



New Release

Device Control Desktop App

Minor version - V3.0.12

2024/08/16

File Name: VN_ROB_G1S16_TTDSUPERCL | File Location: D:\Projects\csmart-digit-validation\ROB files | Last Analysis Model: 224_MCL_RNXT_CAN_VNM_NATV00_D86 | User: Francisco Massucci Silveira | Open Web Server

Class Name: [dropdown]

Feature Analysis

Scatter Plot showing Mean Brightness vs Area. A legend for Screen Size (11-18) is present. A red dot highlights a specific data point. A preview image of a coffee bean is shown on the right.

Plot Parameters:

- Scatter
- Hexbin
- Log

Plot Options:

- x: Area
- y: Mean Brightness
- c: Screen Size

Show: All Images | Seed number: 0 | Class Probability: 99.5% | Screen Size: 18 | Class: OK

AI Model Parameters:

1. Avarage Entropy: 7.32% | Inference Confidence: High Confidence | Cohen's Kappa: 87.3%

2. Binary Accuracy: **894** | Binary Error: **26** | Multiclass Accuracy: **892** | Multiclass Error: **28**

3. Ratio: 97.17% | Ratio: 2.83% | Ratio: 96.96% | Ratio: 3.04%

4. Confusion Matrix: [dropdown]

Analysis Generated on 2024/06/18 at 15:40:00 by DESKTOP-PVBUDNC | 261 pixels per cm | 5 min area | 70 max area

Dashboard

1. **AI Model Parameters** now presents more features:

Cohen's Kappa coefficient measures how well two systems agree when classifying things—in this case, the AI model and Human Analysis (ground truth). It also considers that some agreements might happen by chance. A score near 0 indicates total disagreement, while 100% shows the AI model's predictions are perfectly aligned with human judgment. This metric becomes relevant after the user has adjusted the classification of images in the image mosaic.

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Feature Analysis

Scatter Plot showing Mean Brightness vs Area. The plot includes a legend for Screen Size (11-18) and a red dot indicating a specific data point. A coffee bean image is shown on the right.

Plot Parameters:

- Scatter (checked)
- Hexbin
- Log

Analysis Data:

- Seed number: 0
- Class Probability: 99.5%
- Screen Size: 18

Buttons:

- Generate Plot
- Save Image
- Navigation icons: back, forward, first, last

AI Model Parameters:

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4. Confusion Matrix

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Dashboard

2. **Binary Accuracy** and **Binary Error** measures are used to evaluate the performance of an AI model when differentiating between good coffee and defective coffee. Binary Accuracy calculates the percentage of correct predictions for defective classes out of all predictions, while Binary Error represents the percentage of incorrect predictions. These metrics are crucial for understanding how well the model distinguishes between good and defective coffees, disregarding errors within these subsets.

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Class Name:

Feature Analysis

Scatter Plot: Mean Brightness vs Area. A legend for Screen Size (11-18) is shown. A red dot indicates the current analysis point (Area: 18, Mean Brightness: 120).

Plot Parameters: Scatter, Hexbin, Log. X-axis: Area, Y-axis: Mean Brightness. Show: All Images. Class: OK. Generate Plot, Save Image buttons.

Image Preview: A close-up image of a coffee bean.

AI Model Parameters:

- 1. Avarage Entropy: 7.32%, Inference Confidence: High Confidence, Cohen's Kappa: 87.3%
- 2. Binary Accuracy: **894** (Ratio: 97.17%), Binary Error: **26** (Ratio: 2.83%)
- 3. Multiclass Accuracy: **892** (Ratio: 96.96%), Multiclass Error: **28** (Ratio: 3.04%)

Confusion Matrix: [Confusion Matrix](#)

Analysis Generated on 2024/06/18 at 15:40:00 by DESKTOP-PVBUDNC | 261 pixels per cm | 5 min area | 70 max area

Dashboard

3. **Multiclass Accuracy** and **Error** are used to evaluate the performance of an AI model when differentiating between all classes present in the model. Multiclass Accuracy calculates the percentage of correct predictions for each class out of all predictions, while Multiclass Error represents the percentage of incorrect predictions across these classes. These metrics are essential for understanding how well the model distinguishes between various classes and assessing the overall model error.

File Name
VN_ROB_G1S16_TTDSUPERCL

File Location
D:\Projects\csmart-digit-validation\ROB files

Last Analisis Model
224_MCL_RNXT_CAN_VNM_NATV00_D86

Francisco Massucci Silveira
Open Web Server

Class Name

Feature Analysis

Plot Parameters

Scatter
 Hexbin
 Log

x: Area
y: Mean Brightness
c: Screen Size

Show: All Images

Seed number: 0
Class Probability: 99.5%
Screen Size: 18

Class: OK

Generate Plot **Save Image**

1.

Average Entropy: 7.32%
Inference Confidence: High Confidence
Cohen's Kappa: 87.3%

2.

Binary Accuracy
894
Ratio: 97.17%

Binary Error
26
Ratio: 2.83%

3.

Multiclass Accuracy
892
Ratio: 96.96%

Multiclass Error
28
Ratio: 3.04%

Confusion Matrix ▾

Analysis Generated on 2024/06/18 at 15:40:00 by DESKTOP-PVBUDNC | 261 pixels per cm | 5 min area | 70 max area

Dashboard

4. Click on **Confusion Matrix** button to open this metric. A confusion matrix is a table used to define the performance of a classification algorithm. A confusion matrix visualizes and summarizes the performance of a classification algorithm by presenting the predicted label on the X-axis and the true label (images that have been adjusted by the user) on the Y-axis. This metric is only relevant if the user changed image classes in the image mosaic.

Dashboard

5. Results in the diagonal represent correct predictions, as the predicted label is equal to the True Label. Every other occurrence represent where and how the model error during prediction.

6. A table with the Classes name, Precision, Recall and F1-Score is presented for each class. The definition of these metrics area presented in the text below the table.

7. The **Save Image** button is intended to save the confusion matrix in jpg format

AI Model Parameters

Avarage Entropy

7.32%

Inference Confidence

High Confidence

Cohen's Kappa

87.3%

Binary Accuracy

894

Ratio: 97.17%

Binary Error

26

Ratio: 2.83%

Multiclass Accuracy

892

Ratio: 96.96%

Multiclass Error

28

Ratio: 3.04%

Confusion Matrix ^

5.

Model 224_MCL_RNXT_CAN_VNM_NATV00_D86

6.



Save Image

7.

Quality Control

- Home
- Artificial Intelligence
- Dashboard
- Image Mosaic
- Lot Info
- Classification Report
- Export Data
- Export Images
- Compare

Cloud Services

- Upload Analysis

AI Model

- Model Evaluation

App Configuration

- Acquisition Settings
- General Settings
- About

8.

AI Model
Model Evaluation

1. Add analysis files to the assessment list

+ Add Analysis

9.

No files selected

Clear List

2. Click 'Evaluate Model' after selecting the appropriate analysis files

Evaluate Model**Dashboard**

8. A new section in the side menu named **Model Evaluation** aims to evaluate the performance of a specific AI model after promoting and demoting classes from different analyses, using the Image Mosaic tool. To access this feature, click on Model Evaluation

9. Click in **+Add Analysis** and select the files that have been adjusted for image classification.

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AI Model

Model Evaluation

1. Add analysis files to the assessment list

+ Add Analysis

1 VN_ROB_FAQ_TTD	224_MCL_RNXT_CAN_VNM_NATV00_D86	10.
2 VN_ROB_FAQ_TTD_test	224_MCL_RNXT_CAN_VNM_NATV01_G85	
3 VN_ROB_G1S16_TTDSUPERCL	224_MCL_RNXT_CAN_VNM_NATV00_D86	
4 VN_ROB_S16_28B	224_MCL_RNXT_CAN_VNM_NATV00_D86	
5 VN_ROB_S16_28B_test	224_MCL_RNXT_CAN_VNM_NATV01_G85	
6 VN_ROB02585_3	224_MCL_RNXT_CAN_VNM_NATV00_D86	
7 VN_ROBDAKLAD_CALIB2	224_MCL_RNXT_CAN_VNM_NATV00_D86	
8 VN_ROBDAKLAK_1	224_MCL_RNXT_CAN_VNM_NATV00_D86	
9 VN_ROBDAKLAK_2	224_MCL_RNXT_CAN_VNM_NATV00_D86	
10 VN_ROBDAKLAK_3	224_MCL_RNXT_CAN_VNM_NATV00_D86	
11 VN_ROBDAKLAK_CALIB3	224_MCL_RNXT_CAN_VNM_NATV00_D86	

Clear List

2. Click 'Evaluate Model' after selecting the appropriate analysis files

Evaluate Model

Dashboard

10. Make sure only files that were analyzed with the same AI model are selected in the list. Remove those that are not.

Quality Control

- Home
- Artificial Intelligence
- Dashboard
- Image Mosaic
- Lot Info
- Classification Report
- Export Data
- Export Images
- Compare

Cloud Services

- Upload Analysis

AI Model

- Model Evaluation

App Configuration

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- General Settings
- About

Dashboard

11. Click in **Evaluate Model** button to generate the evaluation

Model Evaluation

1. Add analysis files to the assessment list

+ Add Analysis

1 VN_ROB_FAQ_TTD	224_MCL_RNXT_CAN_VNM_NATV00_D86	⋮
2 VN_ROB_G1S16_TTDSUPERCL	224_MCL_RNXT_CAN_VNM_NATV00_D86	⋮
3 VN_ROB_S16_2BB	224_MCL_RNXT_CAN_VNM_NATV00_D86	⋮
4 VN_ROB02585_3	224_MCL_RNXT_CAN_VNM_NATV00_D86	⋮
5 VN_ROBDAKLAD_CALIB2	224_MCL_RNXT_CAN_VNM_NATV00_D86	⋮
6 VN_ROBDAKLAK_1	224_MCL_RNXT_CAN_VNM_NATV00_D86	⋮
7 VN_ROBDAKLAK_2	224_MCL_RNXT_CAN_VNM_NATV00_D86	⋮
8 VN_ROBDAKLAK_3	224_MCL_RNXT_CAN_VNM_NATV00_D86	⋮
9 VN_ROBDAKLAK_CALIB3	224_MCL_RNXT_CAN_VNM_NATV00_D86	⋮
10 VN_ROBFAQ_02585_2	224_MCL_RNXT_CAN_VNM_NATV00_D86	⋮
11 VN_ROBFAQ_TTD02585_1	224_MCL_RNXT_CAN_VNM_NATV00_D86	⋮

Clear List

2. Click 'Evaluate Model' after selecting the appropriate analysis files

Evaluate Model

11.

Dashboard

C Csmart Digit | Csmart Coffee Technologies S.A.

CSMART
DIGIT

Quality Control

- Home
- Artificial Intelligence
- Dashboard
- Image Mosaic
- Lot Info
- Classification Report
- Export Data
- Export Images
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Cloud Services

- Upload Analysis

AI Model

- Model Evaluation**

App Configuration

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About

File Name: VN_ROB_G1S16_TTDSUPERCL

File Location: D:\Projects\csmart-digit-validation\ROB files

Last Analysis Model: 224_MCL_RNXT_CAN_VNM_NATV00_D86

Francisco Massucci Silveira
Open Web Server

AI Model
Model Evaluation

Selected Analysis: 37

Average Entropy: 8.2%
Inference Confidence: **High Confidence**
Cohen's Kappa: 77.9%

Binary Accuracy: **44204**
Ratio: 92.05%
Binary Error: **3819**
Ratio: 7.95%
Multiclass Accuracy: **42714**
Ratio: 88.94%
Multiclass Error: **5309**
Ratio: 11.06%

Confusion Matrix

Model 224_MCL_RNXT_CAN_VNM_NATV00_D86

True label	Broken	Brown	Floaters	FM	Fragment	Full Black	Immature	Insect Dam.	Moldy	OK	Pod
Broken	762	0	0	0	33	0	3	1	1	25	1
Brown	41	1499	0	9	51	18	809	17	89	108	8
Floaters	4	0	760	0	18	0	6	0	2	56	0
FM	0	0	0	1390	4	1	3	0	0	0	6
Fragment	6	0	0	15	2315	0	2	1	0	3	0
Full Black	1	15	0	4	10	132	36	2	20	3	4
Immature	8	1	0	4	17	1	3554	2	9	111	0
Insect Dam.	5	0	0	0	15	3	101	355	8	86	0
Moldy	5	8	0	4	4	2	22	14	406	34	0
OK	166	9	1	16	201	23	2900	30	41	31478	6
Pod	0	0	0	14	2	0	0	0	0	0	63

Class: FM, Precision: 0.95, Recall: 0.99, F1-Score: 0.97
Class: Floaters, Precision: 1.00, Recall: 0.90, F1-Score: 0.95
Class: OK, Precision: 0.99, Recall: 0.90, F1-Score: 0.94
Class: Fragment, Precision: 0.87, Recall: 0.99, F1-Score: 0.92
Class: Broken, Precision: 0.76, Recall: 0.92, F1-Score: 0.84
Class: Moldy, Precision: 0.70, Recall: 0.81, F1-Score: 0.76
Class: Pod, Precision: 0.72, Recall: 0.80, F1-Score: 0.75
Class: Brown, Precision: 0.98, Recall: 0.57, F1-Score: 0.72
Class: Insect Dam., Precision: 0.84, Recall: 0.62, F1-Score: 0.71
Class: Full Black, Precision: 0.73, Recall: 0.58, F1-Score: 0.65
Class: Immature, Precision: 0.48, Recall: 0.96, F1-Score: 0.64

12.

Precision: For a given class, precision is the ratio of correctly predicted instances of that class to the total number of instances predicted as that class. It answers the question, "Of all the times the model predicted a class, how often was it correct?"

Recall: For a given class, recall is the ratio of correctly predicted instances of that class to the actual number of instances of that class in the analysis. It addresses the question, "Of all the actual instances of a class, how many did the model correctly predict?"

F1 Score: This is the harmonic mean of precision and recall. It is especially useful when the class distribution is uneven. An F1 score reaches its best value at 1 (perfect precision and recall) and its worst at 0.

12. Similar to the resources present in the dashboard for a single file, this tool concatenates the reading for multiple files, presenting a thorough evaluation of the selected Model, its accuracy and ability to generalize to new data. It is important to note that the table presents, from top to bottom, the most accurate class predictions, thus indicating classes at the bottom that require more images to increase the model's performance.



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