

Data Challenge '22

The submission guidelines for competition entries as well as the process for evaluating models are outlined in the following slides

Submission Guidelines



Submission Format



- Each submission entry must include:
- **Test Classification:** the jupyter notebook that runs the classification tasks on new data.
 - Use the provided `solution.ipynb` as base notebook.
- **Models:** the trained models that will be used to classify new data
 - Your notebook must read and use them to provide classification
- **Short Paper:** a short paper (Max 4 pages) describing the team solution

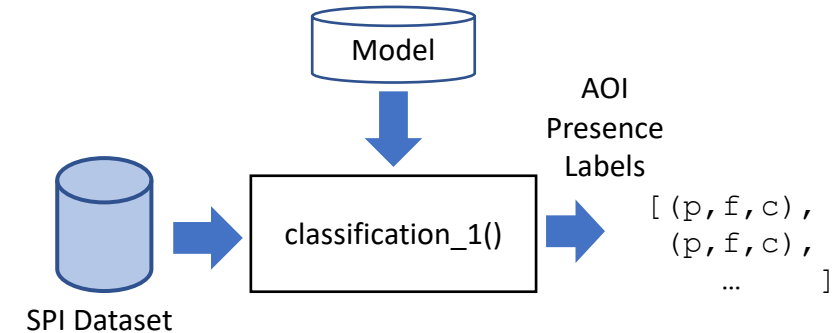
Task 1: AOI Label

- **Input:**

- **SPI DataFrame:** a Pandas DataFrame as read from the CSV file using `pd.read_csv()`
- ***classification_1()*** reads a pre-trained model that you should store in the JupyterHub directory (or you can attach to your submission)
 - Predicts whether the AOI will report a defect in a component.

- **Output:**

- **AOI Labels:** the predicted defects in the form a list of tuples in the form **(Panel (p), Figure (f), Component (c))**
 - **Note:** the list must include the **only the defects components**. If for a component your classifier **does not predict a defect, it must not be** included in the list.



PanelID	FigureID	Date	Time	ComponentID	PinNumber	PadID	...	Shape(um)	PosX(mm)	PosY(mm)	Result
2531908800520102844	1.0	9/1/2019	00:07:04	BC1	1	1.0	...	0.0	55.6	23.6	GOOD
2531908800520102844	1.0	9/1/2019	00:07:04	BC1	2	2.0	...	0.0	48.5	23.6	GOOD
2531908800520102844	1.0	9/1/2019	00:07:04	BC2	1	3.0	...	0.0	13.4	23.6	GOOD
2531908800520102844	1.0	9/1/2019	00:07:04	BC2	2	4.0	...	0.0	20.5	23.6	GOOD
2531908800520102844	1.0	9/1/2019	00:07:04	BC3	1	5.0	...	0.0	55.6	45.6	GOOD
...
27219034900520102844	8.0	7/29/2019	23:26:35	U5	6	3156.0	...	44.4	43.5	87.9	GOOD
27219034900520102844	8.0	7/29/2019	23:26:35	U5	7	3157.0	...	46.7	43.5	86.6	GOOD
27219034900520102844	8.0	7/29/2019	23:26:35	U5	8	3158.0	...	44.4	43.5	85.4	GOOD
27219034900520102844	8.0	7/29/2019	23:26:35	Z1	1	3159.0	...	42.6	43.1	82.4	GOOD
27219034900520102844	8.0	7/29/2019	23:26:35	Z1	2	3160.0	...	53.3	43.1	80.0	GOOD

Task 2: OperatorLabel

• Input:

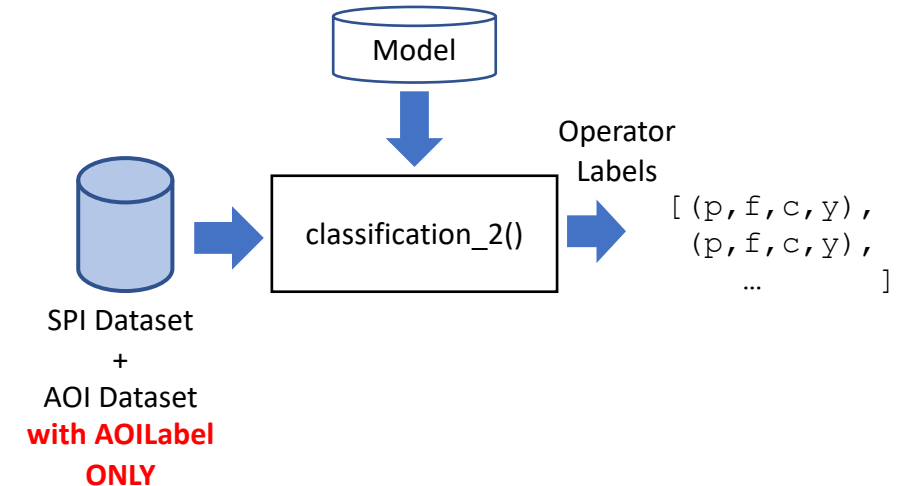
- **SPI DataFrame:** a Pandas DataFrame as read from the CSV file using `pd.read_csv()`
- **AOI Label:** a Pandas DataFrame that we read from the AOI CSV file using `pd.read_csv()`. We include only a subset of the columns. They are:
 - "PanelID", "FigureID", "MachineID", "ComponentID", "PinNumber", "AOILabel"
 - **Note:** The only useful column in the AOI dataset is the **AOILabel**. This is the only additional feature available. The other columns must be used to join the **SPI** and the **AOI** dataframes.

- **classification_2()** reads a pre-trained model that you should store in the JupyterHub directory (or you can attach to your submission).

- Predicts the operator label for the components present in **both** the SPI and the AOI datasets.

• Output:

- The list of predicted **operator labels (Good or Bad)**.
- Each entry is a **tuple** in the form (Panel (p), Figure (f), Component (c), PredictedOperatorLabel (y))



PanelID	FigureID	Date	Time	ComponentID	PinNumber	PadID	...	Shape(um)	PosX(mm)	PosY(mm)	Result
25319088000520102844	1.0	9/1/2019	00:07:04	BC1	1	1.0	...	0.0	56.6	23.6	GOOD
25319088000520102844	1.0	9/1/2019	00:07:04	BC1	2	2.0	...	0.0	48.5	23.6	GOOD
25319088000520102844	1.0	9/1/2019	00:07:04	BC2	1	3.0	...	0.0	13.4	23.6	GOOD
25319088000520102844	1.0	9/1/2019	00:07:04	BC2	2	4.0	...	0.0	20.5	23.6	GOOD
25319088000520102844	1.0	9/1/2019	00:07:04	BC3	1	5.0	...	0.0	55.6	45.6	GOOD
...
27219034800520102844	8.0	7/28/2019	23:26:35	U5	6	3156.0	...	44.4	43.5	87.9	GOOD
27219034800520102844	8.0	7/28/2019	23:26:35	U5	7	3157.0	...	46.7	43.5	86.6	GOOD
27219034800520102844	8.0	7/28/2019	23:26:35	U5	8	3158.0	...	44.4	43.5	85.4	GOOD
27219034800520102844	8.0	7/28/2019	23:26:35	Z1	1	3159.0	...	42.6	43.1	82.4	GOOD
27219034800520102844	8.0	7/28/2019	23:26:35	Z1	2	3160.0	...	53.3	43.1	80.0	GOOD

PanelID	FigureID	ComponentID	AOILabel
26319044800520102844	2	C31	Coplanarity
26319044800520102844	2	D1	Translated
26319044900520102844	6	BC1	UnSoldered

Task 3: RepairLabel

• Input:

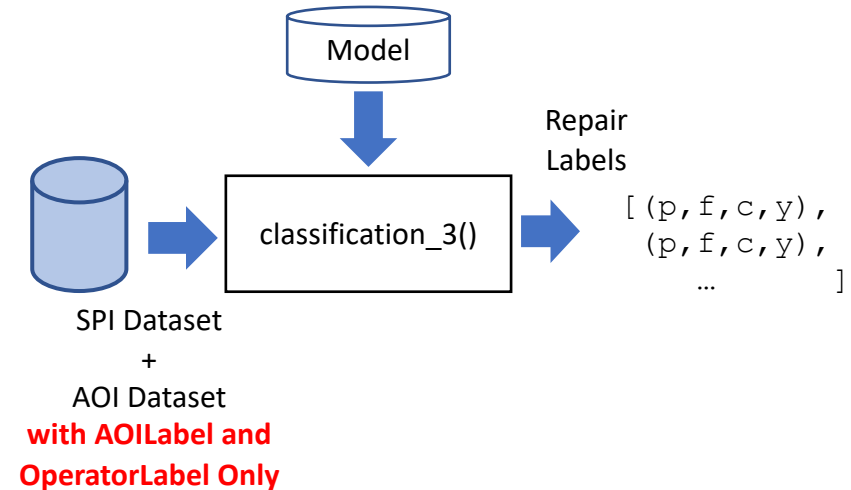
- **SPI DataFrame:** a Pandas DataFrame as read from the CSV file using `pd.read_csv()`
- **AOI and Operator Label:** a Pandas DataFrame that we read from the AOI CSV file using `pd.read_csv()`. We include only a subset of the columns. They are:
 - "PanelID", "FigureID", "MachineID", "ComponentID", "PinNumber", "AOILabel", "OperatorLabel"
 - **Note:** The only useful columns in the AOI dataset are AOILabel and OperatorLabel. These are the only additional feature available. The other columns must be used to join the **SPI** and the **AOI** dataframes.

- **classification_3()** reads a pre-trained model that you should store in the JupyterHub directory (or you can attach to your submission)

- Predicts the repair label for the components present in both the SPI and the AOI datasets and for which the OperatorLabel is **bad**.

• Output:

- The list of predicted **repair labels (NotPossibleToRepair or FalseScrap)**.
- Each entry is a **tuple** in the form (Panel (p), Figure (f), Component (c), PredictedRepairLabel (y))



PanelID	FigureID	Date	Time	ComponentID	PinNumber	PadID	Shape(um)	PosX(mm)	PosY(mm)	Result
2631908800520102844	1.0	9/1/2019	00:07:04	BC1	1	1.0	---	0.0	55.6	23.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC1	2	2.0	---	0.0	48.5	23.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC2	1	3.0	---	0.0	13.4	23.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC2	2	4.0	---	0.0	20.5	23.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	1	5.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	2	6.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	3	7.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	4	8.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	5	9.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	6	10.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	7	11.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	8	12.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	9	13.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	10	14.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	11	15.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	12	16.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	13	17.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	14	18.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	15	19.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	16	20.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	17	21.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	18	22.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	19	23.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	20	24.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	21	25.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	22	26.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	23	27.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	24	28.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	25	29.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	26	30.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	27	31.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	28	32.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	29	33.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	30	34.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	31	35.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	32	36.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	33	37.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	34	38.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	35	39.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	36	40.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	37	41.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	38	42.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	39	43.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	40	44.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	41	45.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	42	46.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	43	47.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	44	48.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	45	49.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	46	50.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	47	51.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	48	52.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	49	53.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	50	54.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	51	55.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	52	56.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	53	57.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	54	58.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	55	59.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	56	60.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	57	61.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	58	62.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	59	63.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	60	64.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	61	65.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	62	66.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	63	67.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	64	68.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	65	69.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	66	70.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	67	71.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	68	72.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	69	73.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	70	74.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	71	75.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	72	76.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	73	77.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	74	78.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	75	79.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	76	80.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	77	81.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	78	82.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	79	83.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	80	84.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	81	85.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	82	86.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	83	87.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	84	88.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	85	89.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	86	90.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	87	91.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	88	92.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	89	93.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	90	94.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	91	95.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	92	96.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	93	97.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	94	98.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	95	99.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	96	100.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	97	101.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	98	102.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	99	103.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	100	104.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0	9/1/2019	00:07:04	BC3	101	105.0	---	0.0	55.6	45.6 GOOD
2631908800520102844	1.0									

Model Performance Evaluation

The Notebook TestPerformance is provided to illustrate the performance evaluation process



RepairLabel: Test Classification



1. Task 1 runs to predict the AOI presence labels
 - Outputs the list of defects
2. Task 2 runs to predict the Operator labels
 - Outputs a list of tuples indicating the operator label of a component
3. Task 3 runs to predict the Repair labels
 - Outputs a list of tuples indicating the repair label of a component

