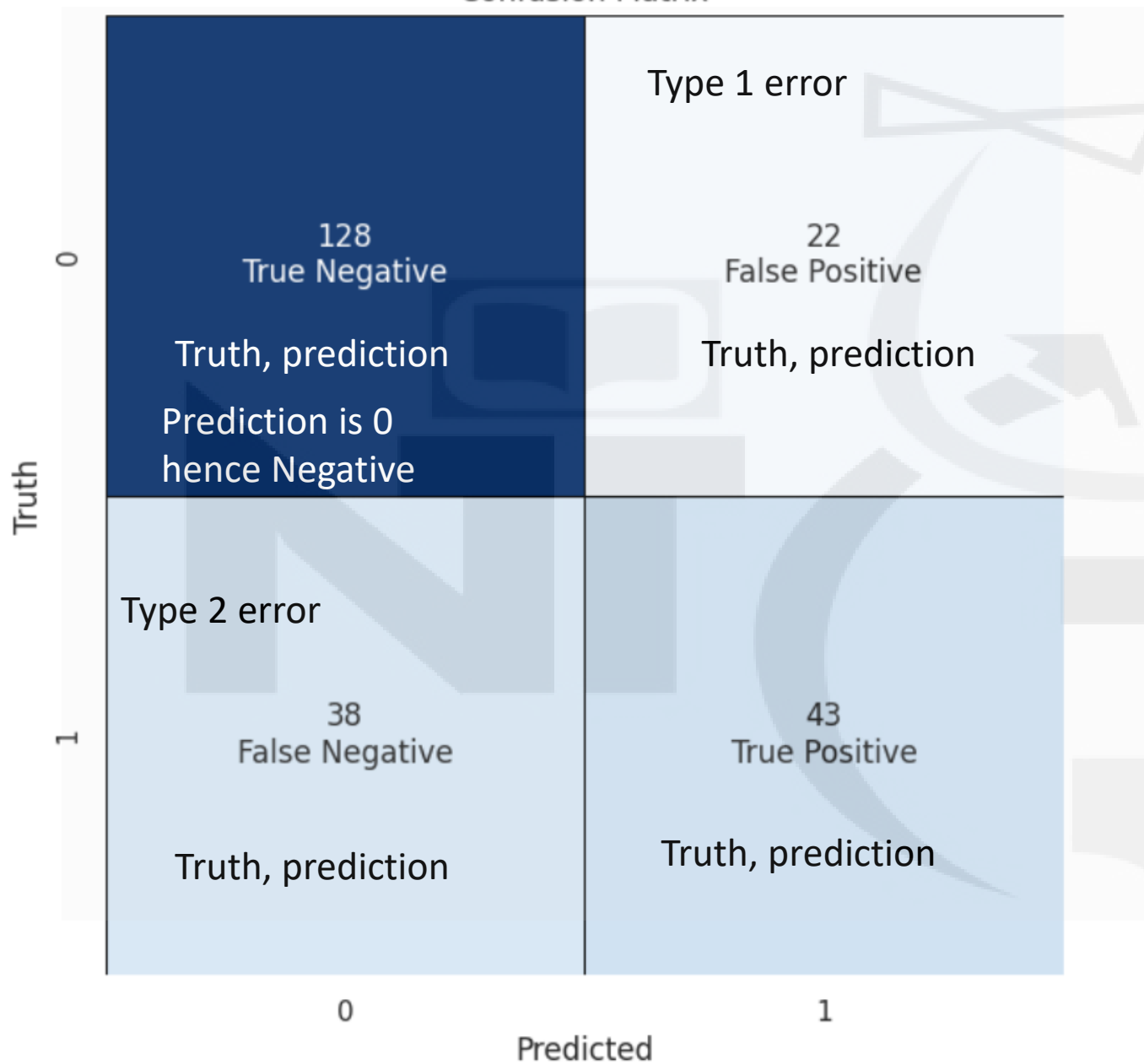# Confusion Matrix

-MUKESH KUMAR

Problem with Accuracy

- It only tells % but doesn't tell details of which prediction were not correct

Confusion Matrix

	Predicted 0	Predicted 1
Truth 0	128 True Negative — Truth, prediction — Prediction is 0 hence Negative	22 False Positive — Type 1 error — Truth, prediction
Truth 1	38 False Negative — Type 2 error — Truth, prediction	43 True Positive — Truth, prediction

How to interpret?

- First part is truth Vs prediction outcome
  - ex: True(actual:0 , predicted:0) Negative(class:model thinks))
- Second part comes from prediction (what model predicted 0 or 1);
  - If prediction =1 > Positive
  - If prediction=0 > Negative

  - Accuracy = Total correct predition/total records   = (TP + TN)/(TP+TN+FP+FN)

Type 1 Error

- False positive

- Predicted =1, its actually a 0

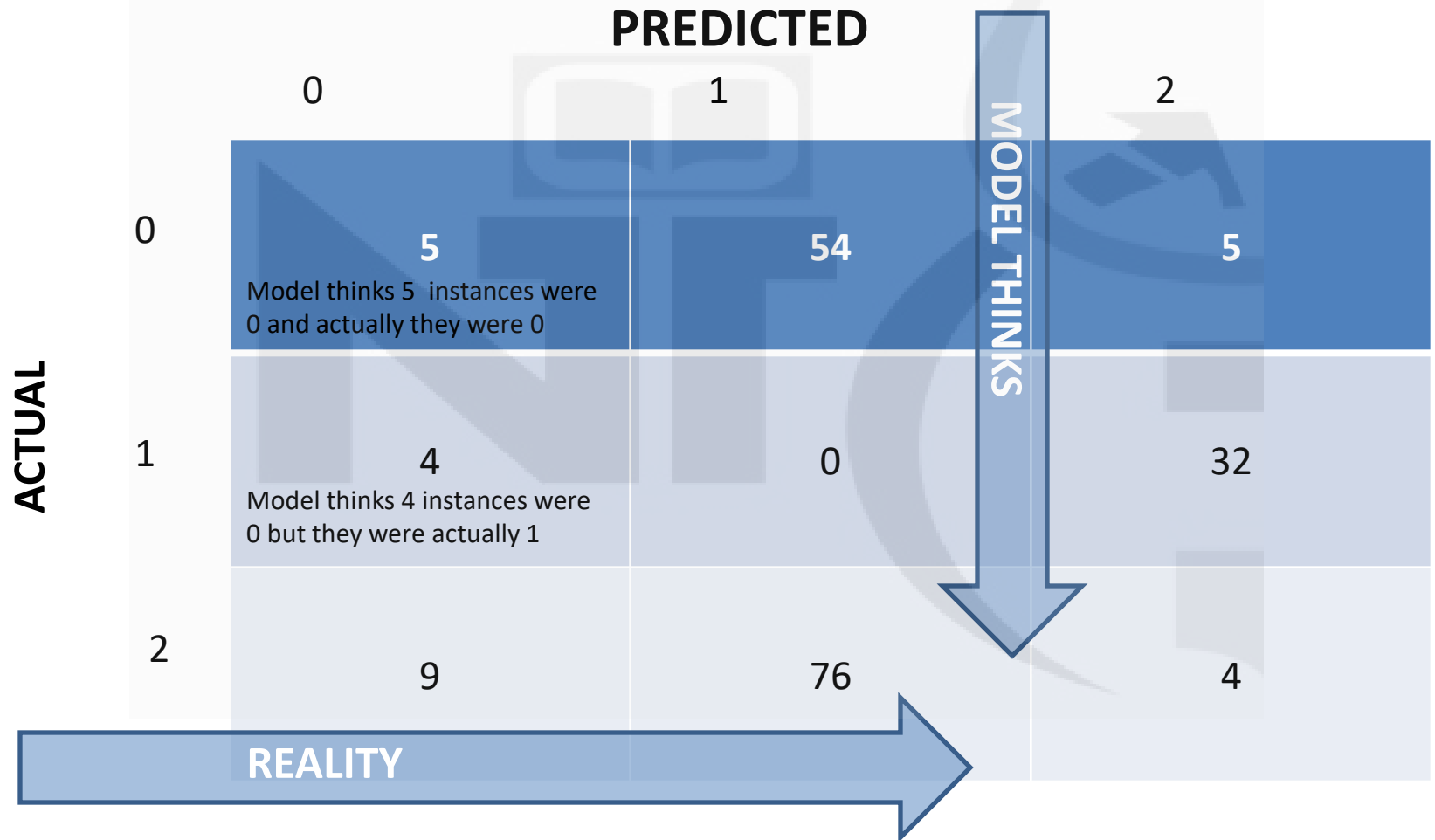- That means our model is saying patient has heart disease but he doesn't have heart disease

Type 2 Error

- False Negative

- Predicted =0, its actually a 1

- That means our model is saying patient doesn't have heart disease but he has heart disease

MultiClass Confusion

Three classes 3X3 matrix

PREDICTED

	0	1	2
0	**5** Model thinks 5 instances were 0 and actually they were 0	**54**	**5**
1	4 Model thinks 4 instances were 0 but they were actually 1	0	32
2	9	76	4

ACTUAL

MODEL THINKS

REALITY

Imbalance Dataset

- Accuracy is misleading when dataset is misleading

- Example 90:10 dataset

Precision

- All the values that were **predicted** to be positive out of these how many were actually positive

- TP/(tp+fP)

- Less type 1 error

Recall

- Out of all the **actual** positives how many were true positives(correctly detected)
- How many times did model predict cancer out of total patient who had cancer

- Tp/(tp+fn)

- Less type 2 error