Grain Quality Measurement using MATLAB

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# Grain Quality Measurement using MATLAB

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Introduction

- Grains & Pulses Quality is related to Physical & Chemical Properties
- Physical quantities are measured in terms of Size, Shape, Color, Weight & moisture
- Chemical quantities are measured in terms of texture & aroma
- Grain quality check is an important parameter at the agriculture industry
- Image processing is a technique to perform Grain quality check
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**Current Pain Areas @ Agriculture industry**

- Manual intervention in Grain Sample Collection and Grain quality analysis
- Huge Time and Labor involved in physical purity test for the samples
- Prone to Human errors and possible Impact on accuracy of precision measurement
- Dependent on skilled labors
- Low Productivity due to manual evaluation
- Available solutions for analysis are discrete in nature
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Integrated Smart Solution

1. Capture Grain Image
2. Analyse Parameters
3. Suggest Design Parameters, Machine Settings, Grain quality, & Grain Sorting machine Product Cost
4. Reduce % Wastage of good grains
5. Increase Revenue

Tool Workflow

1. Camera/Smartphone
2. Software Tool
3. Reports
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Development approach
Types of Analysis

Seed types analysis
- In this analysis amount of different types of grains present in the sample will be determined
- Report indicating the proportion of different types of grains present in the given sample is generated

Defect analysis
- In this analysis quantities of broken, half broken and good grains will be computed
- This analysis will be done on every type of grain found in the given sample and report generated accordingly

Purity analysis
- Amount of pure grains in a given sample will be determined
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Grains/Pulses Information Extracted from Image

- Length (L)
- Width (W)
- Seed area (AS)
- Length of the perimeter (LP)
- Circularity (CS)
- Length to width ratio (LWR)
- Intersection of length and width (IS)
- Centre of gravity (CG)
- Distance between CG and IS (CG-IS)
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Sample Screenshots

Original Grain Sample

Processed Grain Sample

Image Processing Using Matlab
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Sample Report Screenshots
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Rice Grain Case Study

- Rice
- Broken Rice
- Colour Rice

Camera Smartphone

Grain Measurement Tool

Process Image
- Length
- Width
- Seed Area

Reports

Quality Info

Other Parameters

Data
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Infrastructure

- Matlab R2014a
- Image Acquisition Toolbox
- Image Processing Toolbox
- Matlab Compiler
- Parallel Computing Toolbox
- Grain/Pulses Image
- Camera /Smartphone
Future Scope of Work

- To extend Grain Quality measurement techniques for few more grains / pulses
- Tool to address individual specific Analysis needs for grains / pulses
- Intelligence to Compare Physical quantities of grains/pulses
- Grain/Pulses data warehousing
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