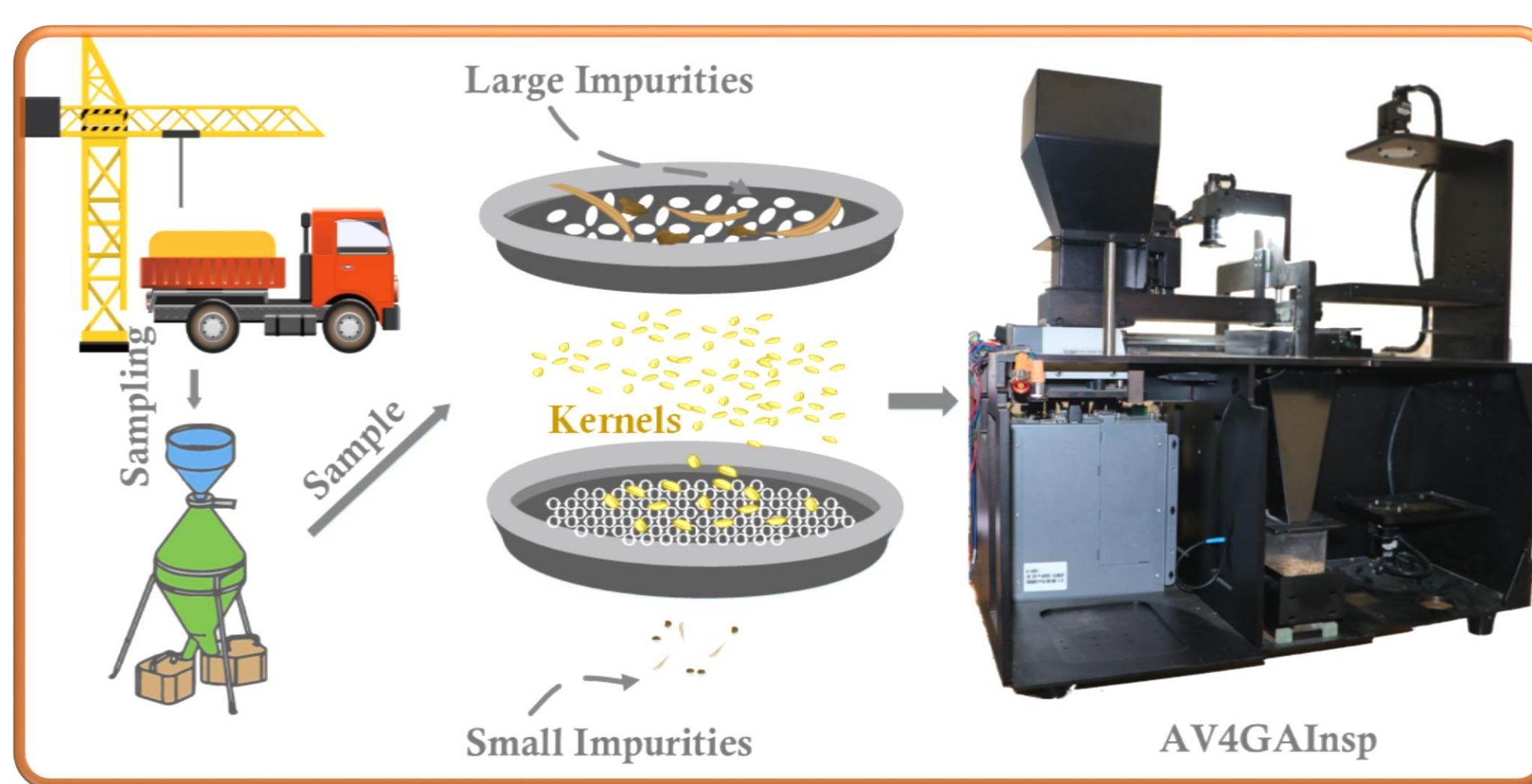


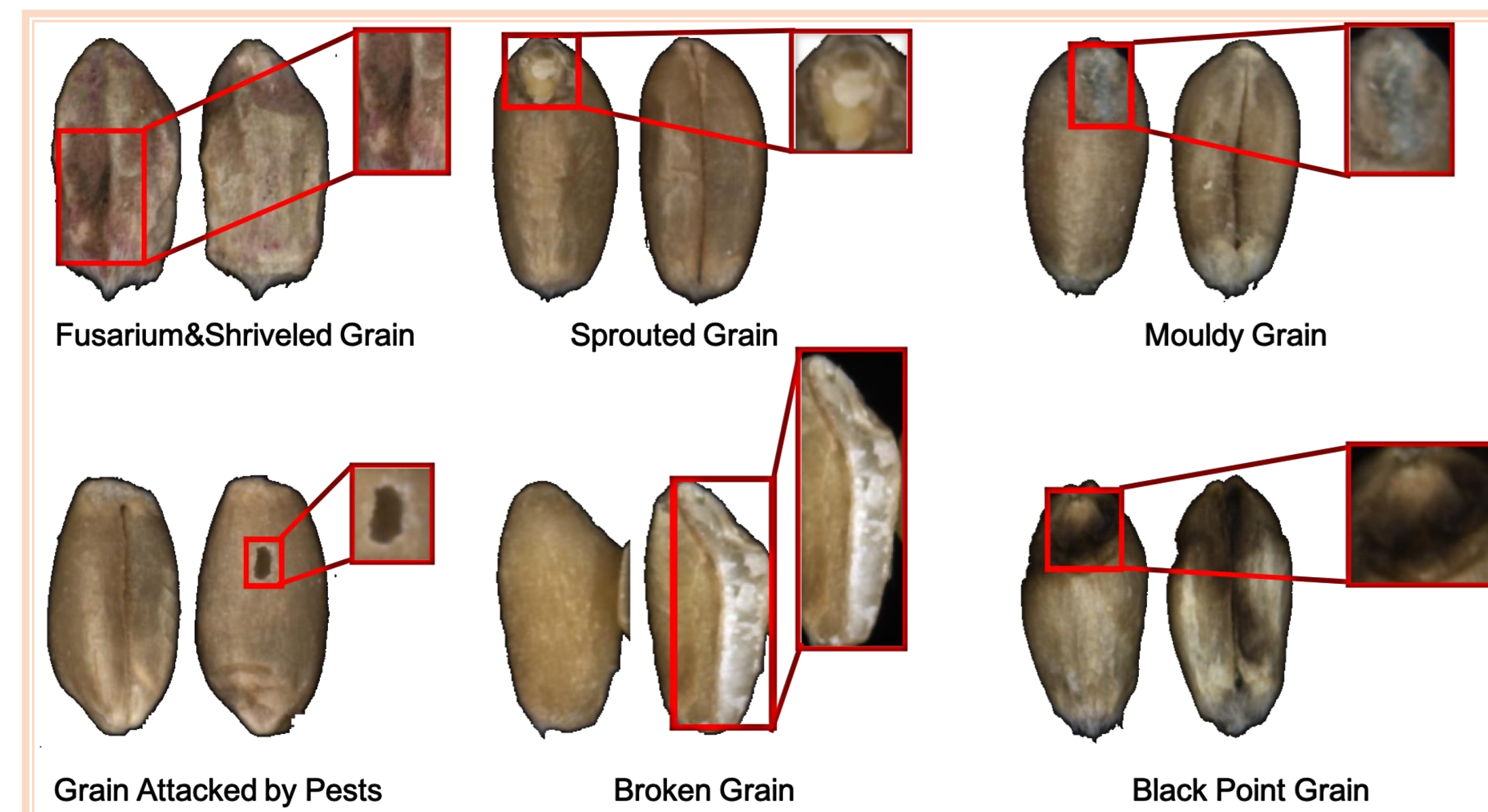
Contributions

- ◆ We developed an automated vision-based system for GAI, named **AV4GAInsp**.
- ◆ The device can accommodate a variety of grain kernels and capture high-quality visual images in an efficient manner.
- ◆ We released a dataset, named **GrainDet**, including over **140K** images for wheat, sorghum and rice.

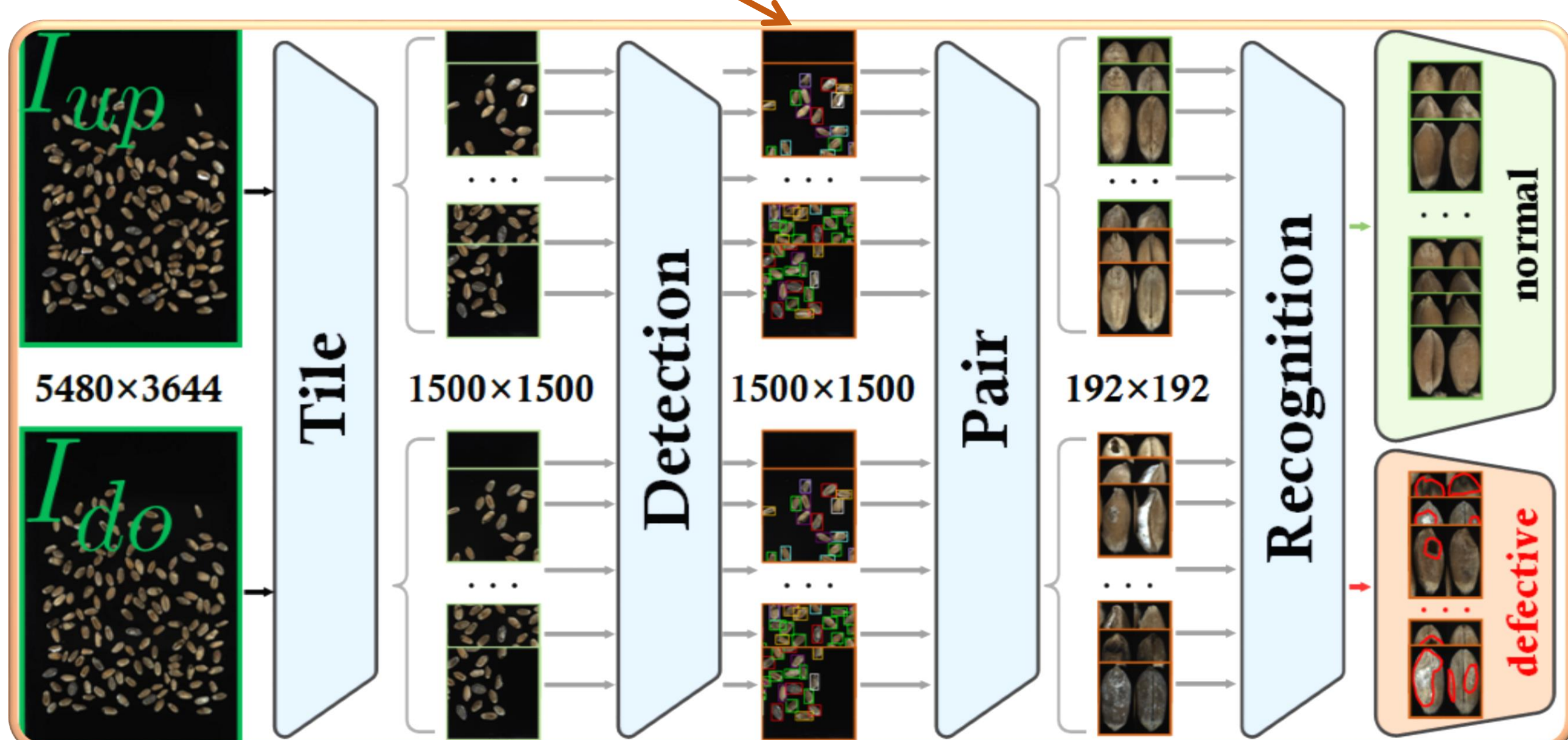
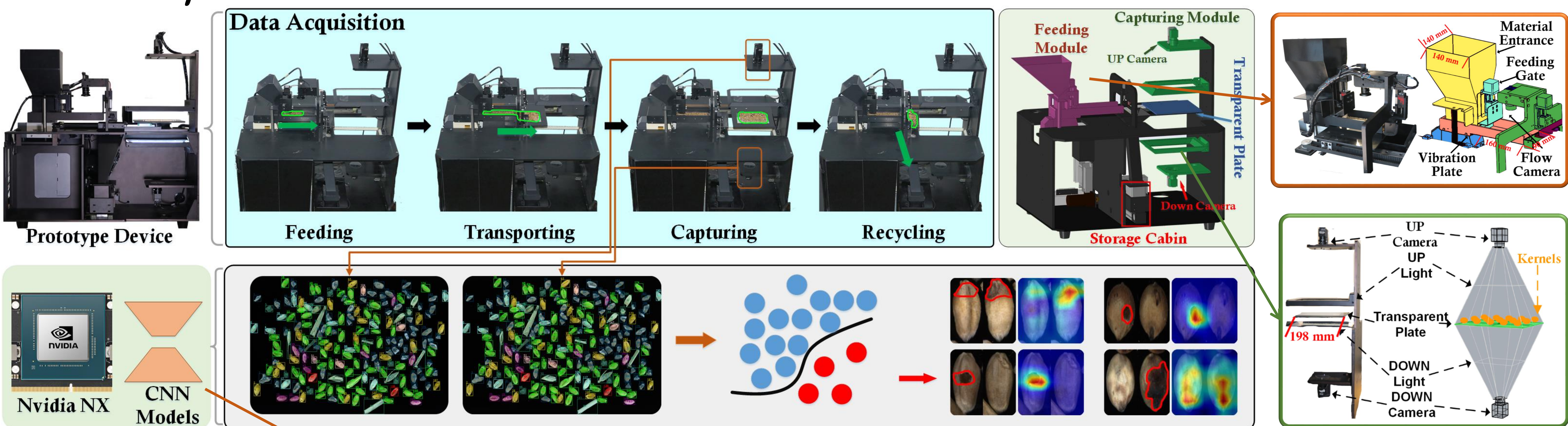
Role in Grain Inspection



Defective Grains (Wheat)



AV4GAInsp



Dataset: GrainDet

Species	NOR	Defective						IM	Total
		SD	FS	MY	BN	AP			
Wheat	48.1K	5.1K	5.1K	1.4K(BP)	5.2K	5.8K	5.2K	4K	80K
Rice	16K	1.1K	1.2K	1.2K(UN)	1.2K	1.2K	1.2K	1.6K	24.7K
Sorghum	24K	3.6K	1.4K	0.2K(HD)	3.6K	3.6K	3.6K	1.2K	41K

Confusion Matrix

a

	NOR	F&S	SD	MY	AP	BN	BP	IM	Recall	Accuracy	F1-score
NOR	9545	17	0	0	1	0	0	0	99.8	99.6	99.7
F&S	31	986	0	1	0	0	3	1	96.5	97.6	97
SD	0	0	1016	0	0	0	0	0	100	100	100
MY	0	3	0	1061	0	0	0	0	99.7	99.9	99.8
AP	4	4	0	0	1080	2	0	0	99.1	99.9	99.5
BN	0	0	0	0	0	1197	0	0	100	99.8	99.9
BP	0	0	0	0	0	0	281	0	100	98.9	99.5
IM	0	0	0	0	0	1	0	796	99.9	99.9	99.9

b

Wheat

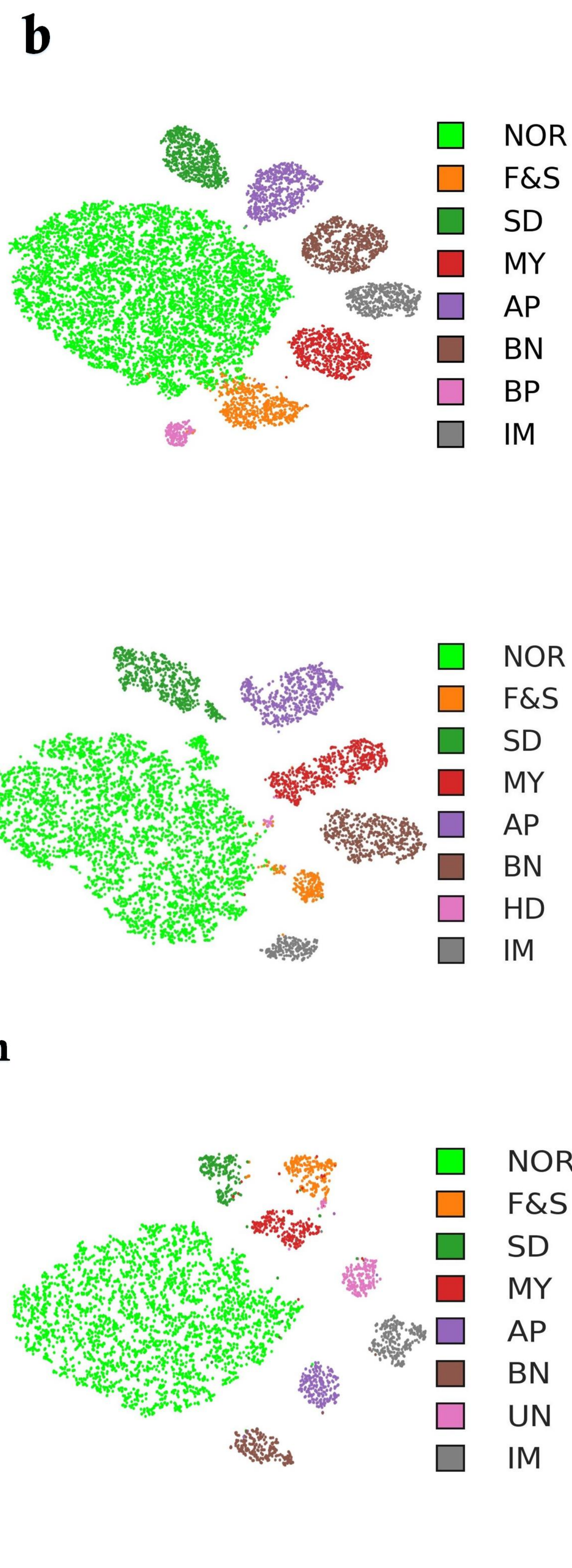
	NOR	F&S	SD	MY	AP	BN	HD	IM	Recall	Accuracy	F1-score
NOR	4777	6	0	3	0	0	0	0	99.8	99.7	99.8
F&S	10	240	0	0	0	0	2	1	94.9	96.4	95.6
SD	2	1	712	0	0	0	0	0	99.6	99.9	99.7
MY	0	1	0	722	1	0	0	0	99.7	98.9	99.3
AP	1	0	0	2	716	0	0	0	99.6	99.9	99.7
BN	0	0	0	1	0	708	0	0	99.9	100	99.9
HD	0	1	1	2	0	0	30	0	88.2	93.8	90.9
IM	0	0	0	0	0	0	0	255	100	99.6	99.8

Sorghum

	NOR	F&S	SD	MY	AP	BN	UN	IM	Recall	Accuracy	F1-score
NOR	3209	1	1	0	2	1	0	0	99.8	99.8	99.8
F&S	0	232	1	0	1	0	4	0	97.5	96.3	96.9
SD	4	2	232	3	0	0	2	0	95.5	97.9	96.7
MY	1	5	3	253	0	0	2	0	95.8	97.3	96.6
AP	1	0	0	0	236	4	1	0	97.5	98.3	97.9
BN	1	0	0	2	1	238	1	3	96.7	97.9	97.3
UN	0	1	0	2	0	0	210	0	98.6	95.5	97
IM	0	0	0	0	0	0	0	292	100	99	99.5

Rice

t-SNE Visualization



AV4GAInsp vs. Experts

