to inspect the quality of a wide range of food products with a computer vision system. Both software and hardware parts of the system should be customized to the specific needs of a food company, including inspection goals and the type of product to analyze.

For example, feature extraction and segmentation algorithms will vary significantly depending on the shape, color and texture of an analyzed object, as well as the surrounding scene (the conveyor belt, a crate) and illumination conditions.

### Measuring, counting and sorting

Market analysis shows that all other things being equal, customers prefer apples with a maximum diameter between 75 and 80 mm.[1] However, people would have a hard time trying to accurately evaluate a fruit's size with the naked eye, while a computer vision system can measure a precise diameter of an apple in a blink of an eye, literally.

Automated counting and sorting system based on image analysis can grade fruits, vegetables, nuts, oysters, etc. according to their shape, size and maturity (for fruits and vegetables), increasing the sorting speed by 10 times compared to humans.[2]

## Packaging

Automated visual check of a filling level and package labeling is another important application of computer vision in the food industry. Besides that, a visual system can check the freshness of a packed product with the aid of a special ink changing its color with time and at a different speed depending on the temperature.

## COLOUR SORTER

**Colour sorters or color sorters** are machines used on the production lines in bulk food processing and other industries. They sort items by color, detecting passing items' colors and using mechanical or pneumatic devices to divert items with colors outside the acceptable range or to create distinct groups.

## FOOD COMPONENT ANALYSIS USING NIR

Near Infrared, or NIR, spectroscopy is an analysis technique for fast, accurate food testing. NIR measurement is a widely-used method in the food and drink and agricultural industries, and it is a convenient, low cost alternative to chemical analysis.

NIR measurement is highly effective in the quality control of a broad range of foodstuffs and supports various aspects of food processing, including:

- Identifying ingredients and additives
- Composition analysis for food labelling
- Detecting food fraud
- Optimising manufacturing and production processes.

**FTNIR**

FT-NIR is a powerful and effective technology for control of raw materials, intermediates and finished products. Common tasks in food processing are

IDENTIFICATION OF FOOD INGREDIENTS AND ADDITIVES

Food ingredients and additives have been used for many years to preserve, flavor, blend, thicken and color foods. Identification of these materials can be applied similar to the raw material ID in pharmaceutical industry for organic pure substances as well as some inorganic minerals and salts. Examples are: fats and fat replacers, carbohydrates, vitamins and nutrients, amino acids, enzymes and preparations, emulsifiers, stabilizers, thickeners, binders, texturizers, preservatives, sweeteners and sugar replacements.