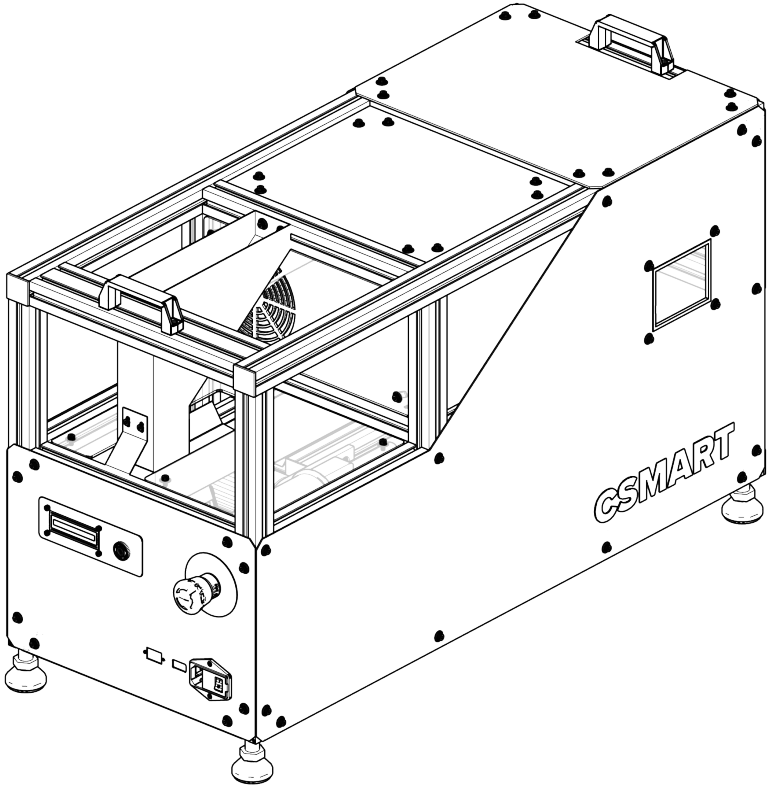


New Release

Desktop App

Minor Version - V3.2.0

2025/08/08

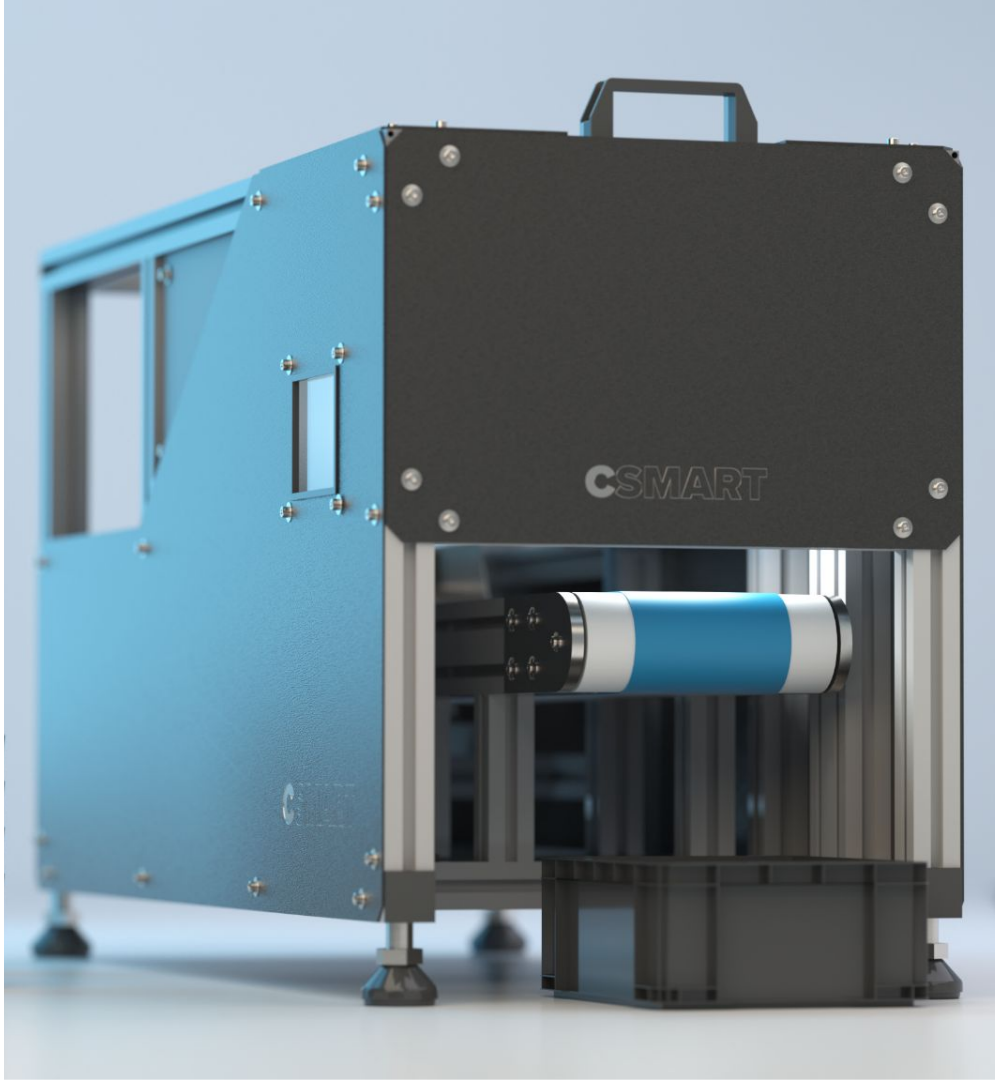
CSMART DIGIT

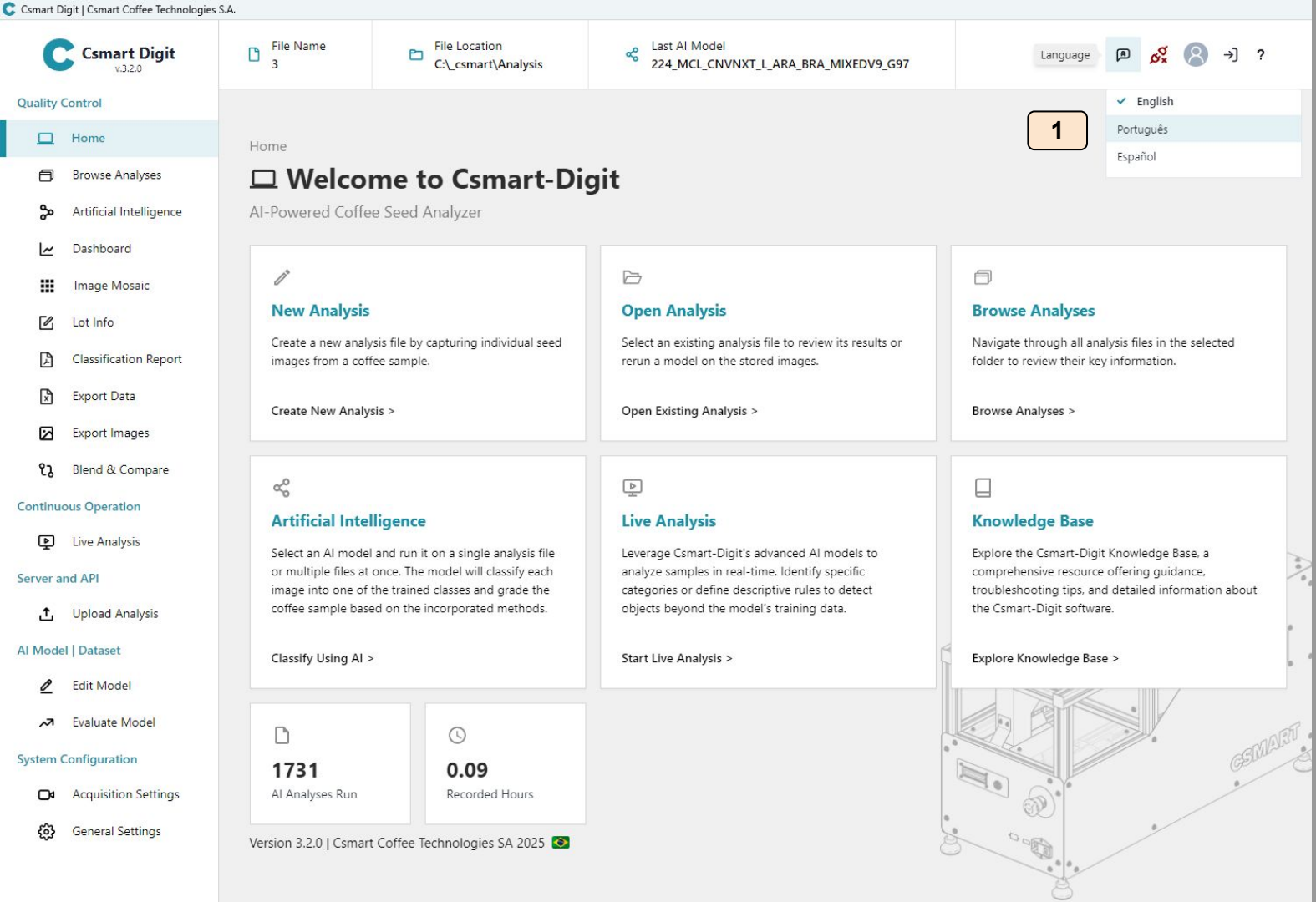
Csmart Digit
v3.2.0

Version 3.2.0 introduces a new method for calculating sample weight directly from image data, replacing the previous approach based on weight-per-class-per-screen-size. The system now uses class-specific density values and shape information stored in the AI model to convert measured areas into precise mass values for each seed and class type.

This enhancement delivers more consistent and representative weight measurements, improving the accuracy of total equivalent defect calculations and other metrics that depend on estimated weight.

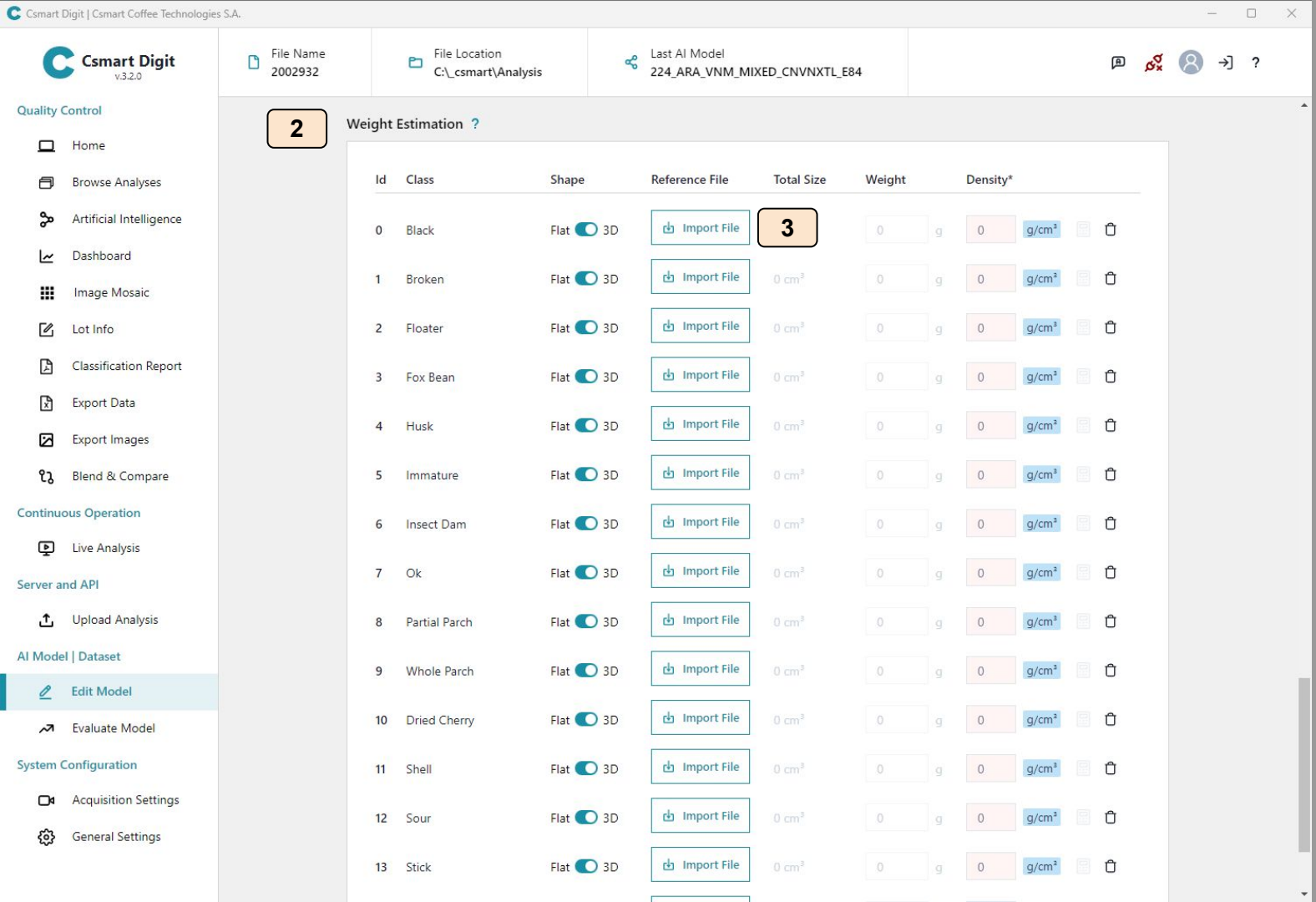
For a detailed explanation, click here





Language

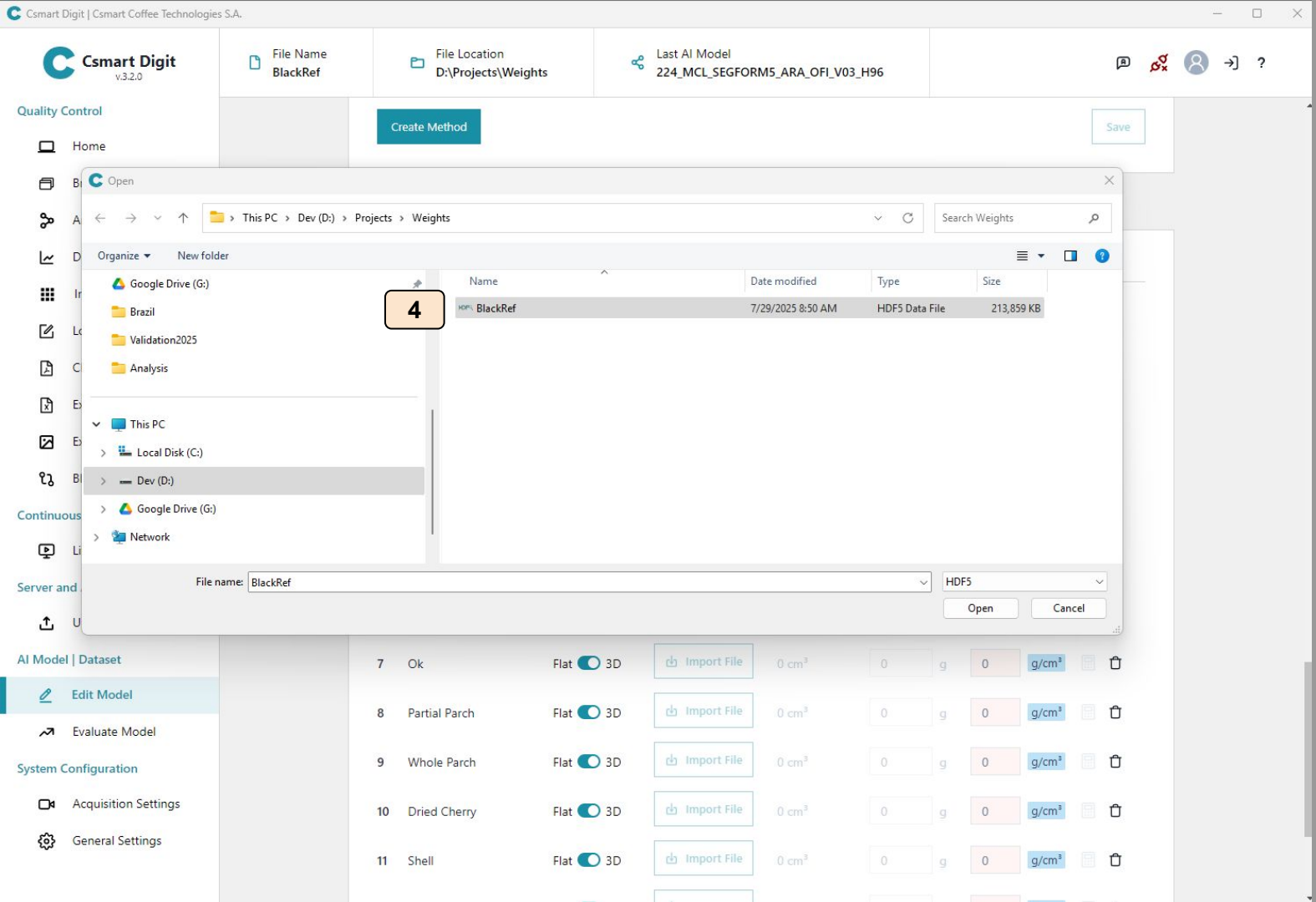
1. The new Language menu in the top bar allows users to switch the app interface between **English, Português, and Español**; changes apply instantly, and the selected language is saved on the device. Any untranslated text will appear in English without affecting files or analysis data.



Weight Estimation

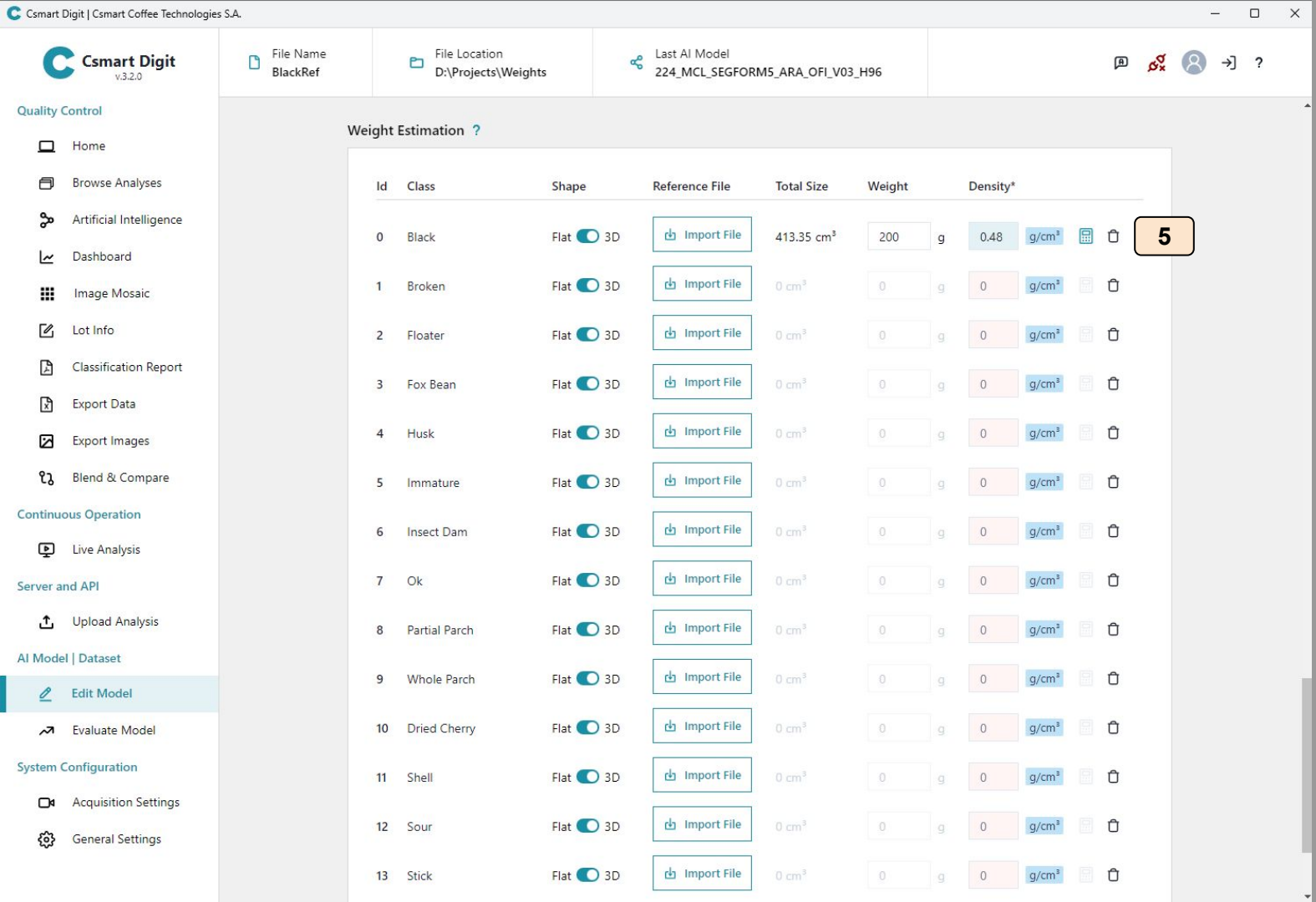
2. A new density-per-class approach has been implemented. When opening a model in Edit Model, the Weight Estimation panel displays all classes in the model along with their Shape, Reference File, Total Size, Weight, and Density*.

3. The reference file is a standard sample analysis with a known weight, used to calculate the density. To select the file, click Import File under Reference File.



Weight Estimation

4. Select the desired .hdf5 file corresponding to the class. To properly implement the density map, it is necessary to generate single-class files with a known weight. There is no minimum weight requirement, but it is recommended to use at least 100g.

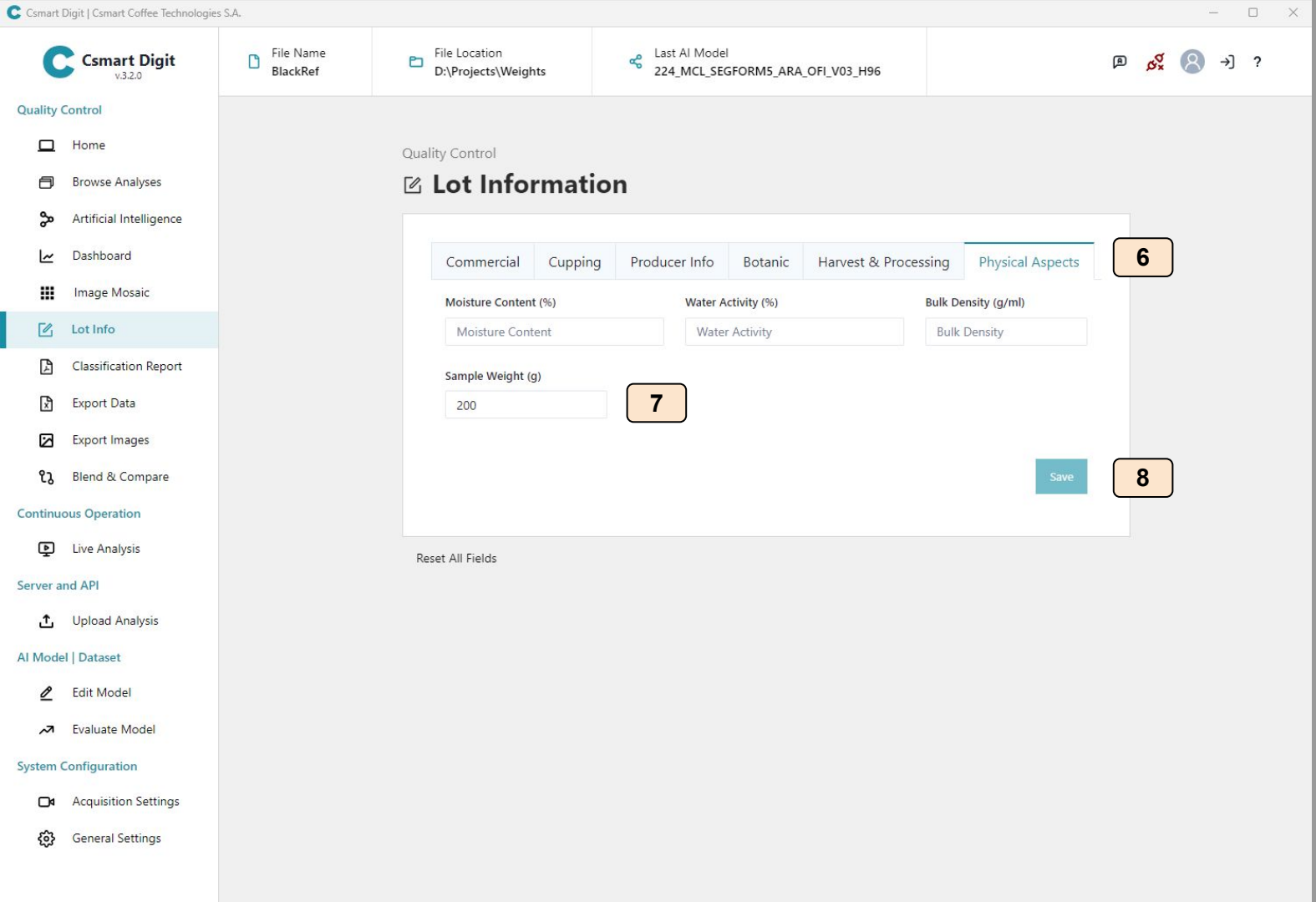


Weight Estimation

5. When opened, the file displays the total volume of the sample. To calculate density, enter the weight measured on a scale when the sample was acquired, and then click the calculator icon. The density will be displayed in g/cm³.

It is important to note that this is neither the bulk density nor the specific density of the coffee, so standard values should not be used. This implementation relies on a holistic approach to calculate volume.

Repeat this process for all other classes.

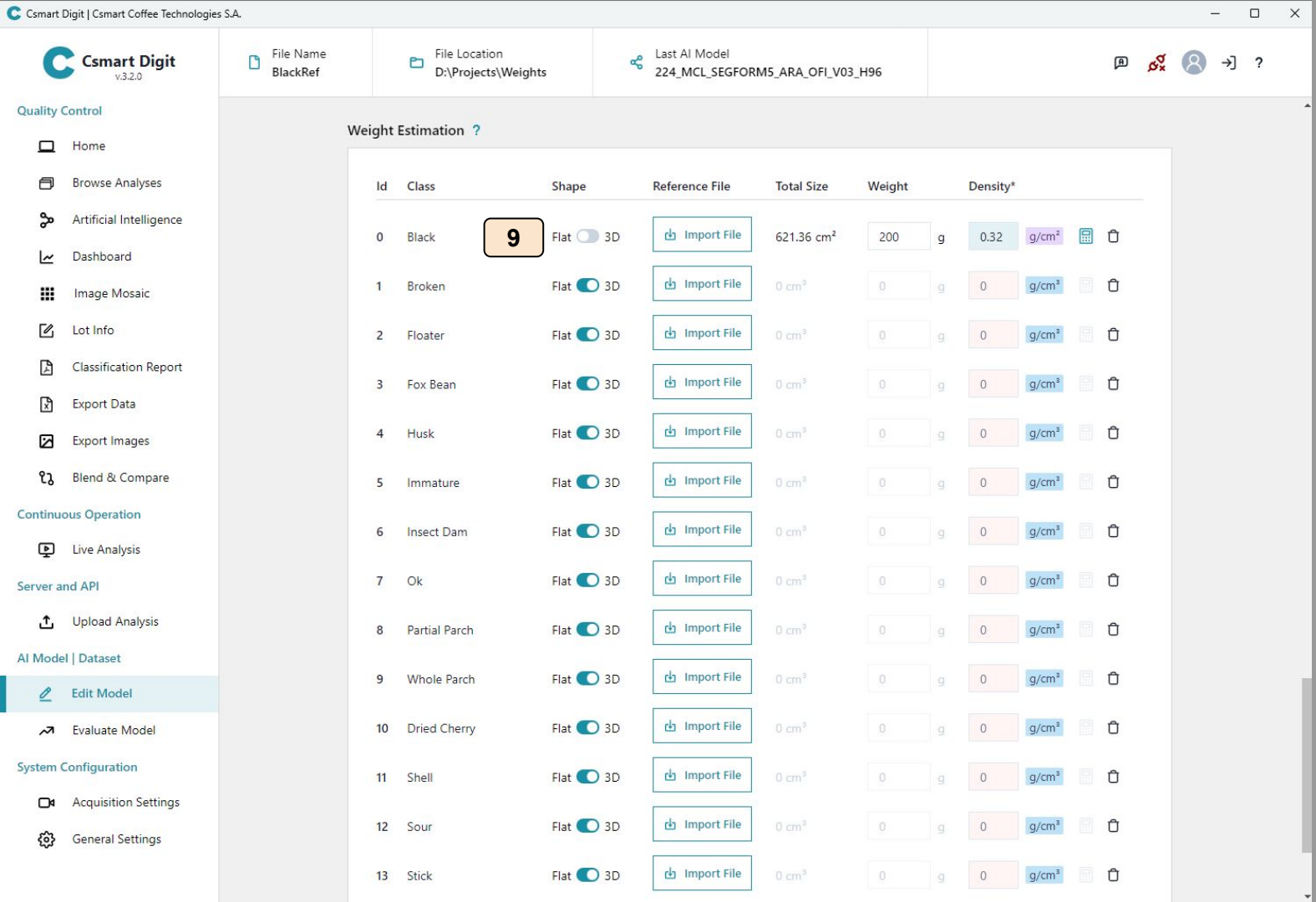


Weight Estimation

6. To streamline the process, it is possible to save the weight information inside the reference file, under Lot Analysis / Physical Aspects.

7. Enter the sample weight and click Save (8). This keeps all data stored in the same file and helps prevent typing errors.

Now, this weight data will be used to calculate density when the reference file is imported.

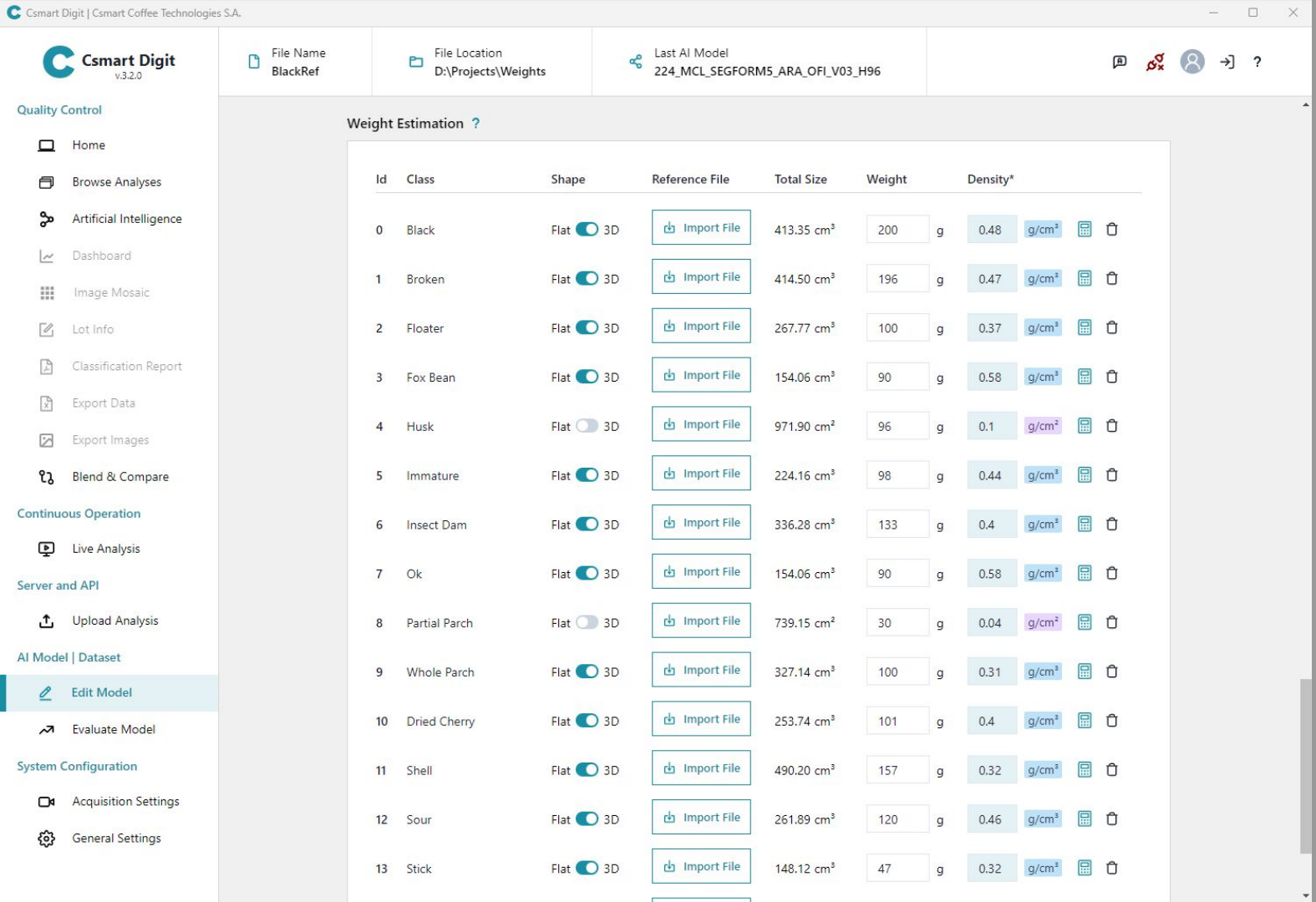


Weight Estimation

6.It is also possible to work with planar data for classes that follow a linear relationship between area and weight, such as husks, parchment, and silver skins.

When switching from 3D to Flat, the density is calculated using the area instead, and the unit becomes g/cm².

Make sure to apply this option only to classes that do not grow volumetrically.

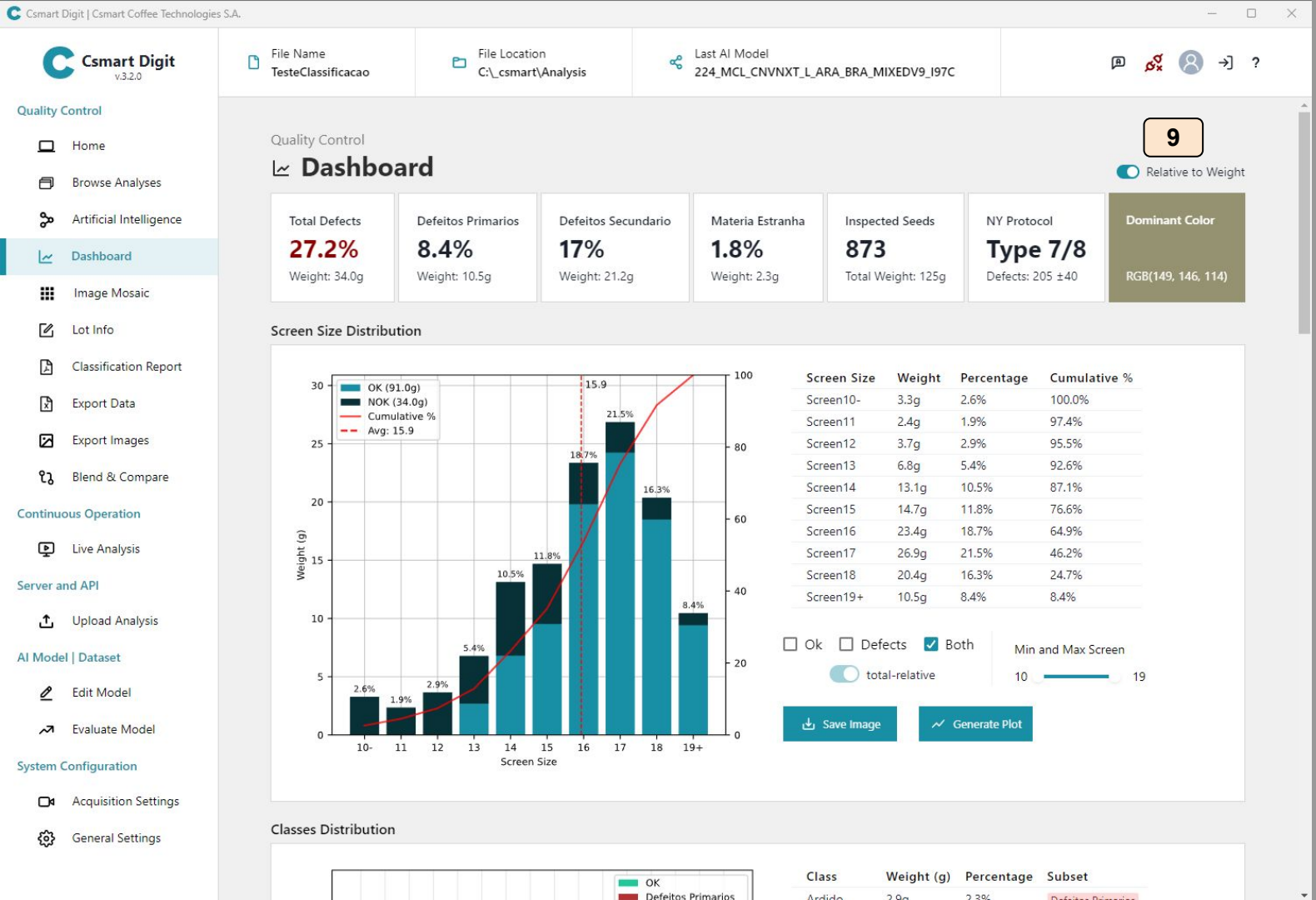


Weight Estimation

After opening a reference file for each class and selecting the Shape option for the required classes, the density map is complete. Click save, and the model will be ready to use with the new version.

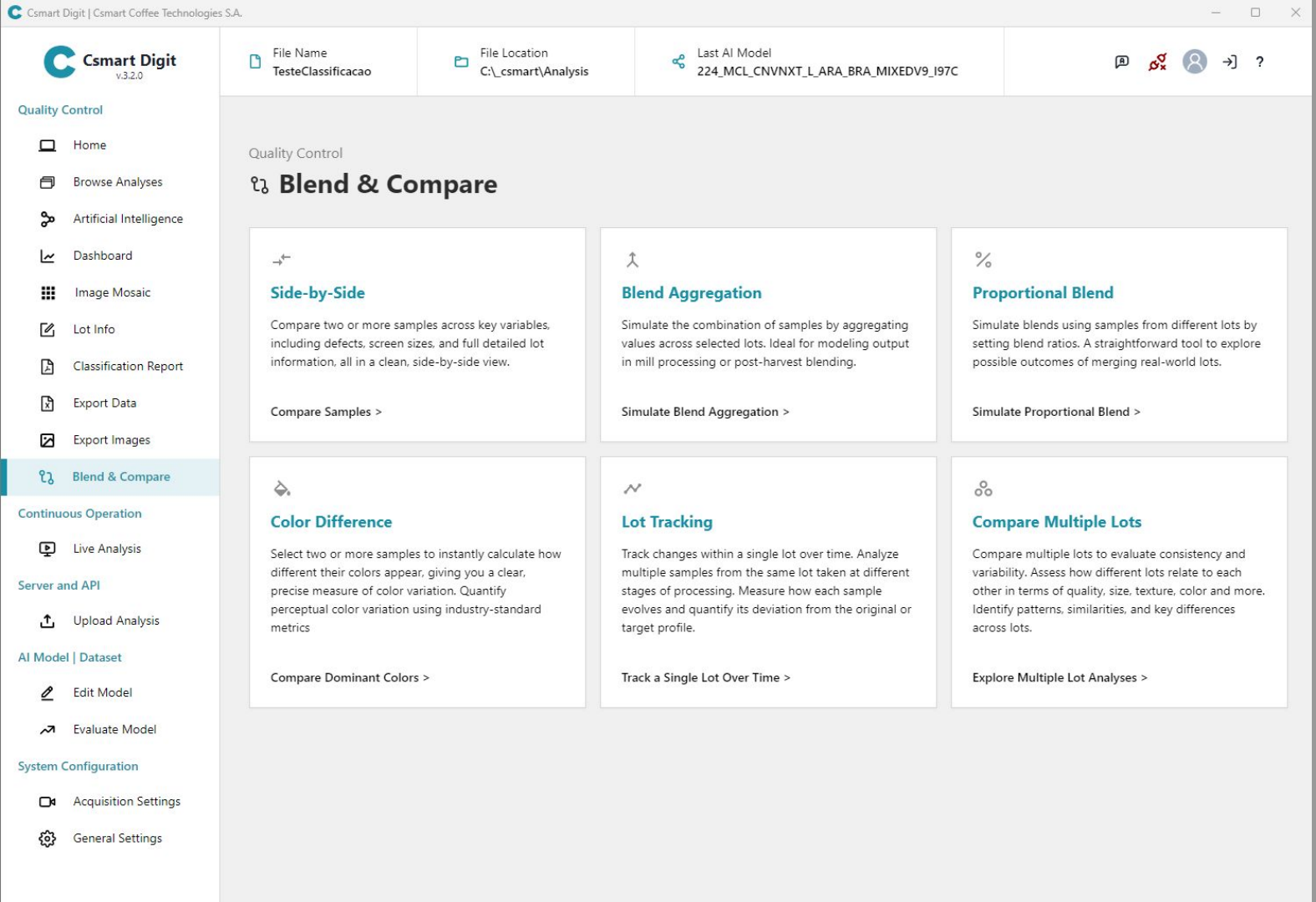
Note that when importing Reference Files, it is possible to select more than one file to generate an average density reading.

If a reference file is not available, it is also possible to manually enter the density.



Weight Estimation

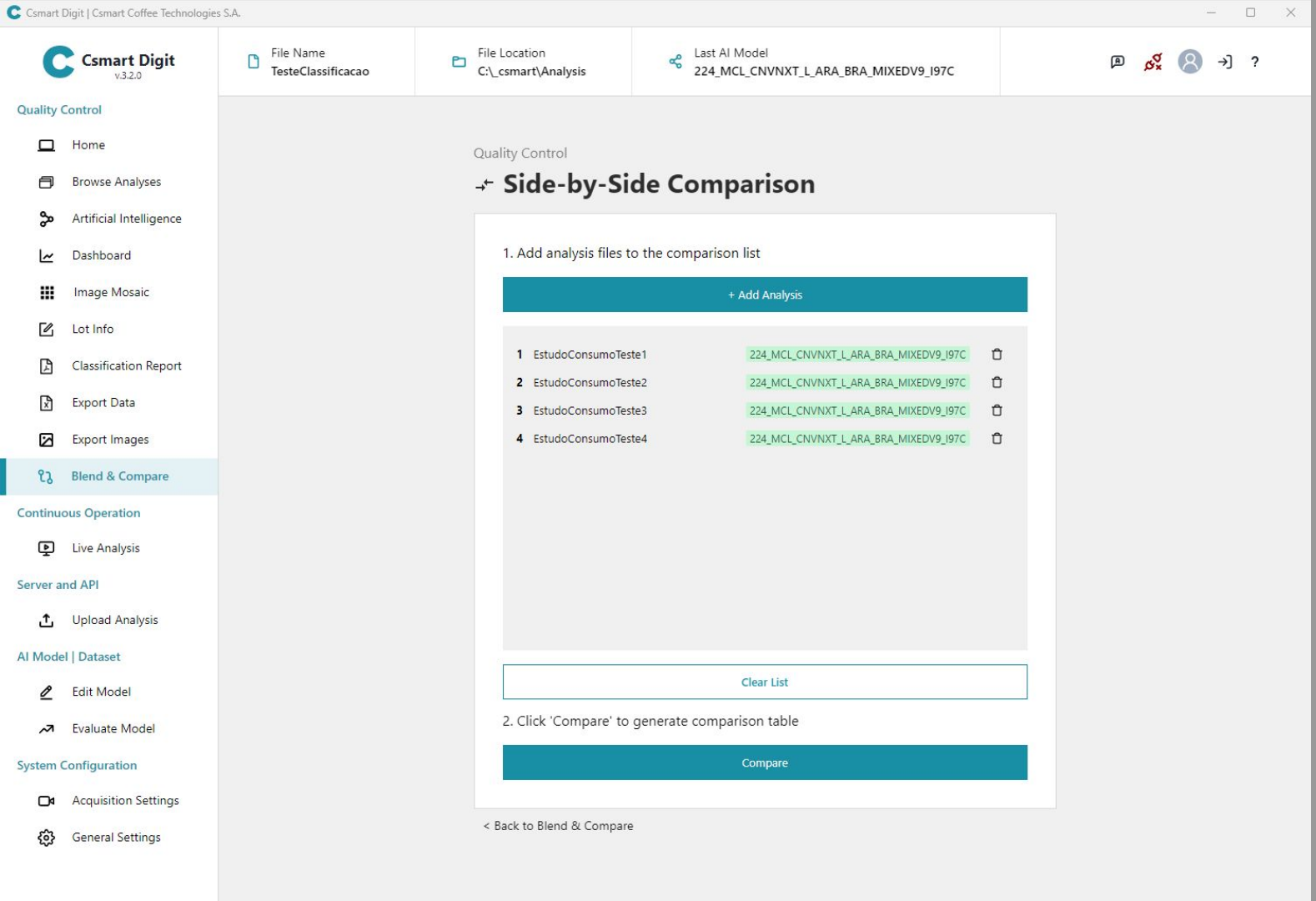
9. After running an analysis with a model that includes a density map, every variable is now expressed on a weight basis. It is still possible to switch back to occurrence %, but the weight-based view aligns better with the standard way of calculating percentages in coffee quality control.



Blend & Compare

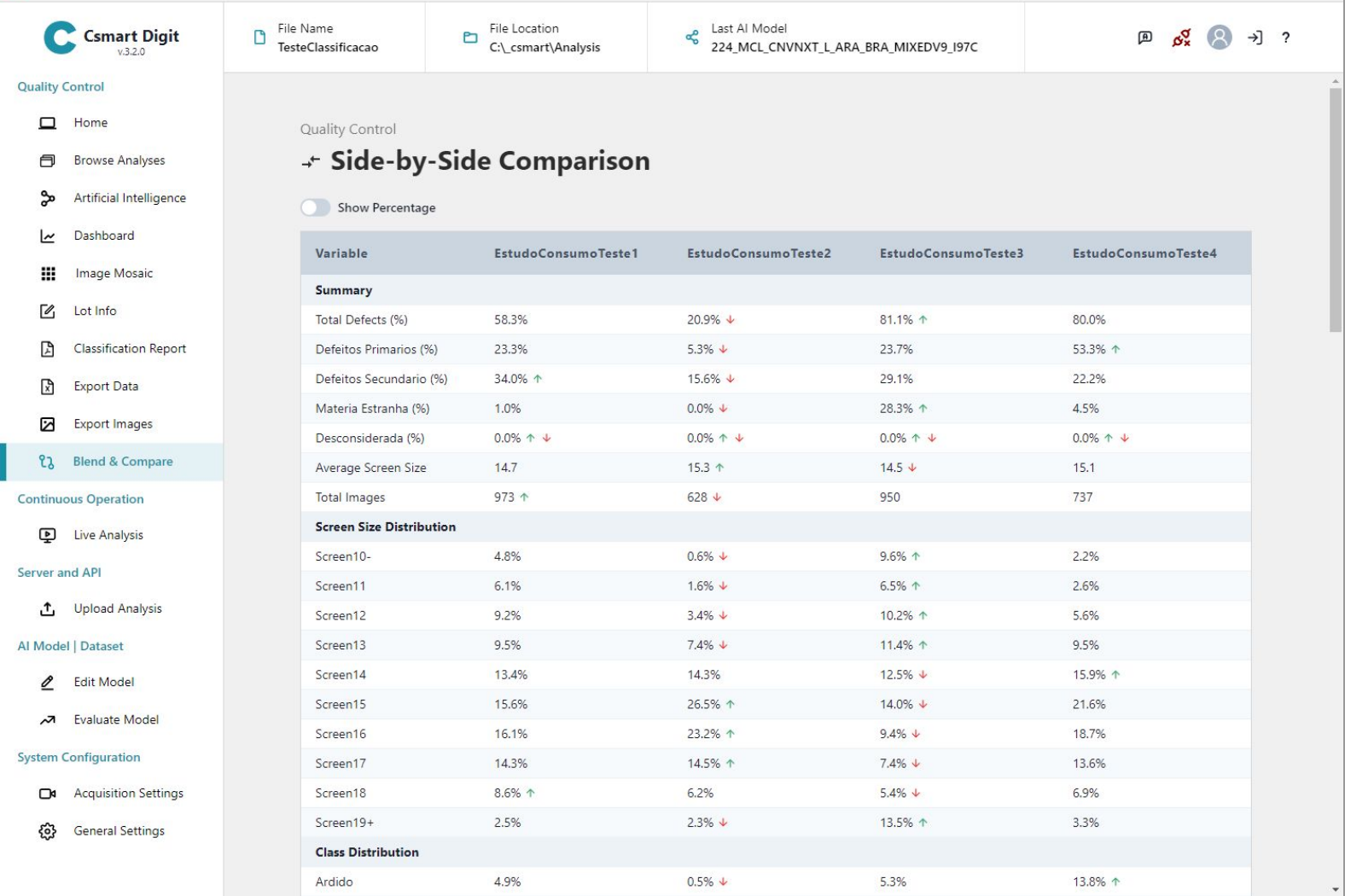
The improved Blend & Compare section now includes several new features to enhance lot-level analysis, providing macro-scale insights and supporting tasks beyond the classification of green coffee.

New tools include Side-by-Side, Blend Aggregation, Proportional Blend, Color Difference, and Lot Tracking. The Compare Multiple Lots feature was already available in previous versions.



Side by Side Comparison

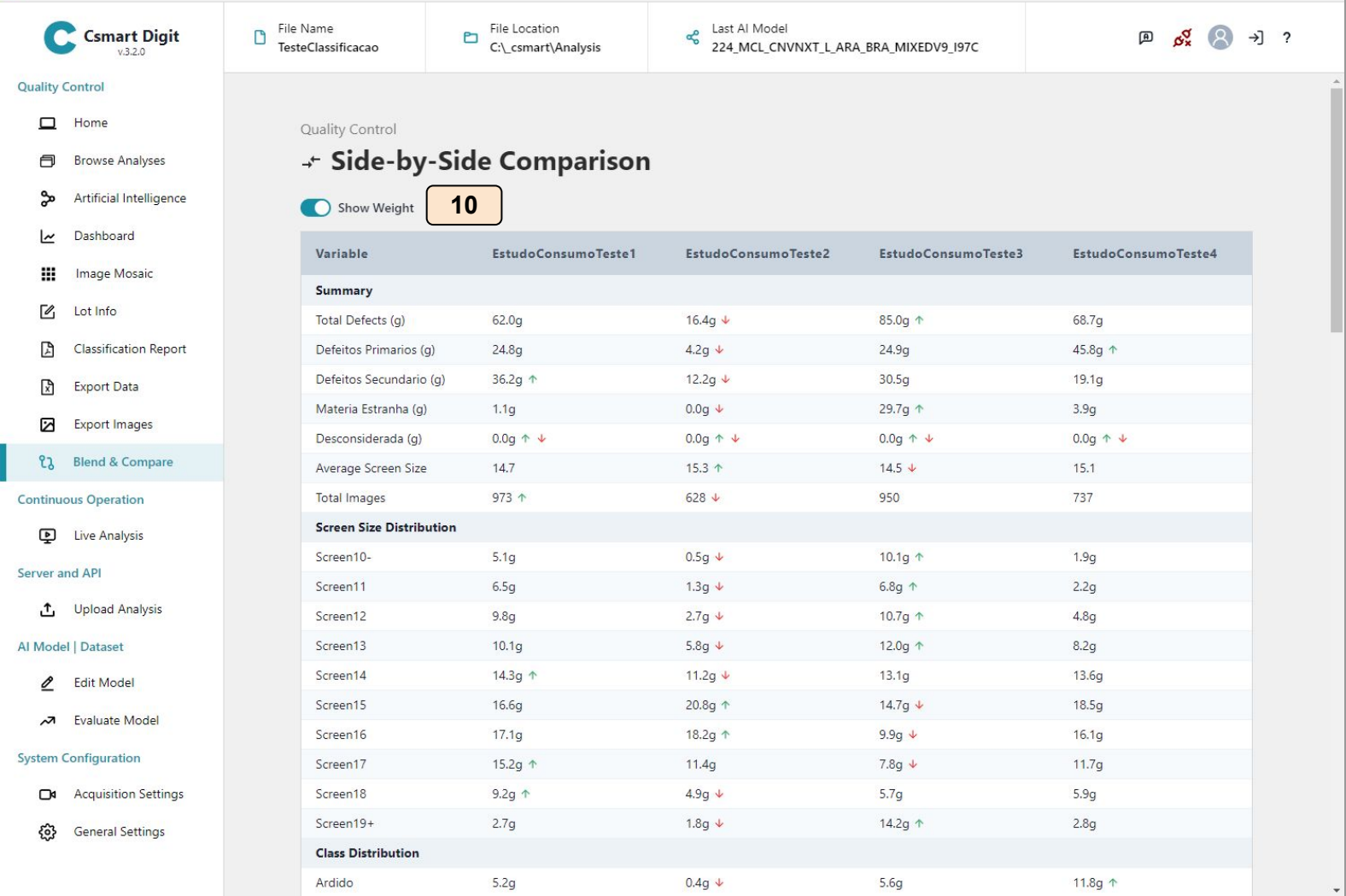
The Side-by-Side tool is designed to present the most relevant variables in a clear, table-style format. Simply select the analyses you want to compare and click **Compare**.



Variable	EstudoConsumoTeste1	EstudoConsumoTeste2	EstudoConsumoTeste3	EstudoConsumoTeste4
Summary				
Total Defects (%)	58.3%	20.9% ↓	81.1% ↑	80.0%
Defeitos Primarios (%)	23.3%	5.3% ↓	23.7%	53.3% ↑
Defeitos Secundario (%)	34.0% ↑	15.6% ↓	29.1%	22.2%
Materia Estranha (%)	1.0%	0.0% ↓	28.3% ↑	4.5%
Desconsiderada (%)	0.0% ↑ ↓	0.0% ↑ ↓	0.0% ↑ ↓	0.0% ↑ ↓
Average Screen Size	14.7	15.3 ↑	14.5 ↓	15.1
Total Images	973 ↑	628 ↓	950	737
Screen Size Distribution				
Screen10-	4.8%	0.6% ↓	9.6% ↑	2.2%
Screen11	6.1%	1.6% ↓	6.5% ↑	2.6%
Screen12	9.2%	3.4% ↓	10.2% ↑	5.6%
Screen13	9.5%	7.4% ↓	11.4% ↑	9.5%
Screen14	13.4%	14.3%	12.5% ↓	15.9% ↑
Screen15	15.6%	26.5% ↑	14.0% ↓	21.6%
Screen16	16.1%	23.2% ↑	9.4% ↓	18.7%
Screen17	14.3%	14.5% ↑	7.4% ↓	13.6%
Screen18	8.6% ↑	6.2%	5.4% ↓	6.9%
Screen19+	2.5%	2.3% ↓	13.5% ↑	3.3%
Class Distribution				
Ardido	4.9%	0.5% ↓	5.3%	13.8% ↑

Side by Side Comparison

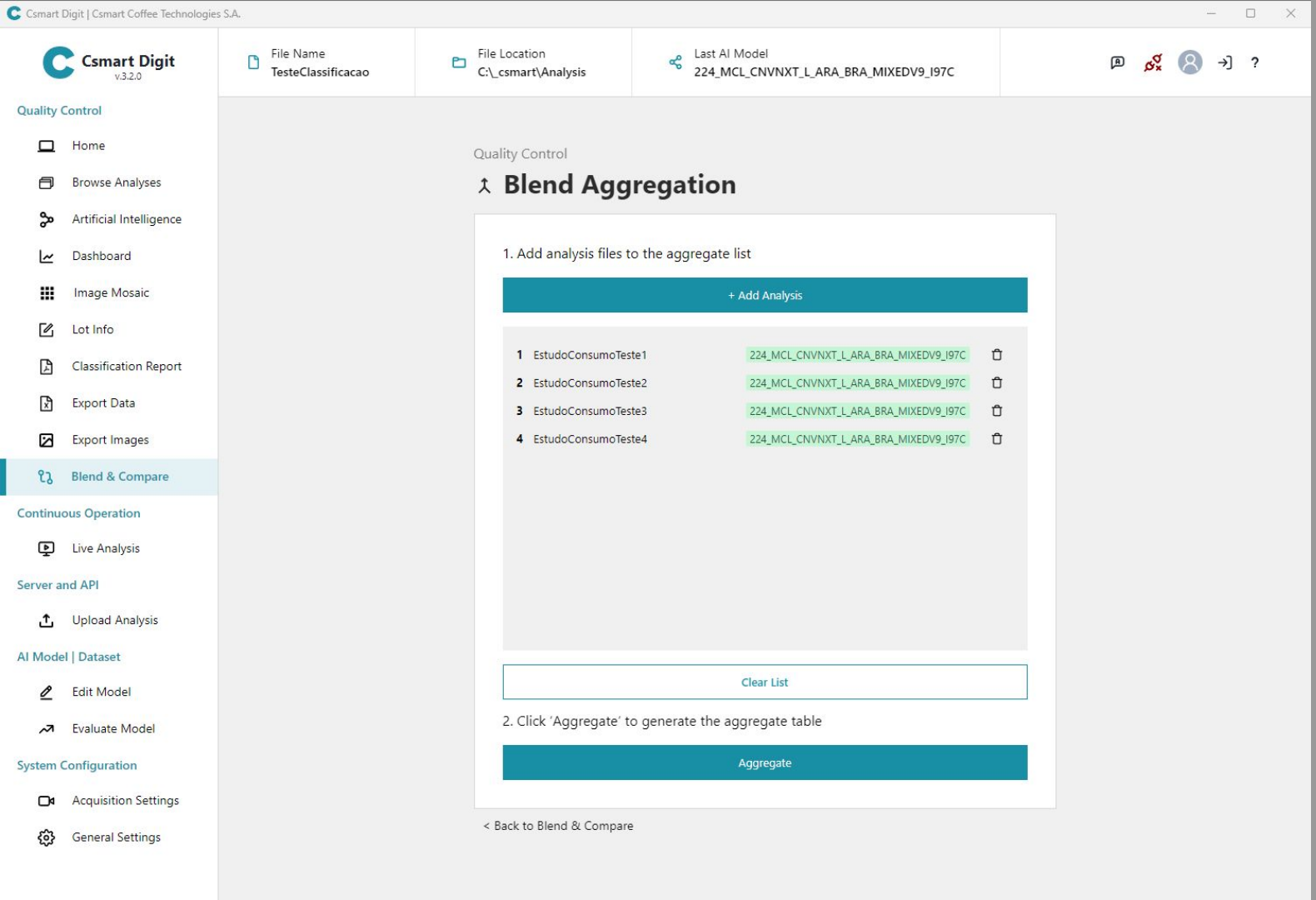
All the selected files are displayed with variables in individual rows, along with green and red arrows indicating the highest and lowest values among the selected files for each variable.



Variable	EstudoConsumoTeste1	EstudoConsumoTeste2	EstudoConsumoTeste3	EstudoConsumoTeste4
Summary				
Total Defects (g)	62.0g	16.4g ↓	85.0g ↑	68.7g
Defeitos Primarios (g)	24.8g	4.2g ↓	24.9g	45.8g ↑
Defeitos Secundario (g)	36.2g ↑	12.2g ↓	30.5g	19.1g
Materia Estranha (g)	1.1g	0.0g ↓	29.7g ↑	3.9g
Desconsiderada (g)	0.0g ↑ ↓	0.0g ↑ ↓	0.0g ↑ ↓	0.0g ↑ ↓
Average Screen Size	14.7	15.3 ↑	14.5 ↓	15.1
Total Images	973 ↑	628 ↓	950	737
Screen Size Distribution				
Screen10-	5.1g	0.5g ↓	10.1g ↑	1.9g
Screen11	6.5g	1.3g ↓	6.8g ↑	2.2g
Screen12	9.8g	2.7g ↓	10.7g ↑	4.8g
Screen13	10.1g	5.8g ↓	12.0g ↑	8.2g
Screen14	14.3g ↑	11.2g ↓	13.1g	13.6g
Screen15	16.6g	20.8g ↑	14.7g ↓	18.5g
Screen16	17.1g	18.2g ↑	9.9g ↓	16.1g
Screen17	15.2g ↑	11.4g	7.8g ↓	11.7g
Screen18	9.2g ↑	4.9g ↓	5.7g	5.9g
Screen19+	2.7g	1.8g ↓	14.2g ↑	2.8g
Class Distribution				
Ardido	5.2g	0.4g ↓	5.6g	11.8g ↑

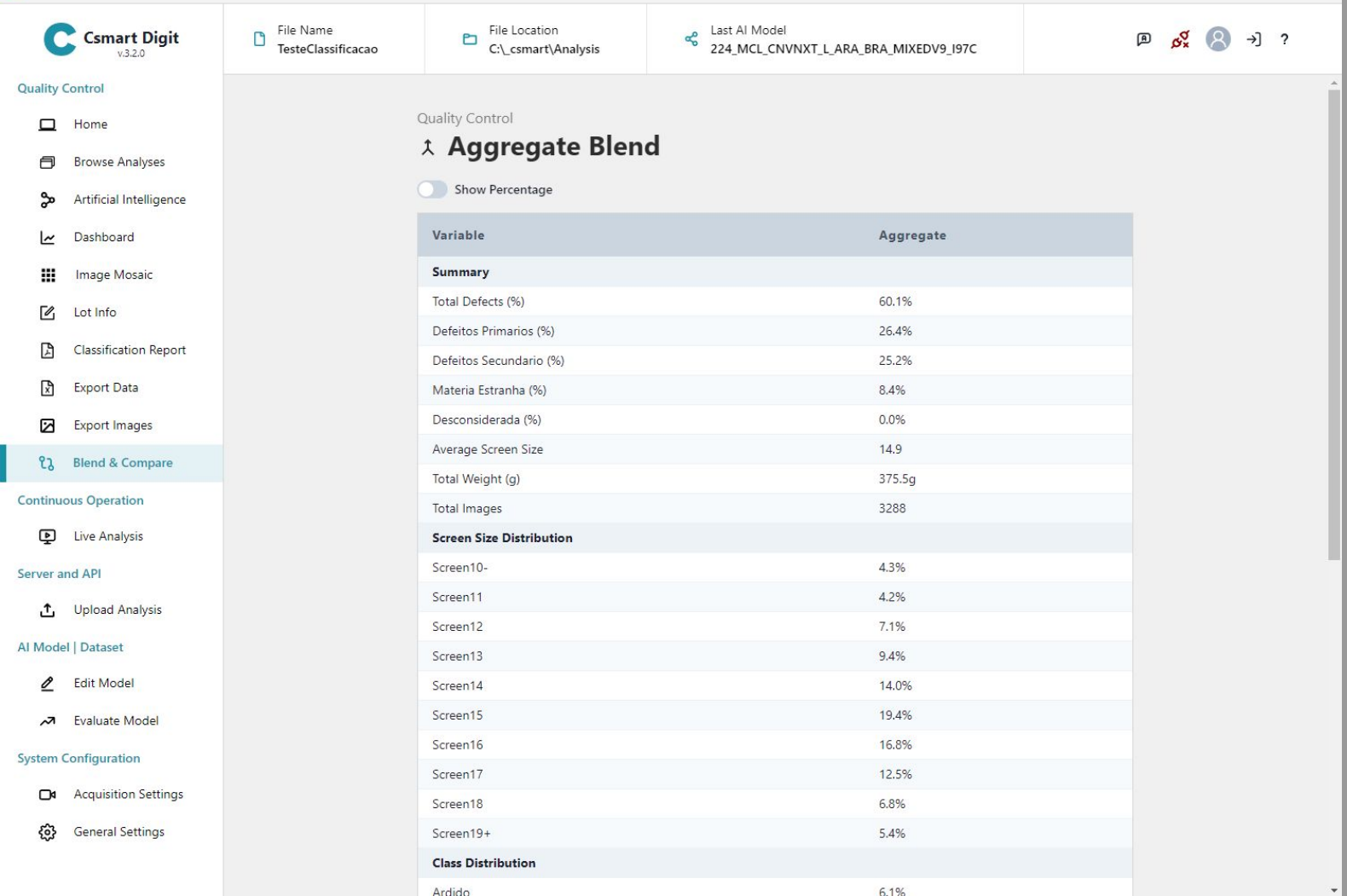
Side by Side Comparison

10. It is also possible to switch between weight and percentage values for each variable.



Blend Aggregation

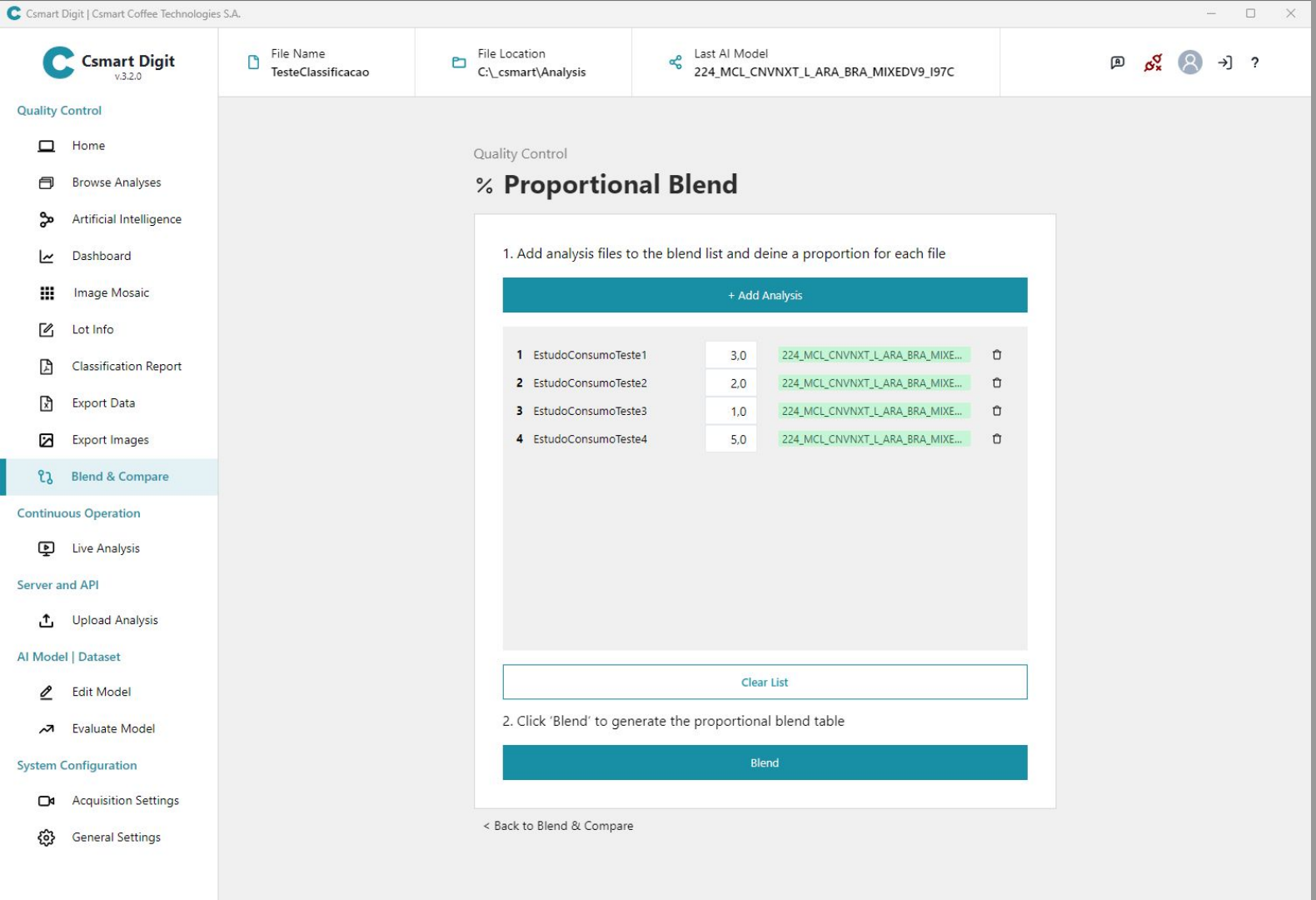
To use Blend Aggregation, follow the same principle as in side-by-side: select the files to be aggregated and then click aggregate.



Variable	Aggregate
Summary	
Total Defects (%)	60.1%
Defeitos Primarios (%)	26.4%
Defeitos Secundario (%)	25.2%
Materia Estranha (%)	8.4%
Desconsiderada (%)	0.0%
Average Screen Size	14.9
Total Weight (g)	375.5g
Total Images	3288
Screen Size Distribution	
Screen10-	4.3%
Screen11	4.2%
Screen12	7.1%
Screen13	9.4%
Screen14	14.0%
Screen15	19.4%
Screen16	16.8%
Screen17	12.5%
Screen18	6.8%
Screen19+	5.4%
Class Distribution	
Ardido	6.1%

Blend Aggregation

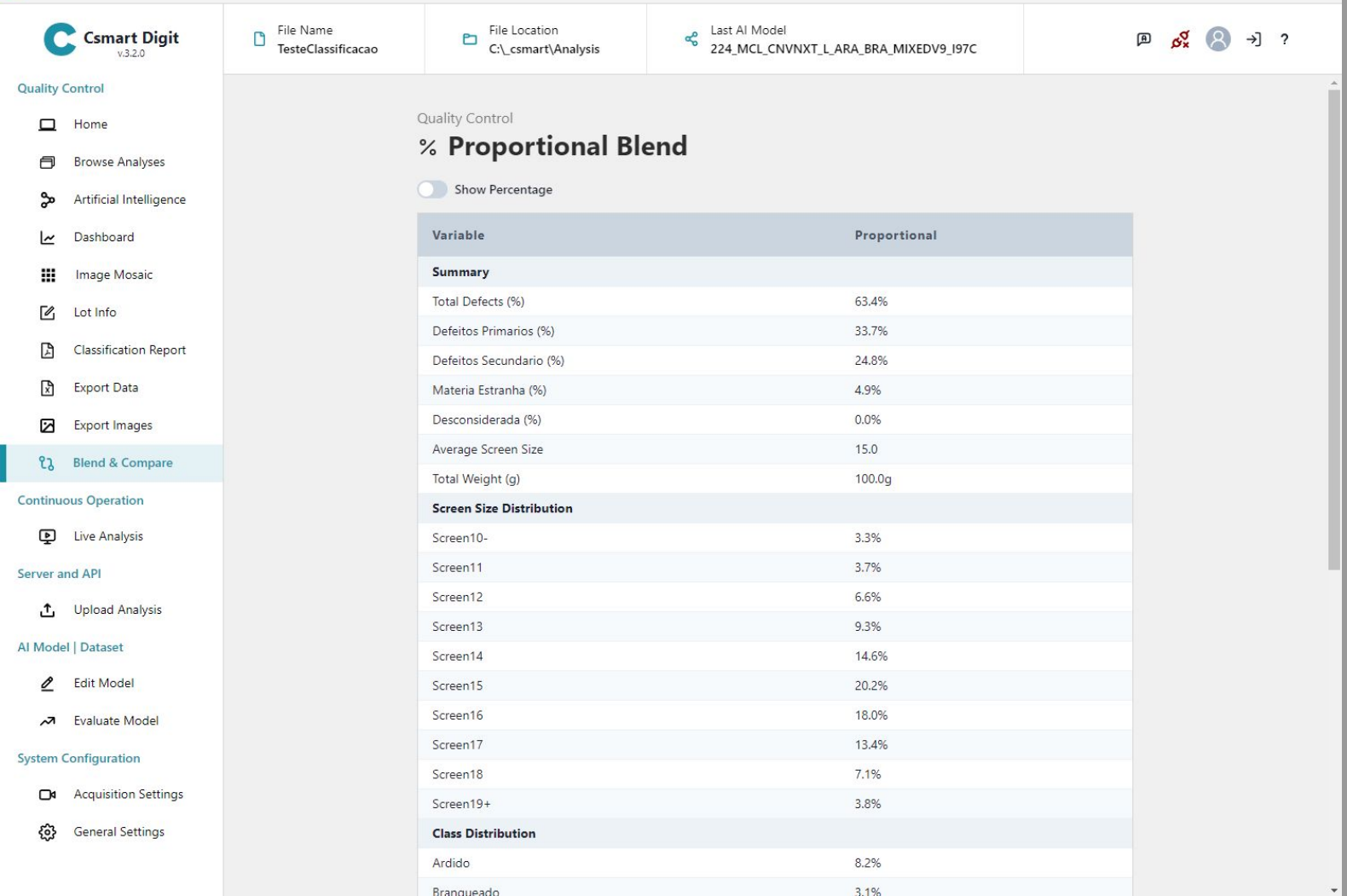
The aggregate values are displayed in a single column, averaging the percentages equally among the selected files and summing the weight values for the fields that present weight.



Proportional Blend

The last blend tool is the Proportional Blend, similar to Blend Aggregation, but with the option to input absolute proportions for each sample. The calculation is based on a 100 g theoretical sample.

Proportions are absolute values, and the calculation is made by dividing each value by the total sum, avoiding the need to input percentages and sum to 100%. Any value entered will produce results.



Quality Control

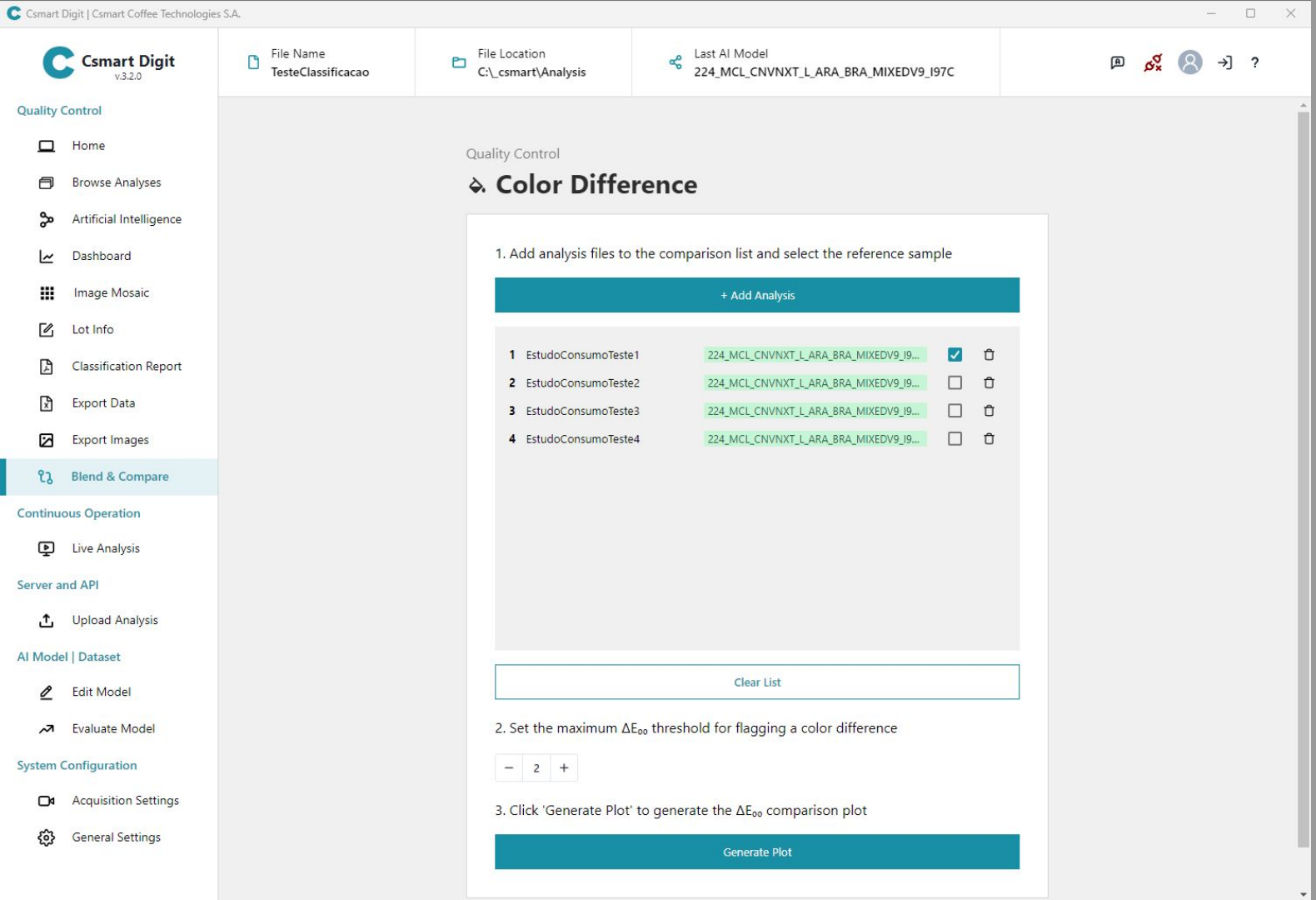
% Proportional Blend

Show Percentage

Variable	Proportional
Summary	
Total Defects (%)	63.4%
Defeitos Primarios (%)	33.7%
Defeitos Secundario (%)	24.8%
Materia Estranha (%)	4.9%
Desconsiderada (%)	0.0%
Average Screen Size	15.0
Total Weight (g)	100.0g
Screen Size Distribution	
Screen10-	3.3%
Screen11	3.7%
Screen12	6.6%
Screen13	9.3%
Screen14	14.6%
Screen15	20.2%
Screen16	18.0%
Screen17	13.4%
Screen18	7.1%
Screen19+	3.8%
Class Distribution	
Ardido	8.2%
Branqueado	3.1%

Proportional Blend

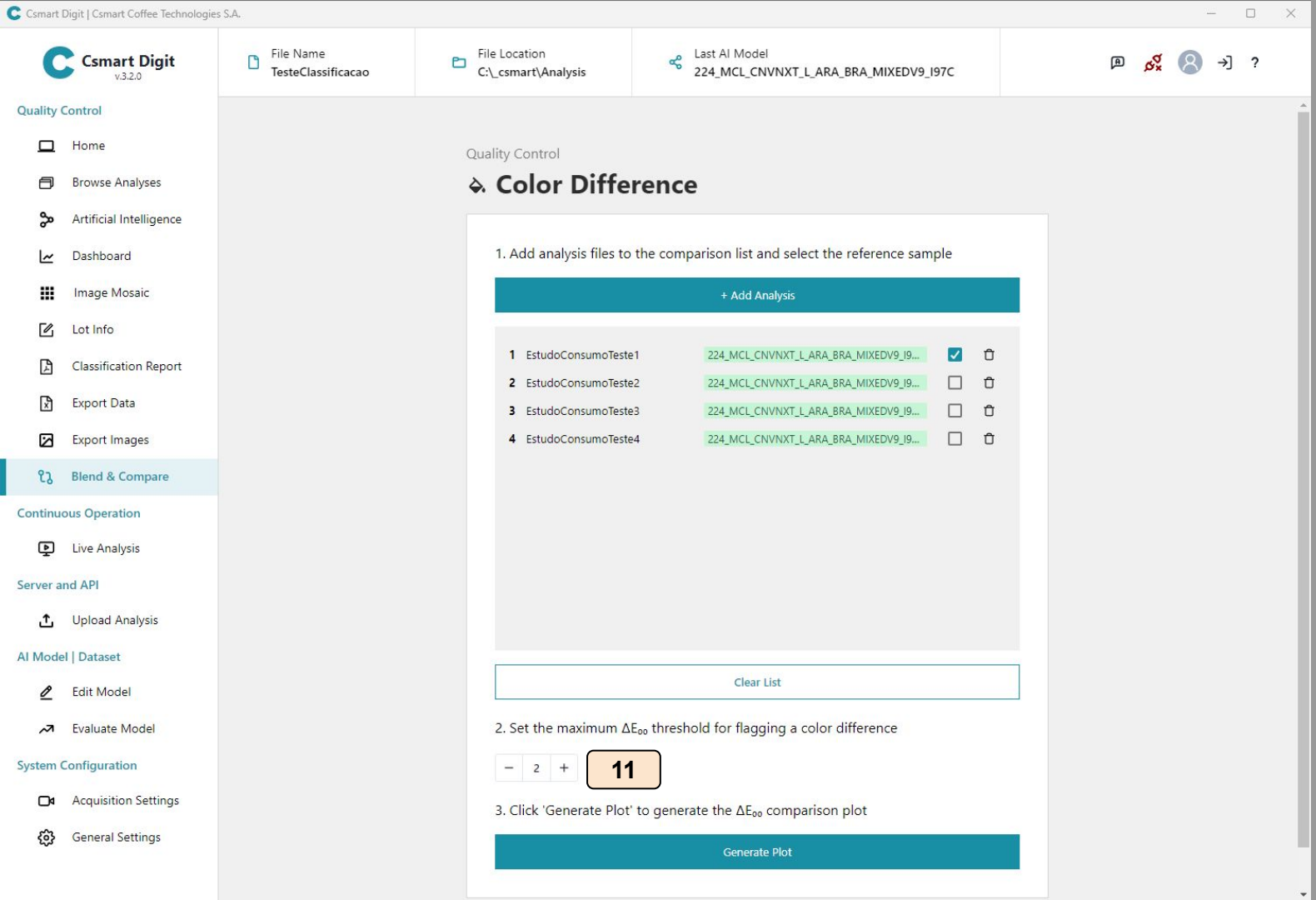
The Proportional Blend is displayed in a single column, with values weighted according to the input proportion. The weights are based on a 100 g sample.



Color Difference

Color Difference is a new tool that compares the dominant color in each sample and presents results based on the CIEDE2000 perceptual scale.

Similar to previous compare tools, select the samples you wish to compare. In this case, it is necessary to choose a reference sample, against which all other samples will be measured.



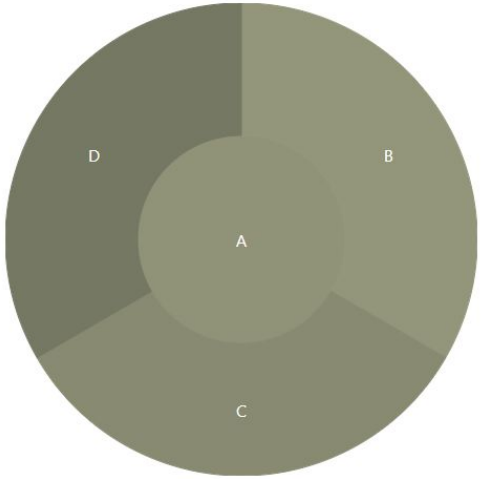
Color Difference

11. Set the color threshold to compare the samples. The values follow the CIEDE2000 perceptual scale, ranging from 0 to 12, with a standard value of 2 (difference perceptible to trained eyes).

After selecting the samples, choosing the reference sample, and setting the threshold for color similarity, click OK to generate the results.

Color Circle

11



12

Sample	Filename	Delta	Flag
A	EstudoConsumoTeste1	0.0	Reference
B	EstudoConsumoTeste2	1.0	Similar
C	EstudoConsumoTeste3	2.8	Investigate
D	EstudoConsumoTeste4	10.0	Investigate

Perceptual ΔE_{00} Scale

ΔE_{00} (CIEDE2000)

ΔE_{00} Interpretation Guide

0 to 1:
Nearly imperceptible. Even a trained color specialist would have difficulty noticing any difference.

1 to 2:
Only a trained eye can perceive the difference.

2 to 10:
Slight but obvious difference — the average person would notice the colors are not exactly the same.

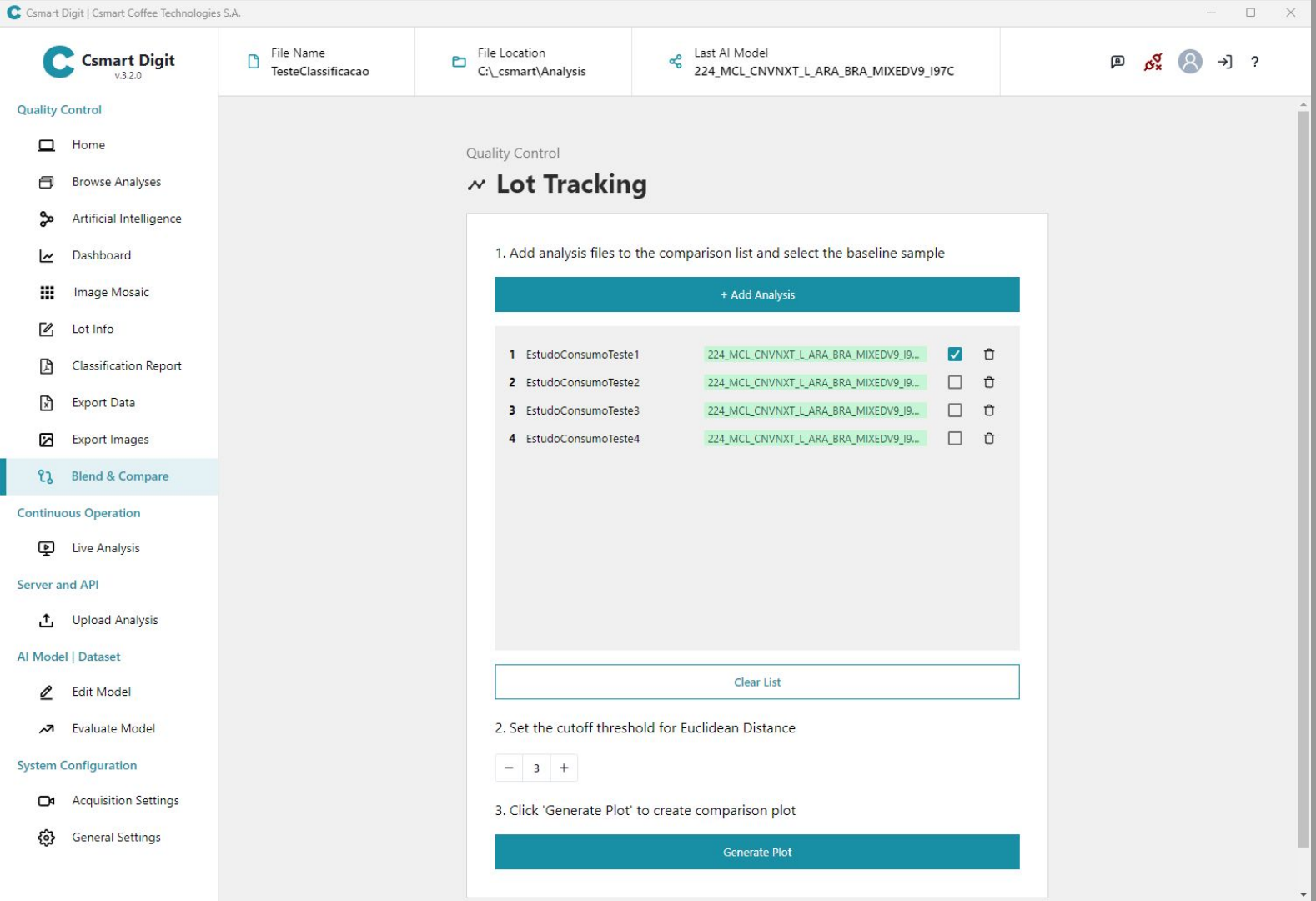
Above 10:
Large and clearly visible difference to anyone.

Color Difference

11. The color circle displays the reference sample at the center, connected to all other samples to create a visual assessment tool.

12. The results are also shown in a table format, with a flag based on the CIEDE2000 scale indicating *Reference*, *Similar*, or *Investigate*.

Use this tool with caution, as comparisons between machines that have not been previously color-calibrated may produce deviations in the analysis.



Lot Tracking

Lot Tracking is a new tool designed to measure differences within the same lot at different stages of the processing chain (same lot, different samples).

Using dimensionality reduction techniques, the tool compares multiple variables gathered from individual images and expresses them as a single distance value. An empirical threshold must be set to define whether samples belong to the same group.

To use this tool, select the required samples, set the threshold value, and click *Generate Plot*.

Csmart Digit | Csmart Coffee Technologies S.A.

Csmart Digit
v.3.2.0

File Name
TesteClassificacao

File Location
C:_csmart\Analysis

Last AI Model
224_MCL_CNVNXT_L_ARA_BRA_MIXEDV9_I97C

Quality Control
- Home
- Browse Analyses
- Artificial Intelligence
- Dashboard
- Image Mosaic
- Lot Info
- Classification Report
- Export Data
- Export Images
- Blend & Compare

Continuous Operation
- Live Analysis

Server and API
- Upload Analysis

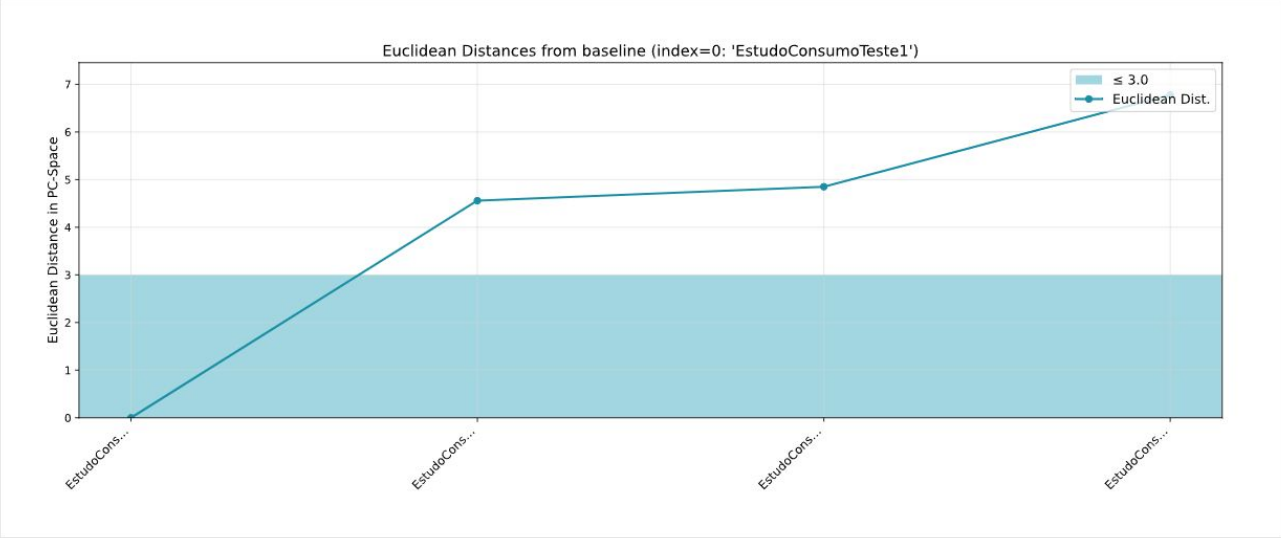
AI Model | Dataset
- Edit Model
- Evaluate Model

System Configuration
- Acquisition Settings
- General Settings

Quality Control

Lot Tracking

Euclidian Distance

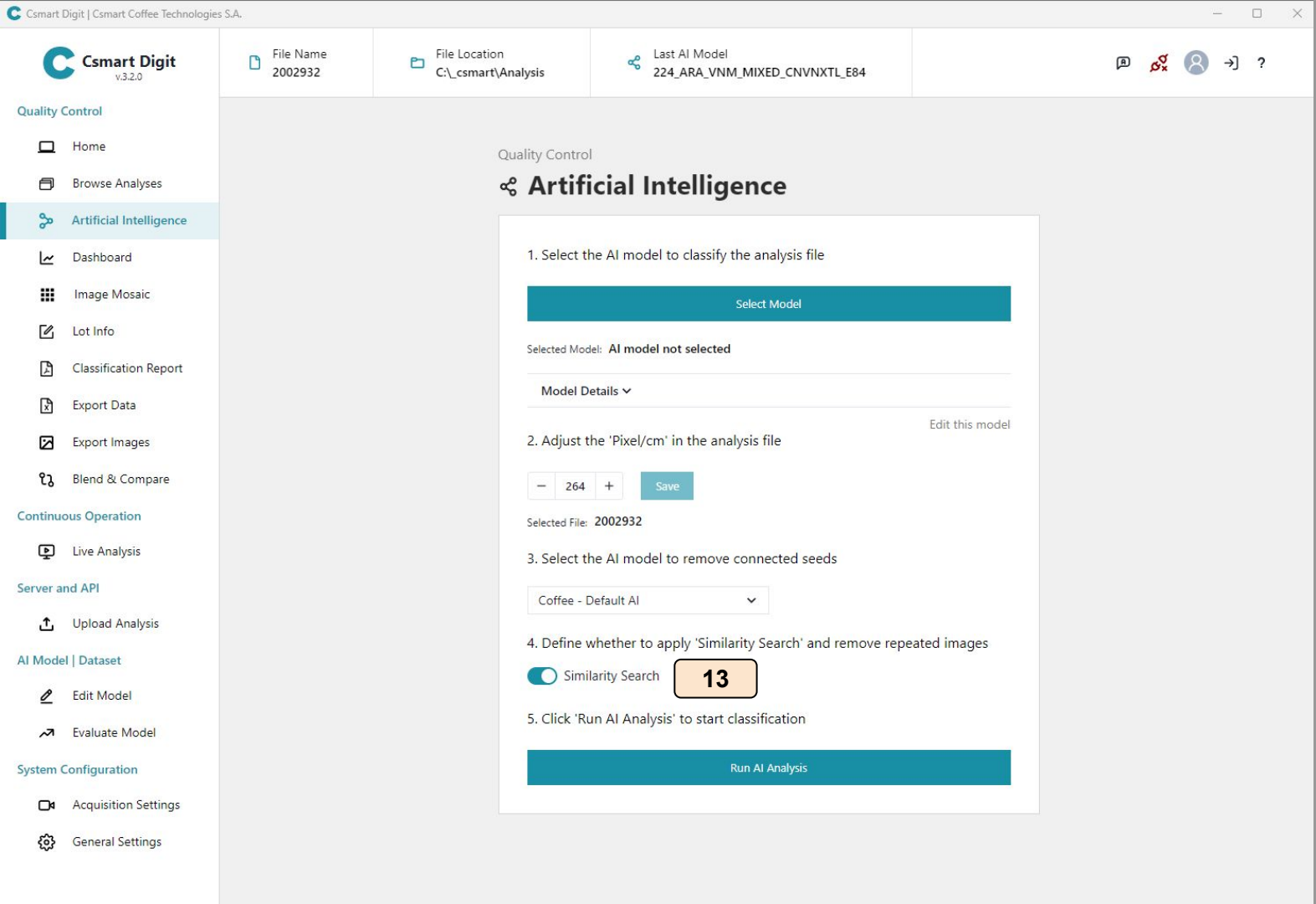


< Select Other Samples

Lot Tracking

The plot displays how far each sample is from the baseline (first sample) in a reduced feature space. Lower values indicate samples that are more similar to the baseline, while higher values indicate greater differences.

The shaded area in the chart represents the similarity threshold set previously. This is an empirical value that should be determined using known samples. Samples with distances within this threshold are considered part of the same group, while those above it may indicate changes in quality, processing, or storage conditions.



Artificial Intelligence

13. A new Similarity Search tool has been implemented to detect repeated seeds in stored images from continuous captures.

Use this tool when you notice repetition in the image mosaic.

CSMART

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