

# USING DEEP LEARNING TO ASSESS PHENOTYPICAL DIFFERENCES IN RICE SEED IMAGE DATA OF GENOTYPICALLY IDENTIFIED SEEDS OF INDICA SUBPOPULATION

Marvin Jerald Feranil Villador, Jeffrey Detras and  
Val Randolph Madrid

# RICE FOR US!

wearychef.com



# RICE PRODUCTION



# RICE PRODUCTION



# RICE PRODUCTION



# RICE FOR US!

wearychef.com



# RICE RESEARCH



AUS 78-62::IRGC 69456-1	AUS	IRIS	IRGC	Ind2	3k	19.0	C	A	C	A	T	T	C	G	G	A	G	G
PA FADAYA::IRGC 58524-1	PA F	IRIS	IRGC	Indx	3k	19.0	C	A	C	A	T	T	C	G	G	A	G	G
MEKENZIE SMALL::IRGC 49895-1	MEK	IRIS	IRGC	Ind2	3k	19.0			C	A	T	T	C	G	G	A	G	G
TAMASHIRO HIKARI::IRGC 74534-	TAM	IRIS	IRGC	Indx	3k	19.0			C	A	T	T	C	G	G	A	G	G
MADINIKA 1329::GERVEX 8366-C1	MAD	IRIS	IRGC	Ind2	3k	19.0	C	A	C	A	T	T	C	G	G	A	G	G
TSIPALA B 160::GERVEX 8378-C1	TSI	IRIS	IRGC	Indx	3k	19.0	C	A	C	A	T	T	C	G	G	A	G	G
TSIPALA MENA 626::GERVEX 5392																		



# BIOINFORMATICS

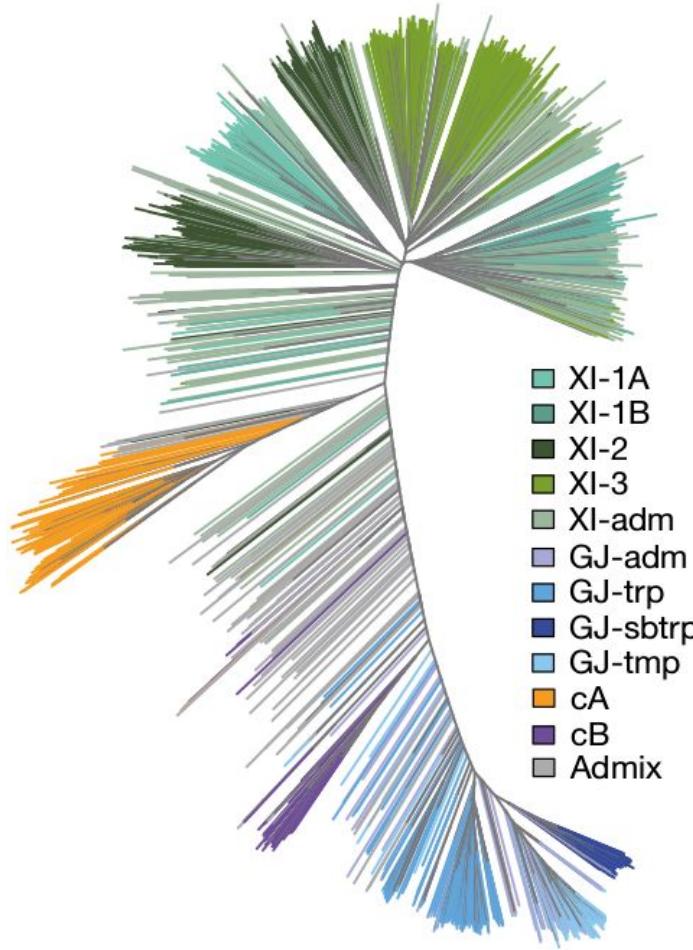


# BIOINFORMATICS

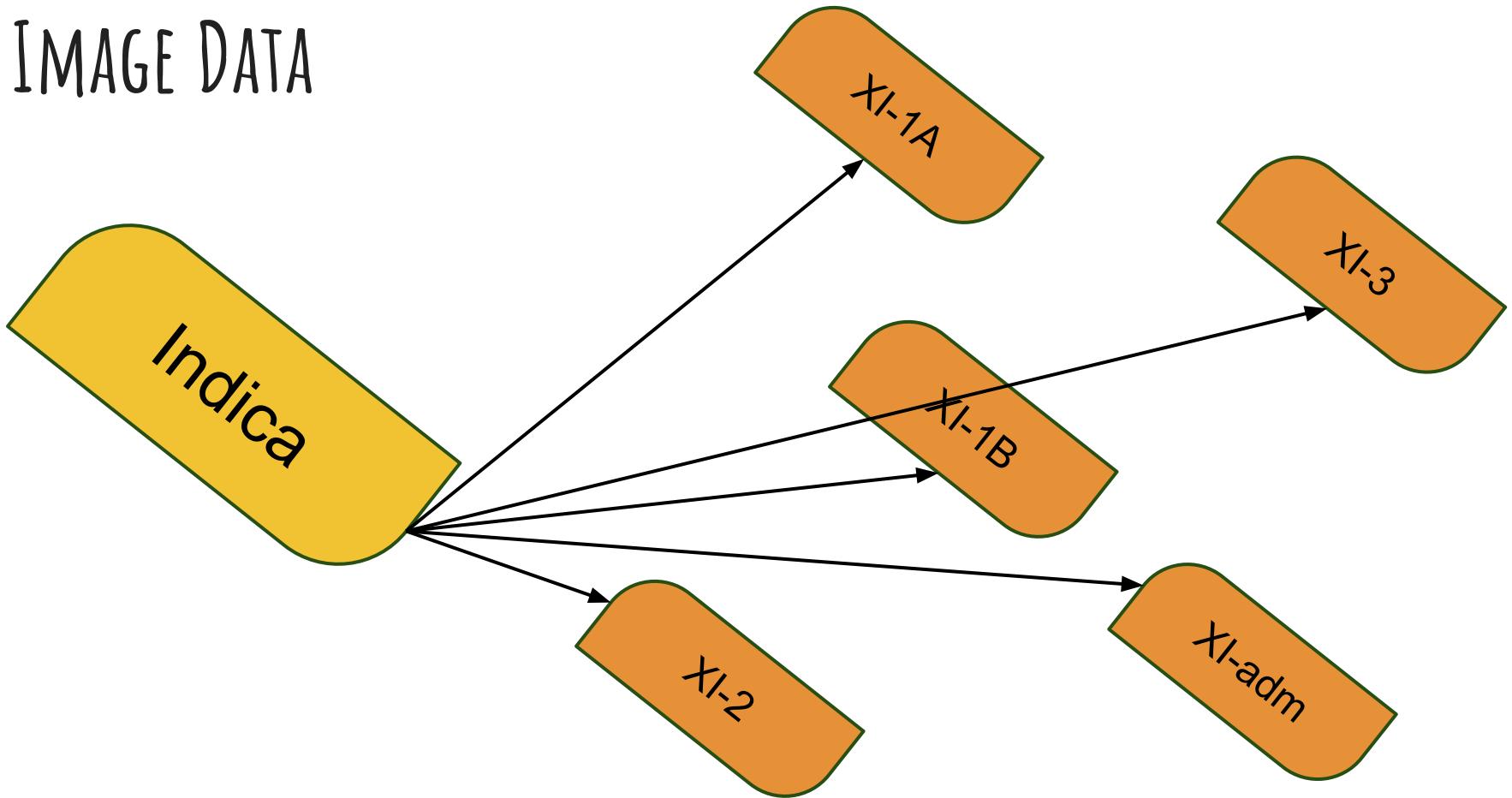


# OBJECTIVES

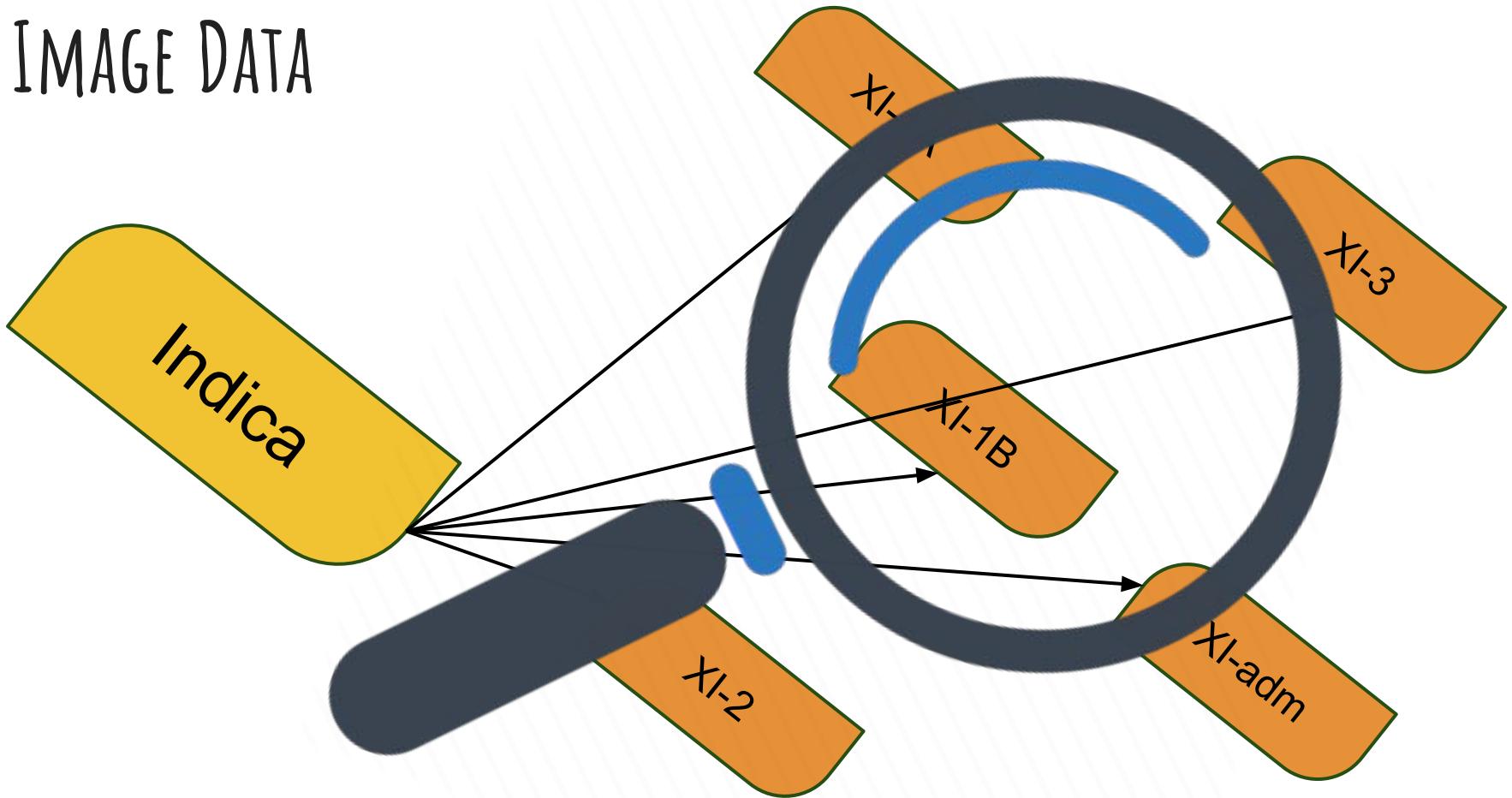
# GENOMIC VARIATION



# IMAGE DATA



# IMAGE DATA



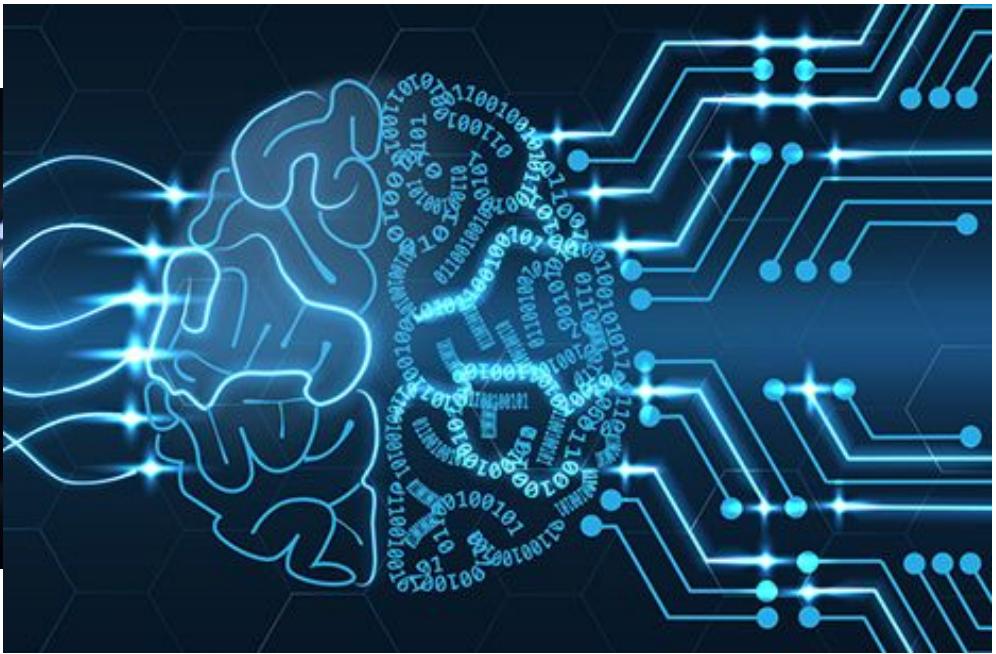
# CHECK DIFFERENCES!



# CHECK DIFFERENCES!



# THE "RICE" OF ARTIFICIAL INTELLIGENCE! (PUN INTENDED)



# METHODOLOGY

# IMAGE PROCESSING



# RICE SEED EXTRACTION



# RICE SEED ENHANCEMENT AND ENLARGEMENT



CLAHE! Yey!  
Contrast-Limited Adaptive Histogram  
Equalization

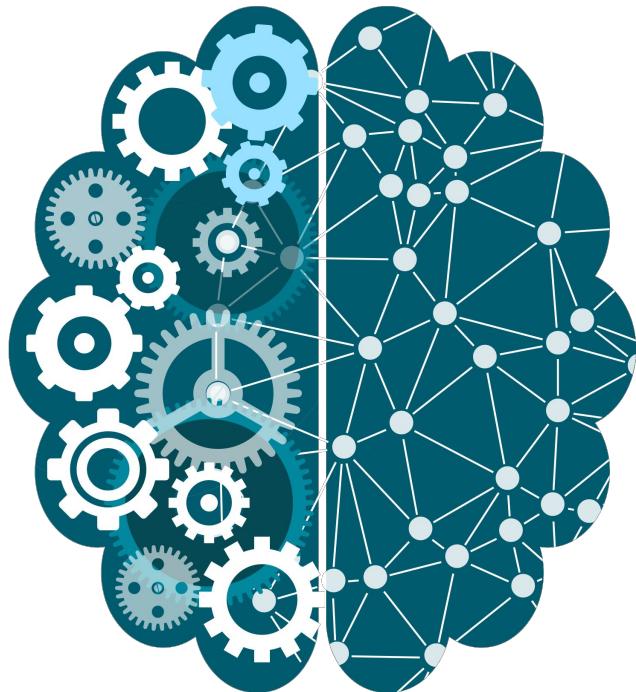
# RICE SEED ENHANCEMENT AND ENHANCED IMAGE



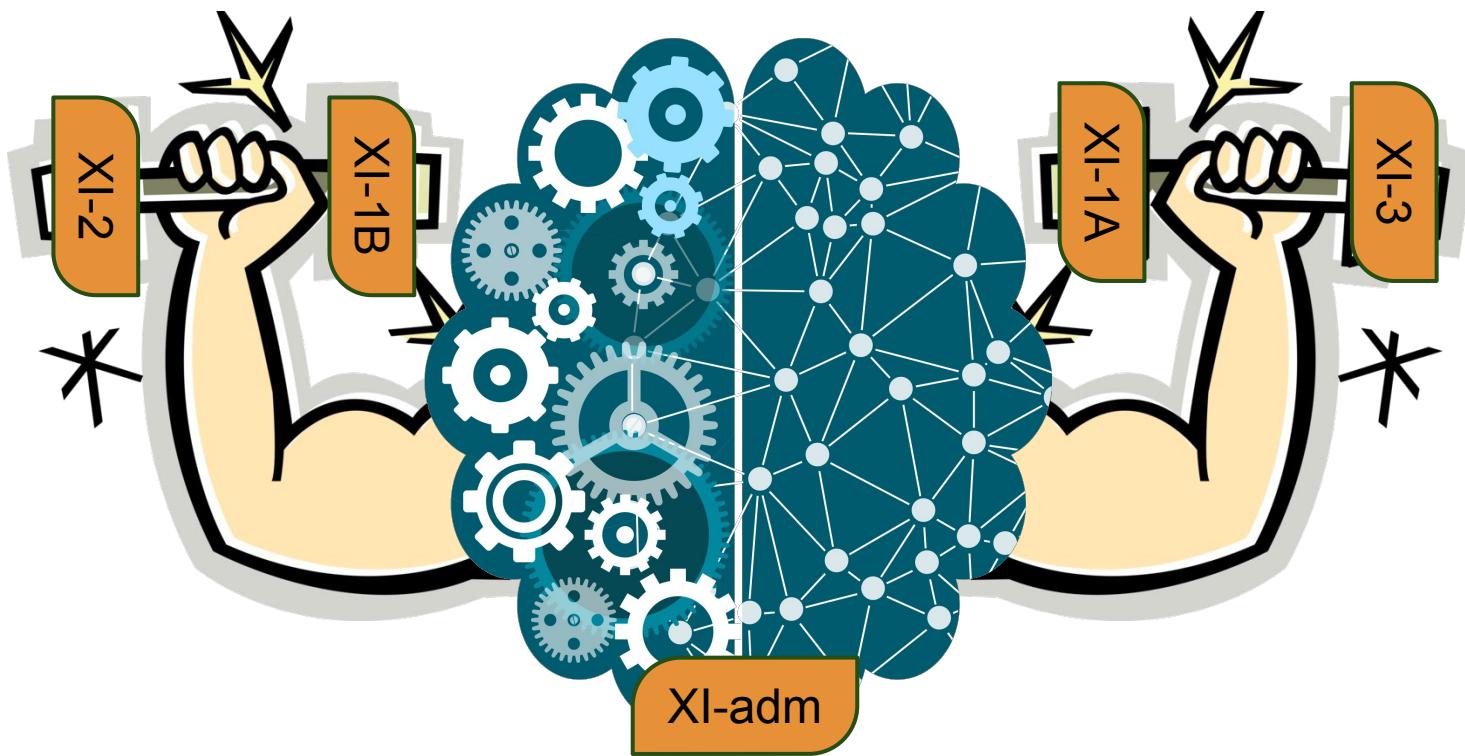
Bicubic  
Interpolation



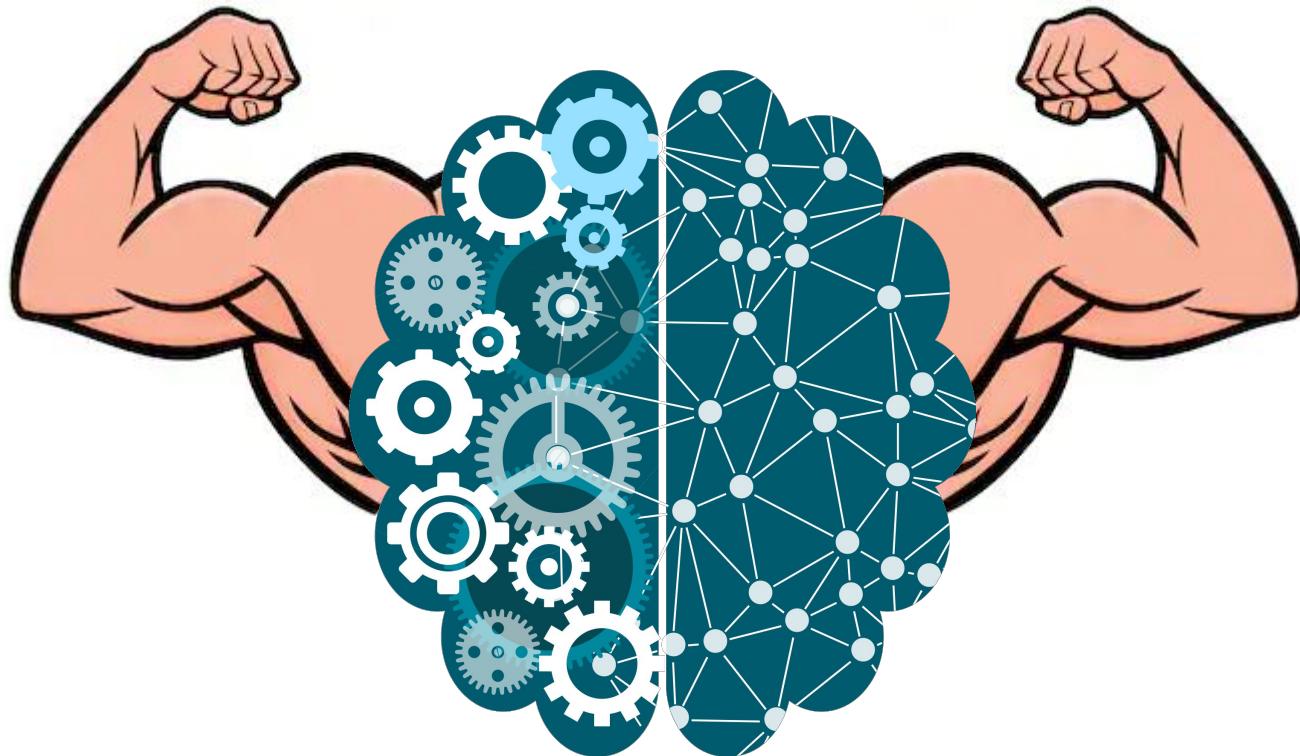
# BUILD RICE SEED CLASSIFIER



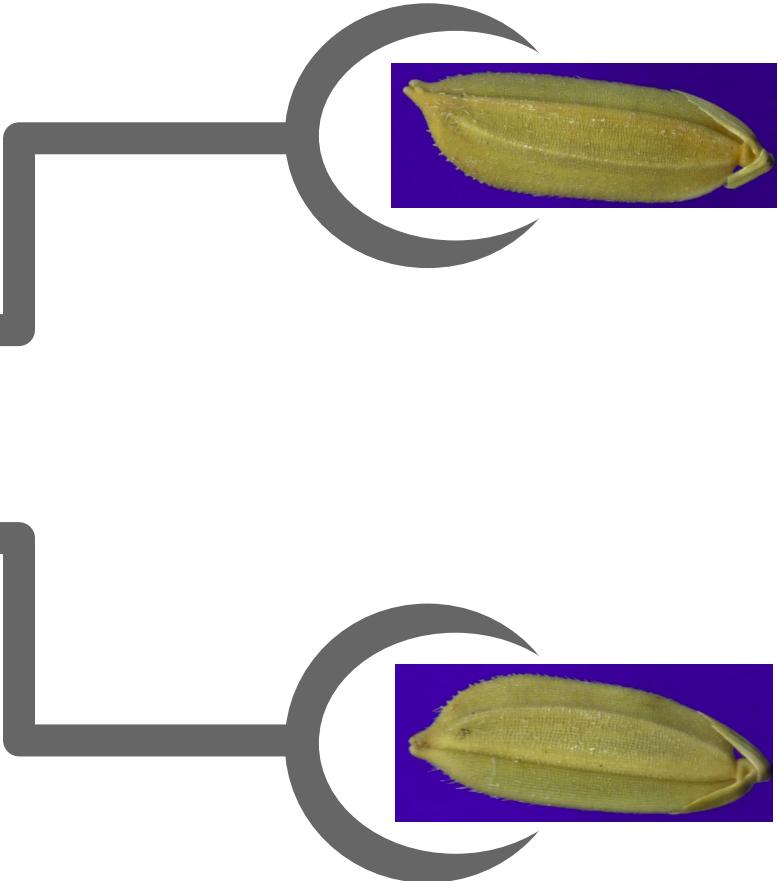
# TRAIN RICE SEED CLASSIFIER



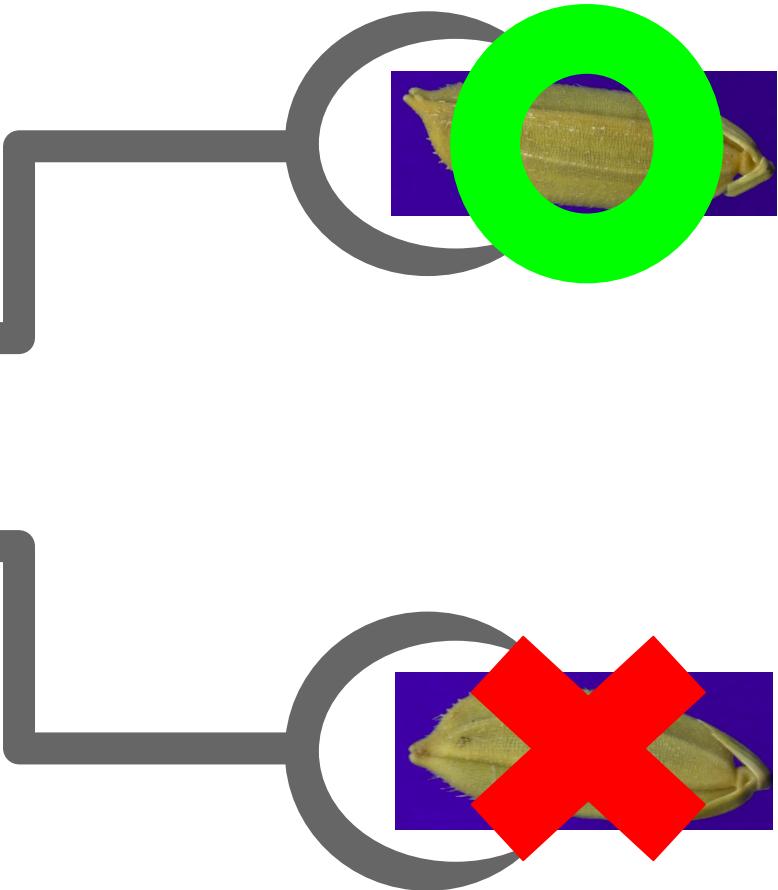
# TRAINED MODEL



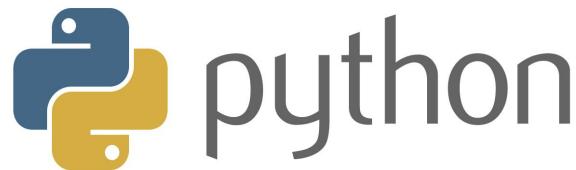
# TEST AND EVALUATE



# TEST AND EVALUATE



# TECHNOLOGIES

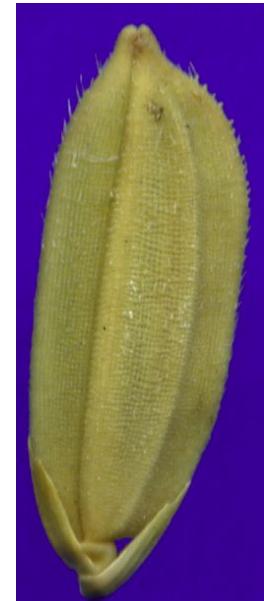
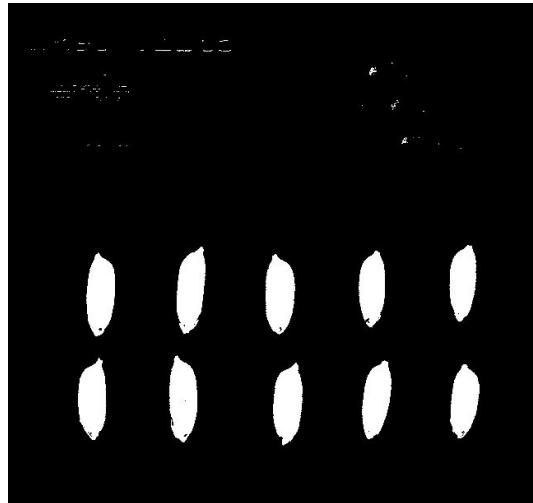


RESULTS  
AND  
DISCUSSION

# RICE SEED EXTRACTION



# RICE SEED EXTRACTION



# IMAGE ENHANCEMENT



XI-1A



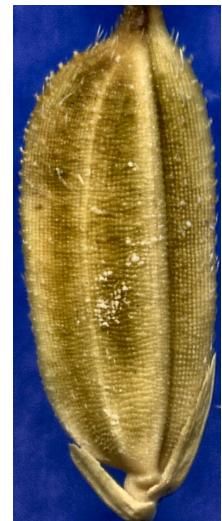
XI-1B



XI-2



XI-3



XI-adm

# IMAGE ENHANCEMENT



XI-1A



XI-1B



XI-2



XI-3



XI-adm

# IMAGE ENHANCEMENT

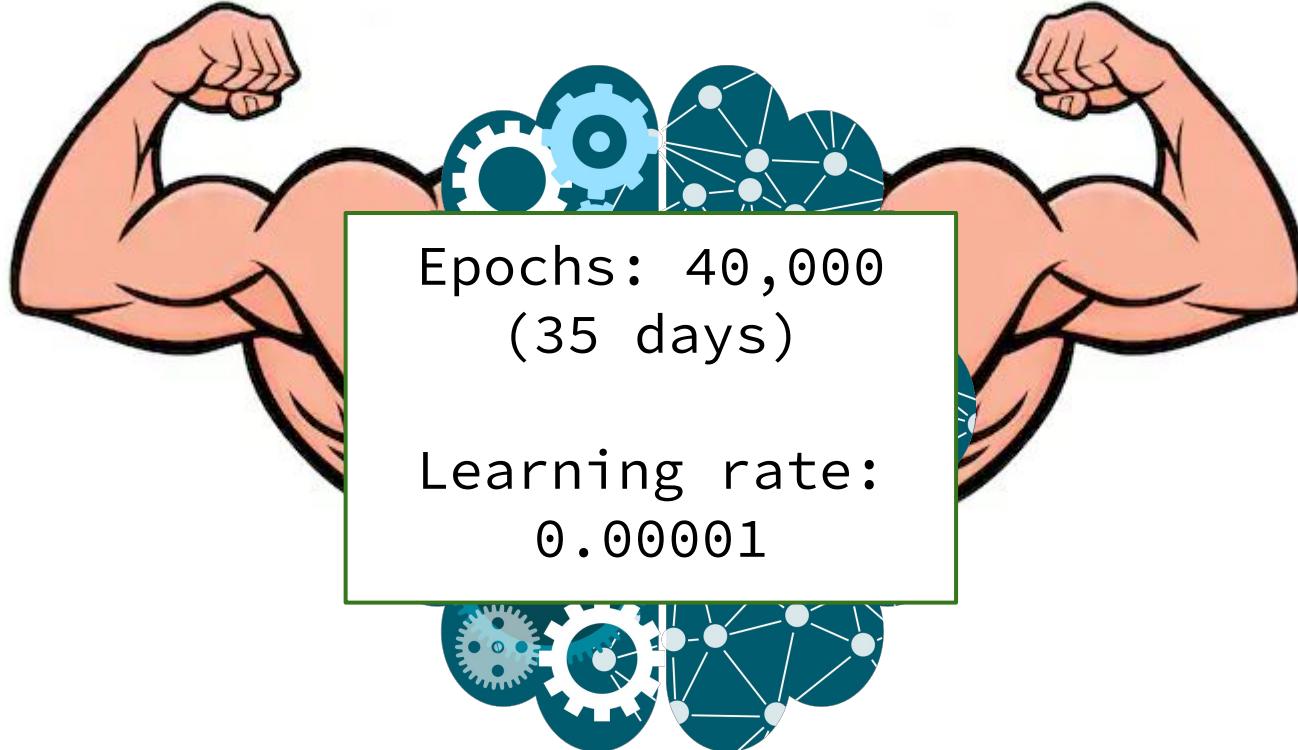


**GREAT JOB!**

# SAMPLE SIZES

	TRAINING	VALIDATION	TEST
XI-1A	752	118	20
XI-1B	448	112	20
XI-2	1296	324	20
XI-3	1144	286	20
XI-adm	1904	476	20
TOTAL	5544	1386	100

# PARAMETERS



# TRAINING RESULTS

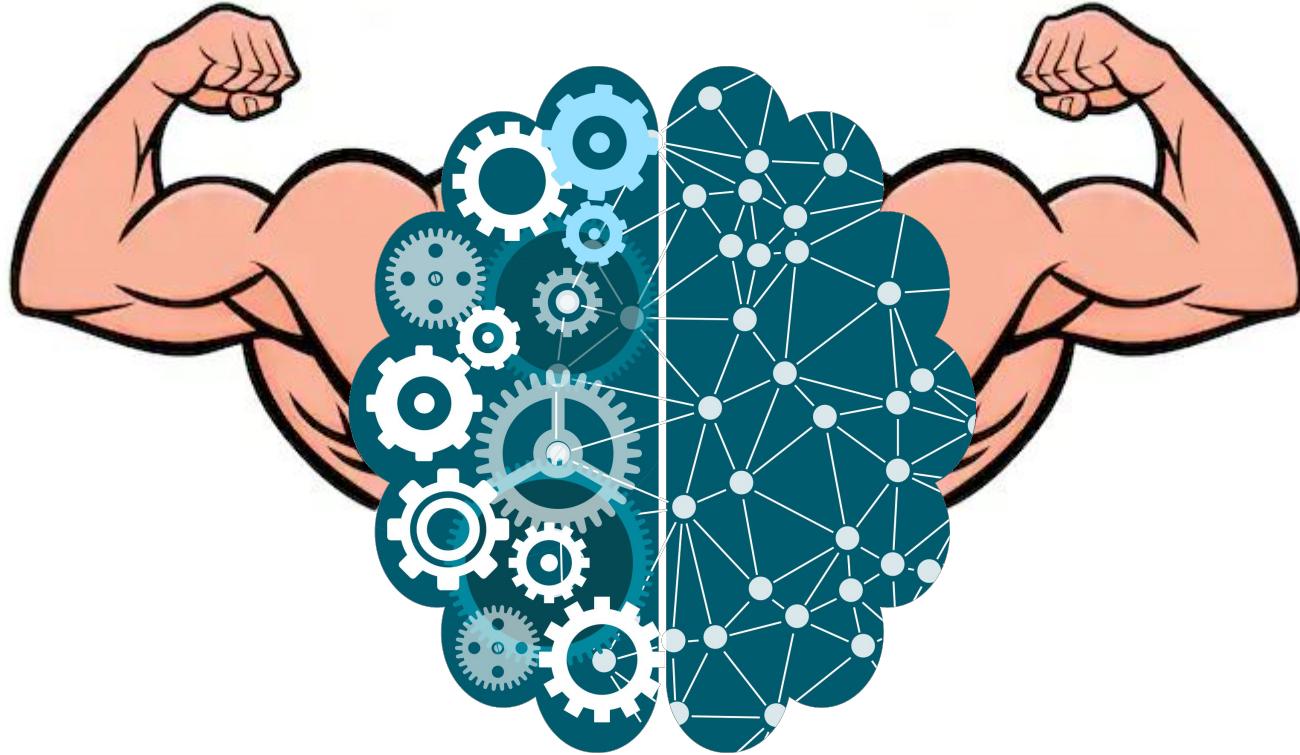
Training Accuracy: 47.65%

Validation Accuracy: 34.92%

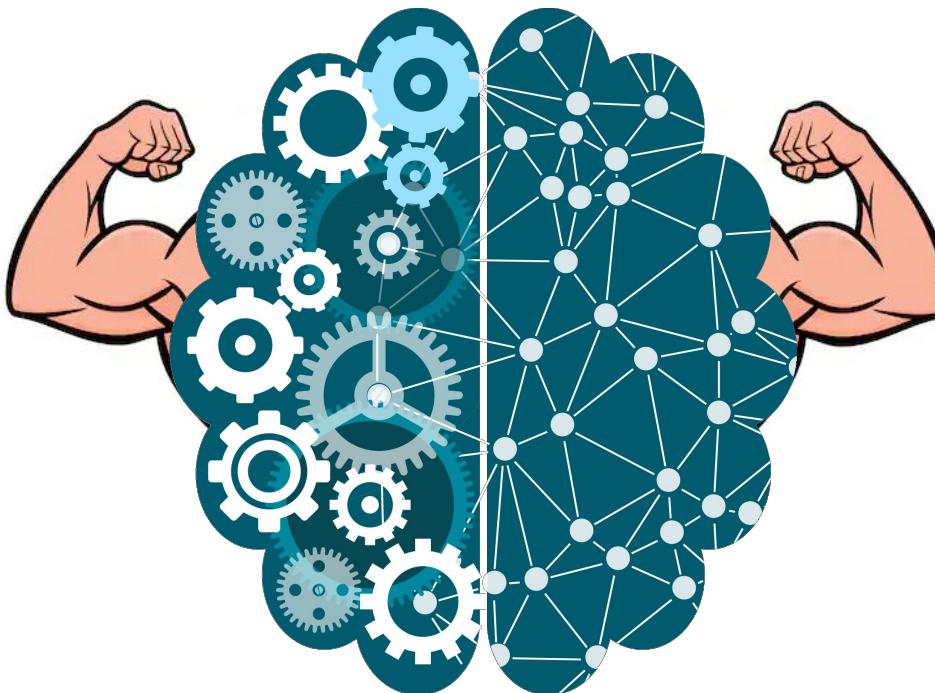
Training Loss: 1.2364

Validation Loss: 1.3926

# TRAINING



# TRAINING



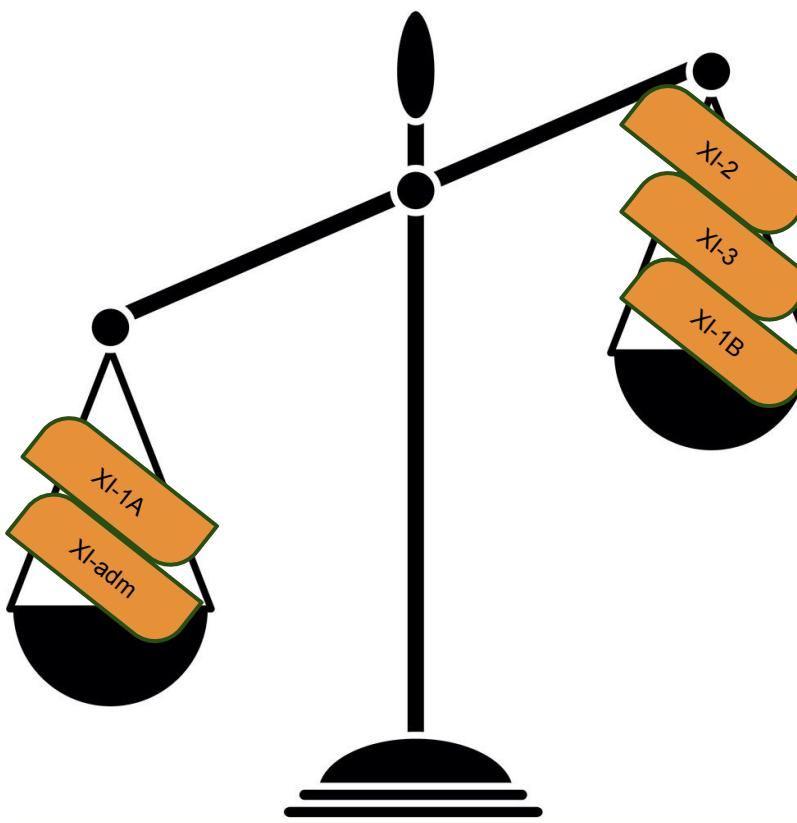
# TRAINING



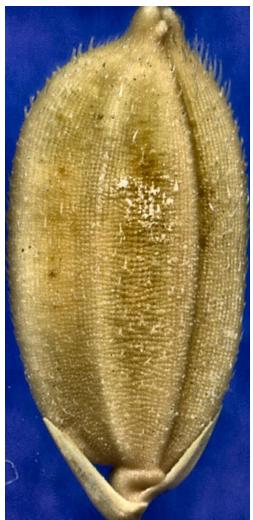
# CONFUSION MATRIX

		prediction					
		XI-1A	XI-1B	XI-2	XI-3	XI-adm	TOTAL
actual	XI-1A	10	0	4	0	6	20
	XI-1B	3	0	4	3	10	20
	XI-2	5	0	0	4	11	20
	XI-3	6	0	1	2	11	20
	XI-adm	2	0	2	4	12	20
	TOTAL	26	0	11	13	50	100

# PREDICTION



# PREDICTION



XI-1A



XI-1B



XI-2



XI-3



XI-adm

# PREDICTION

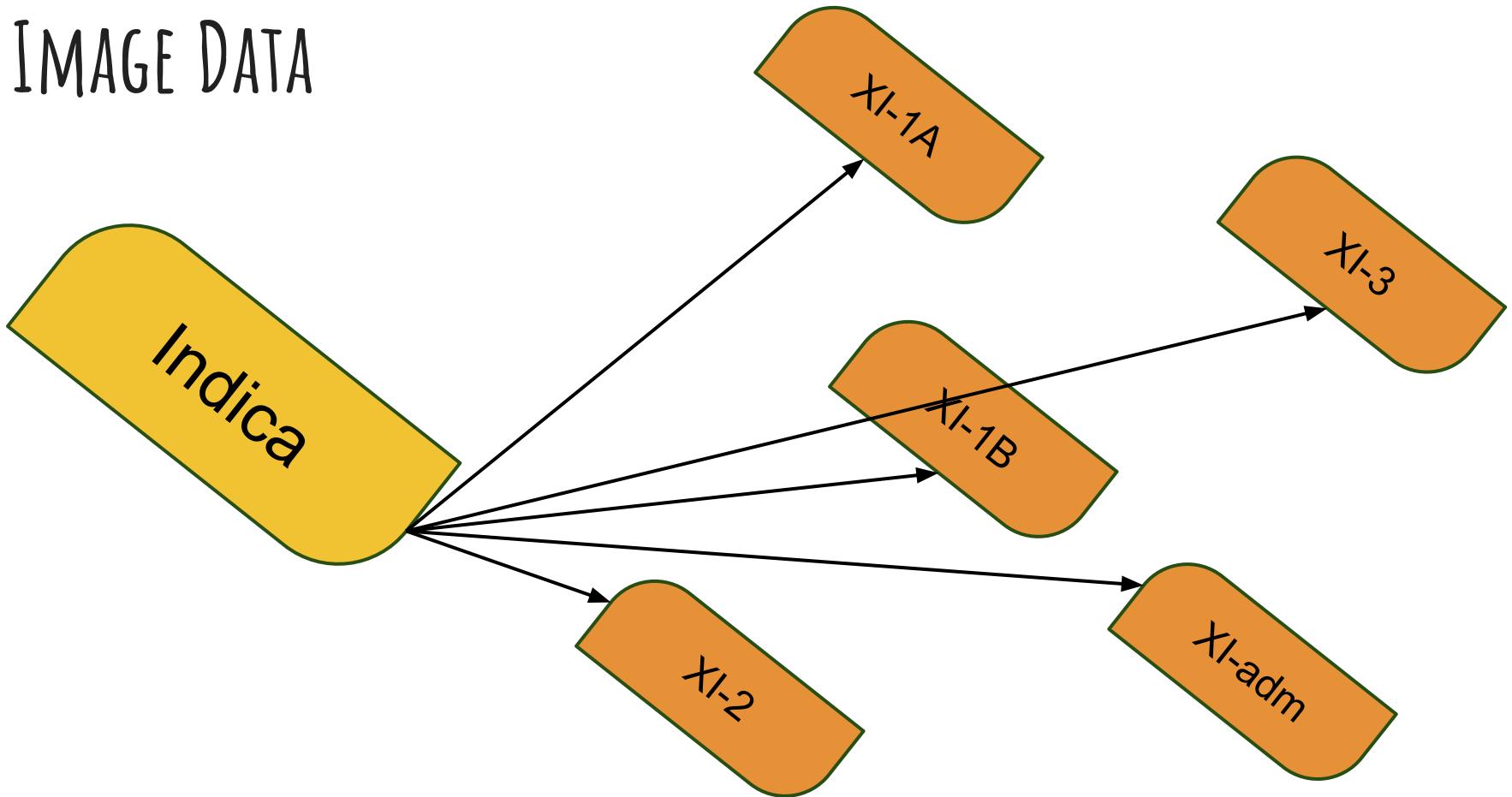


# PREDICTION

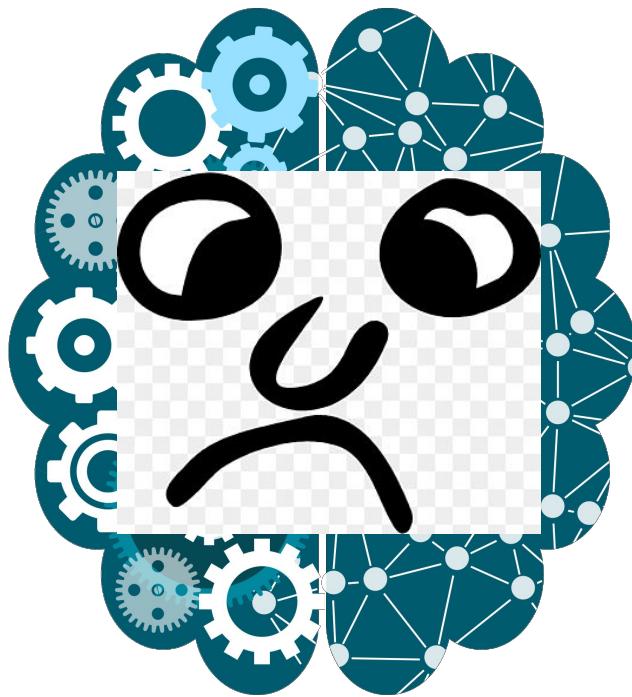
Final Prediction Accuracy: 24%

# CONCLUSION

# IMAGE DATA



# CLASSIFIER MODEL



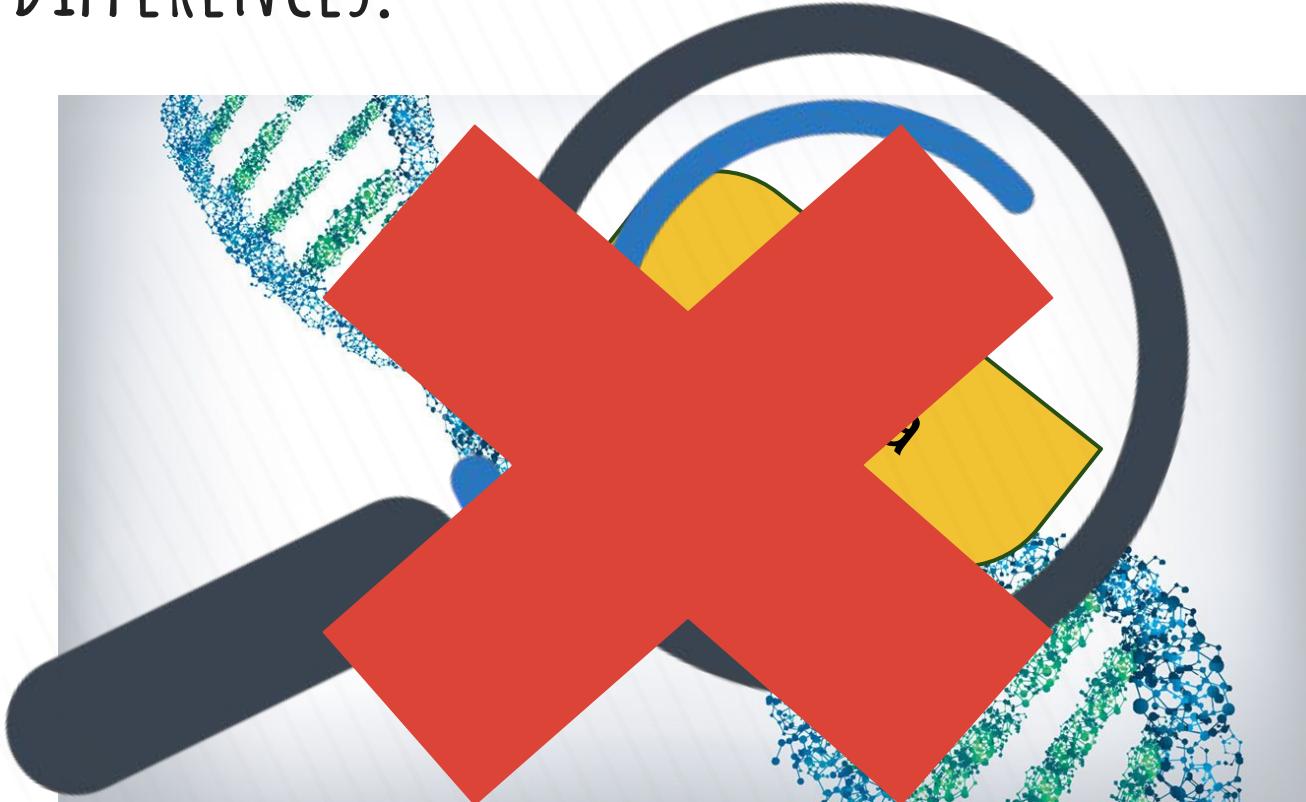
# CLASSIFIER MODEL



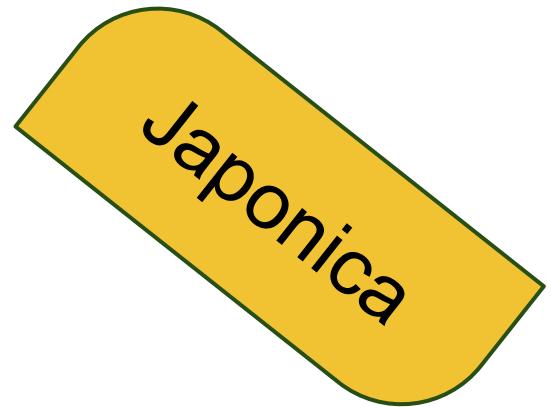
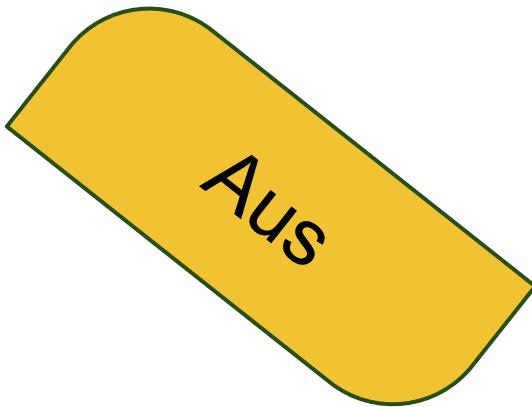
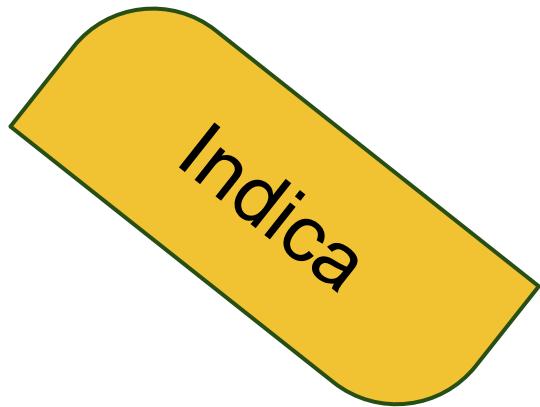
# CHECK DIFFERENCES!



# CHECK DIFFERENCES!



# BALANCED AND MORE IMAGE DATA



THANK YOU!