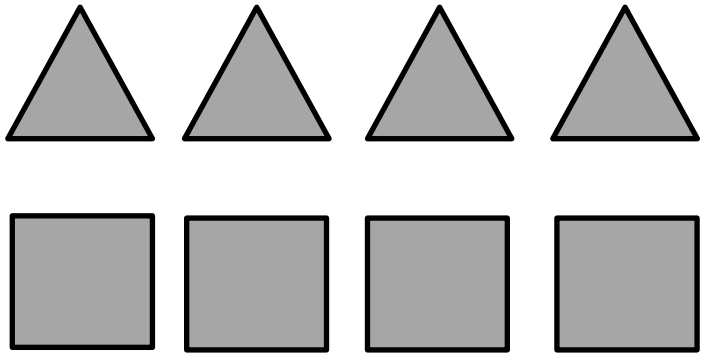
Biometrics and Applied Intelligence

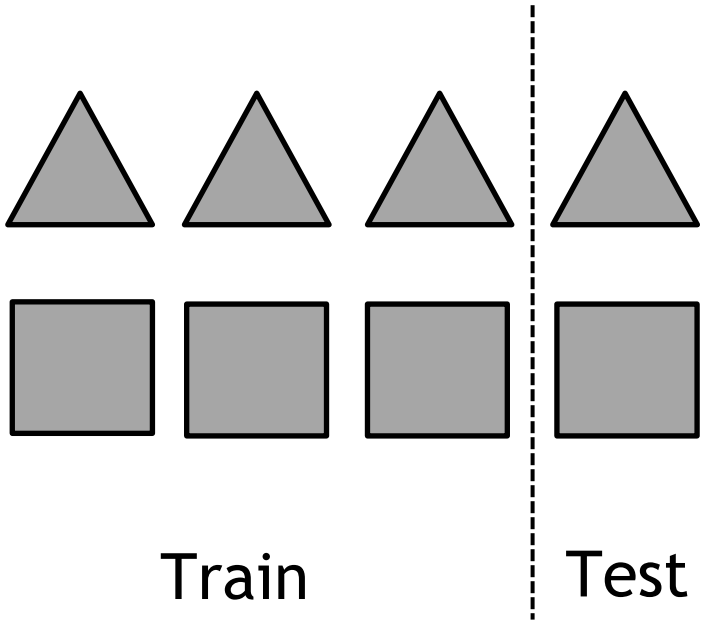
The Devil is in the Details: Biased Training

Problem: Shape recognition
triangle or square?

Data



Data

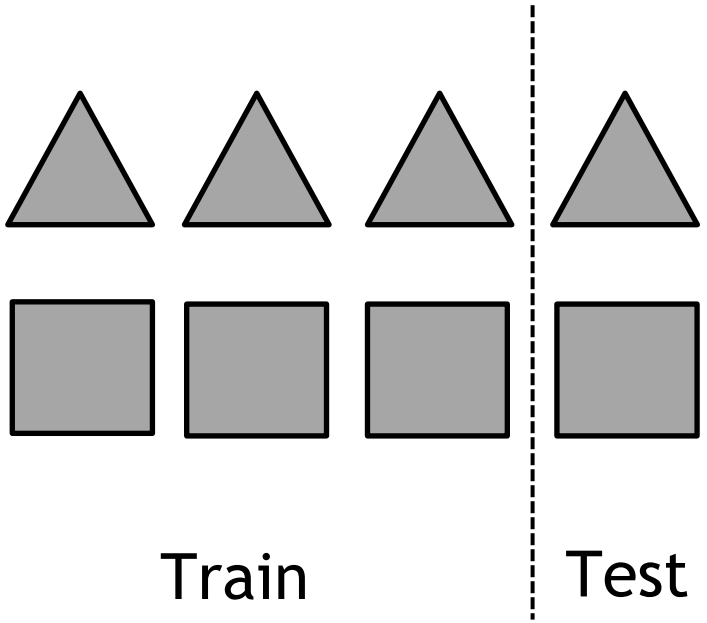


Problem: Shape recognition triangle or square?

Accuracy: 90%

	△	□
△	95	5
□	15	85

Data



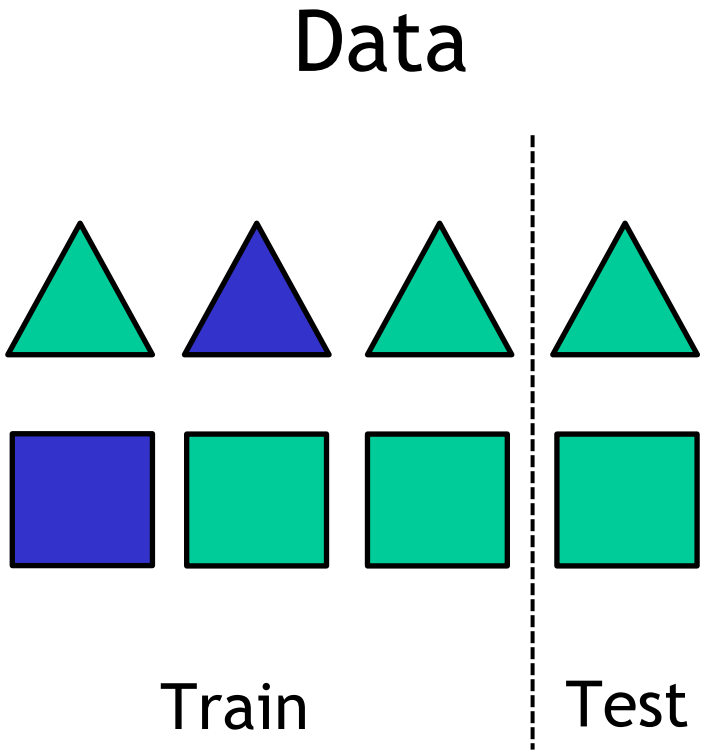
Problem: Shape recognition
triangle or square?

Accuracy: 90%

	△	□
△	95	5
□	15	85

Are all triangles and squares the same?
Assumption of homogeneous population

Problem: Shape recognition triangle or square?



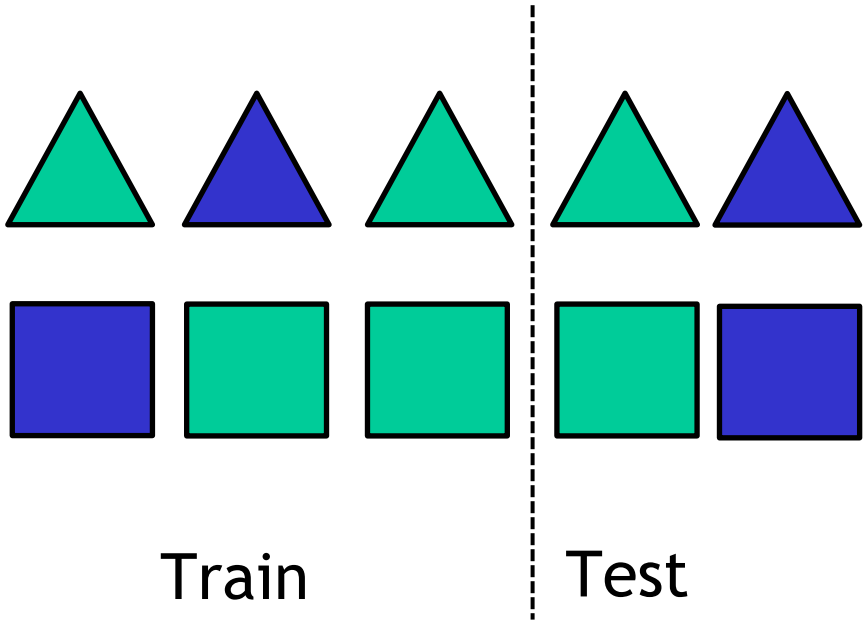
Accuracy: 90%

	95	5
	15	85

Biased databases imply a **double penalty** for underrepresented classes:

- Models are **trained** according to non-representative diversity.
- Models are **tested** on privileged classes

Data



Problem: Shape recognition
triangle or square?

Accuracy: 85%

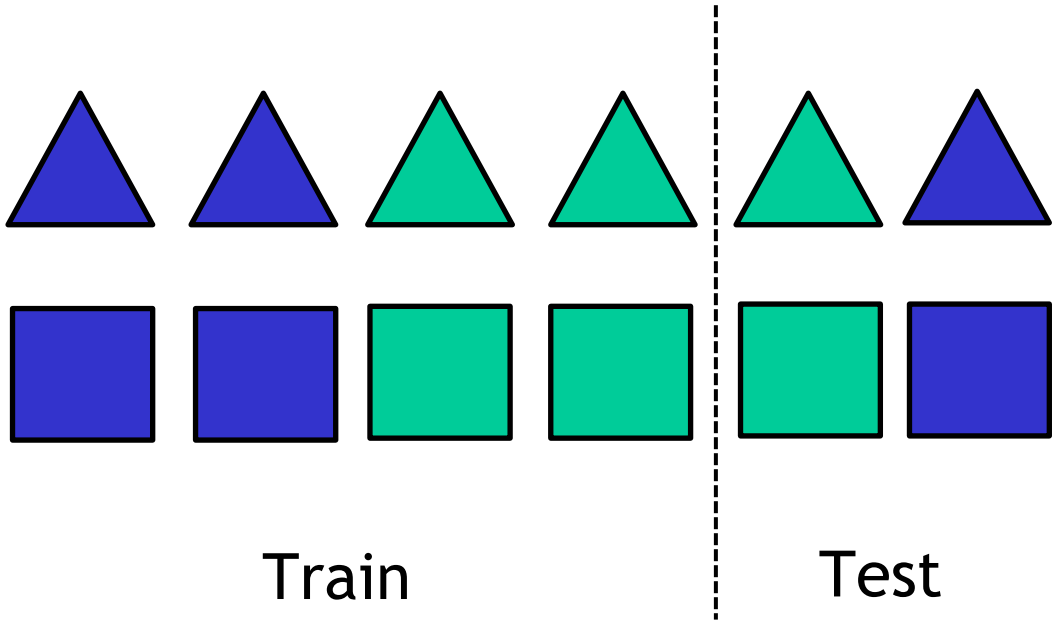
	90	10
	20	80

Color does not affect the shape…

Therefore, performance should be the same

Problem: Shape recognition triangle or square?

Data



Heterogeneous populations might produce heterogeneous performances

Blue Accuracy: 90%

	△	□
△	95	5
□	15	85

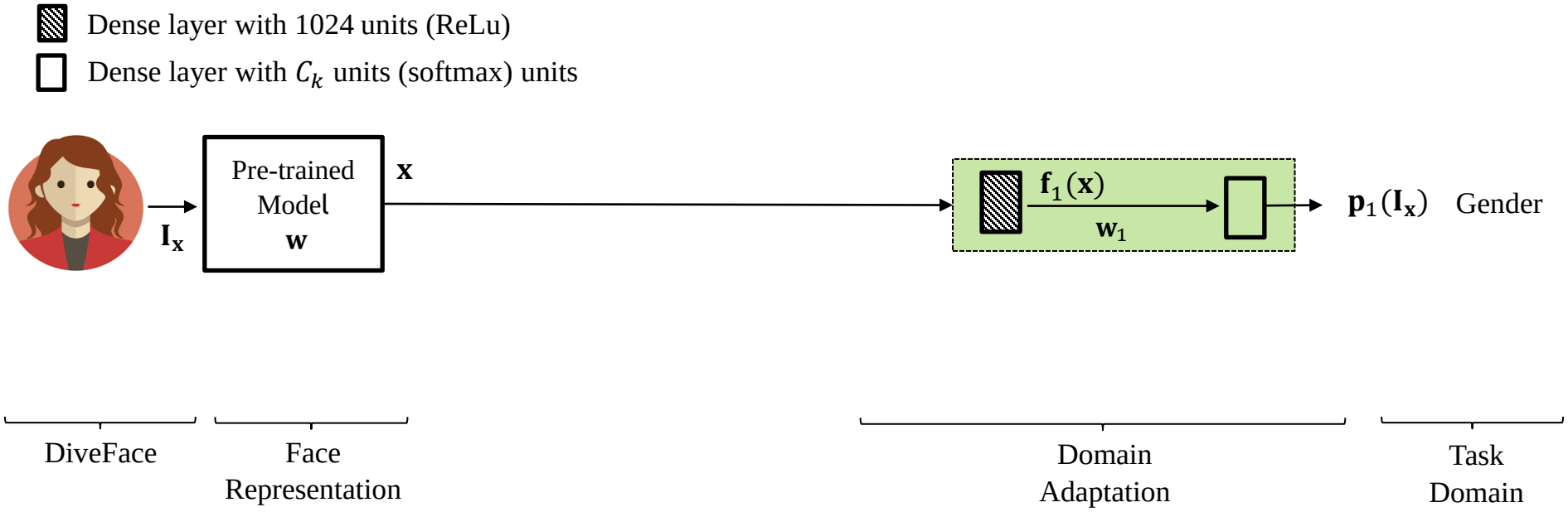
Orange Accuracy: **80%**

	△	□
△	85	15
□	25	75

TASKS

TASK 4.1:

- Train 3 different Gender Classifiers (previous Task 3.3) using images from same ethnic group: Model A (only Asian), Model B (only Black), Model C (only Caucasian)



TASKS

TASK 4.1:

- Train 3 different Gender Classifiers (previous Task 3.3) using images from same ethnic group: Model A (only Asian), Model B (only Black), Model C (only Caucasian)

	MODEL A	MODEL B	MODEL C
			
Training	1000 images from Asian group	1000 images from Black group	1000 images from Caucasian group

TASKS

Color does not affect the shape…

Therefore, performance should be the same

TASK 4.2:

- Evaluate the 3 Gender Classifiers (previous Task 4.1) using images from each of the three ethnic groups.

MODEL A **MODEL B** **MODEL C**

Evaluation:
3 test sets × 3 models = 9 accuracies

500 images from Asian group -> Accuracy for Asian group
500 images from Black group -> Accuracy for Black group
500 images from Caucasian group -> Accuracy for Caucasian group

TASKS

TASK 4.3:

- Train one Gender Classifiers (previous Task 3.3) using images from all three ethnic groups:

MODEL D

Training

1000 images from Asian group + 1000 images from Black group
+ 1000 images from Caucasian group

TASKS

TASK 4.4:

- Evaluate the Gender Classifier (previous Task 4.3) using images from each of the three ethnic groups:

MODEL D

Evaluation:
3 test sets × 1 model = 3 accuracies

500 images from Asian group -> Accuracy for Asian group
500 images from Black group -> Accuracy for Black group
500 images from Caucasian group -> Accuracy for Caucasian group