Age Detection By Neural Network

GROUP G

2023

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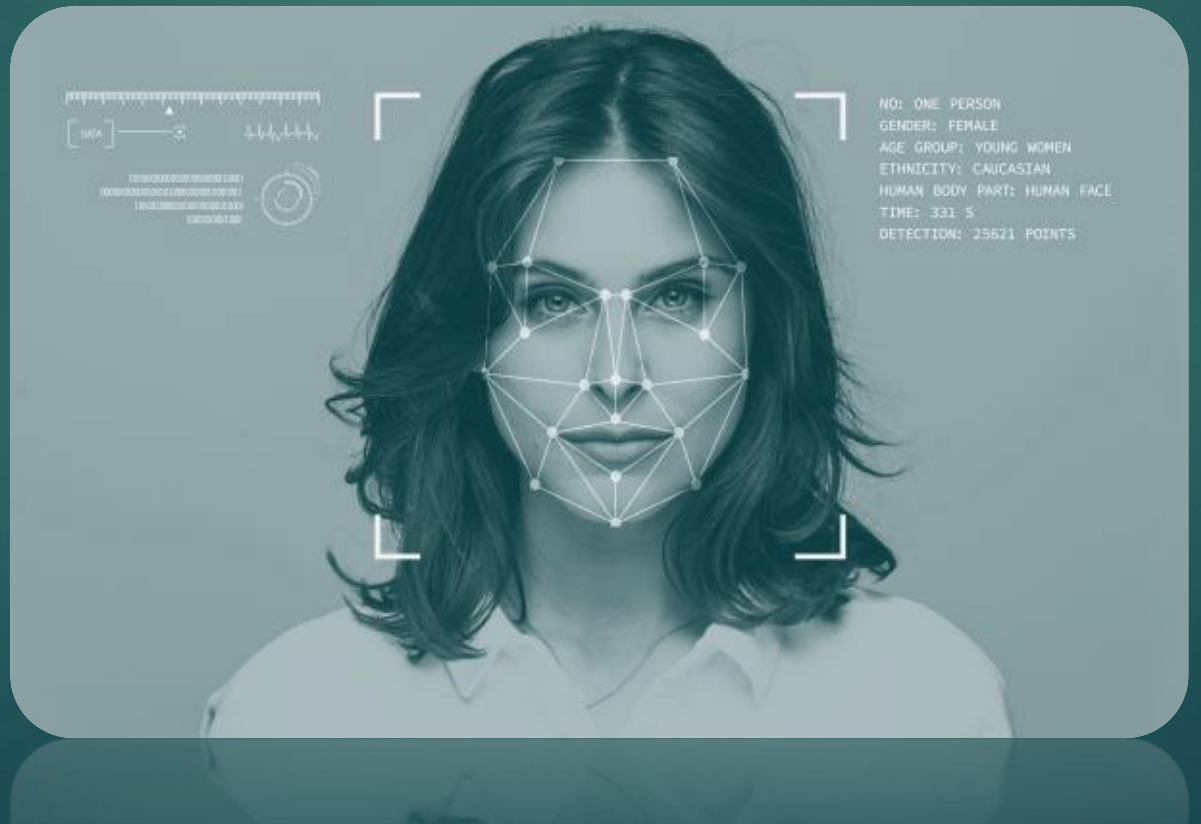
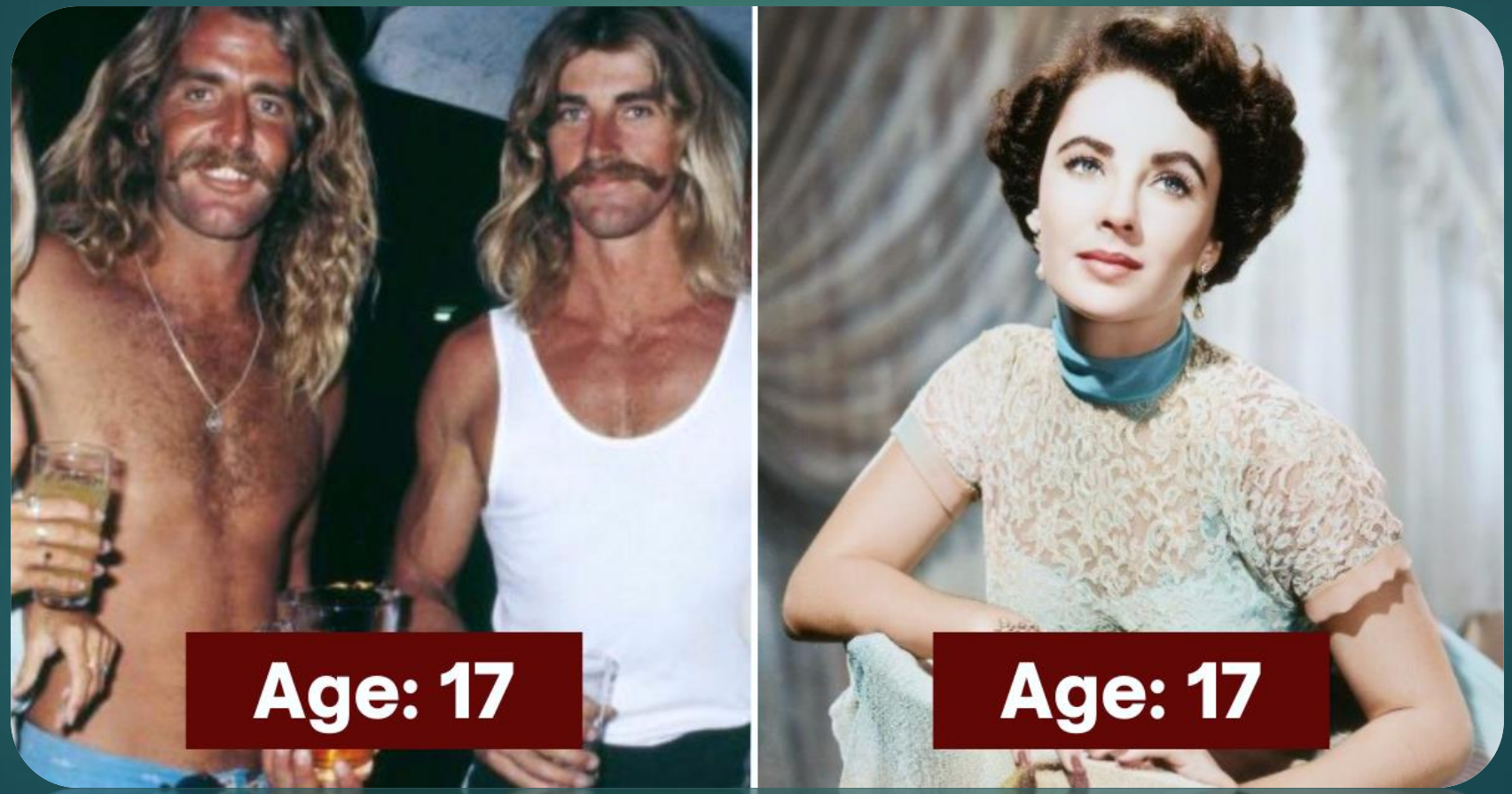
Introduction

- Human Age Classification (HAC) using facial images
- Applications: marketing, healthcare, security, face recognition, etc.



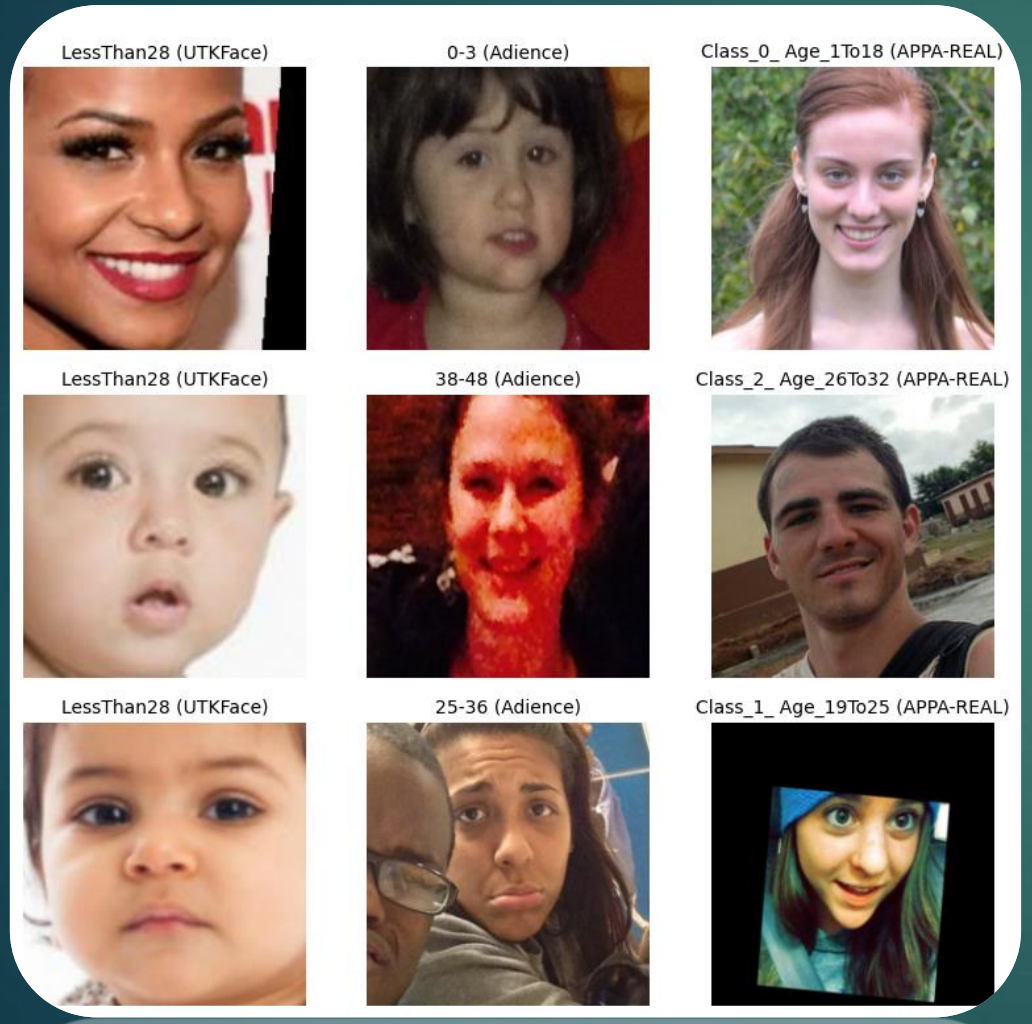
Challenges and Solutions

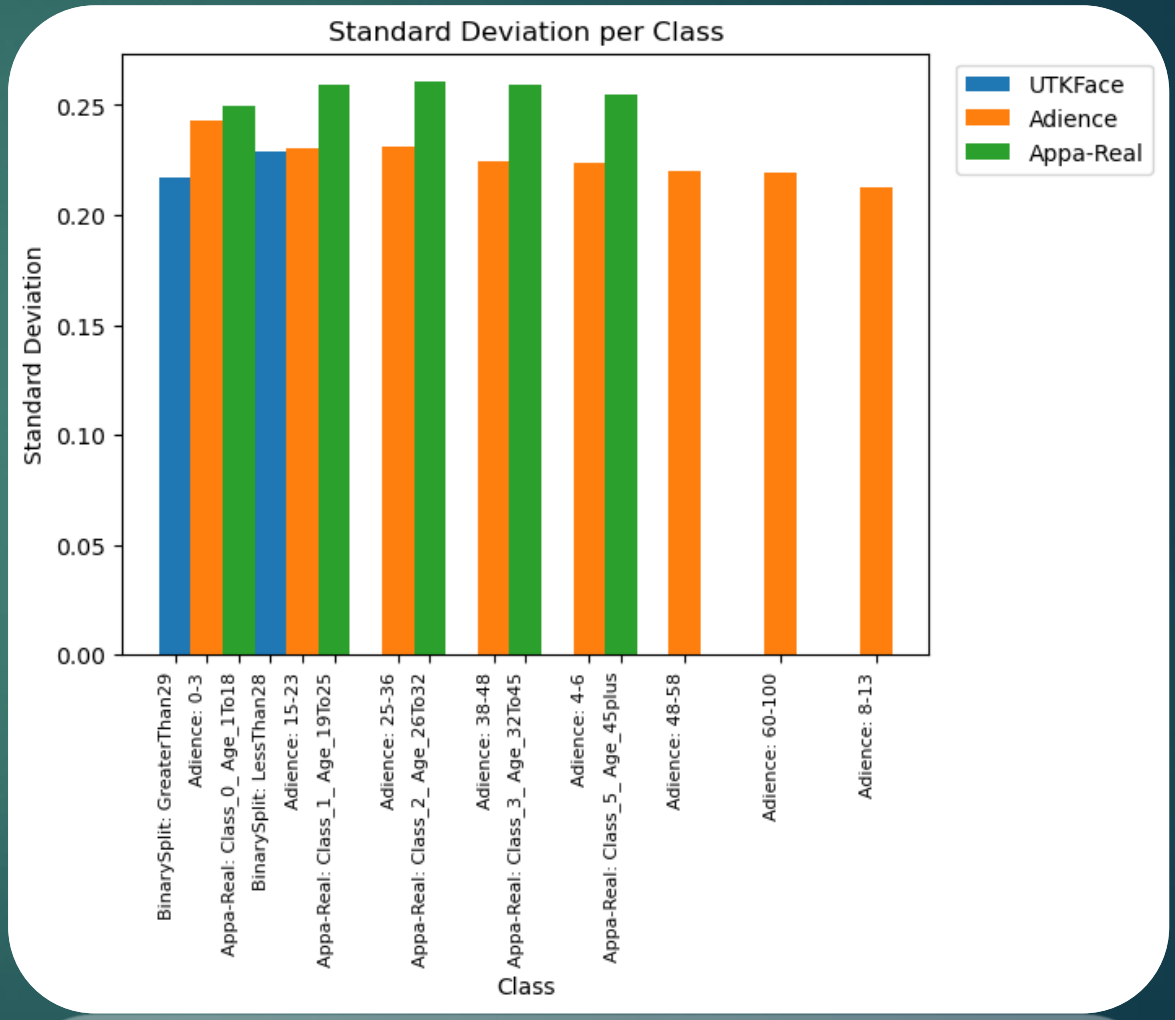


Datasets

Dataset Specification	UTKFace	APPA-REAL	Adience
Total Number of Images	23,706	7,591	11,030
No of Classes	2	5	8
Image Resolution	200x200	816x816	-
Image Format	JPEG	JPEG	JPEG

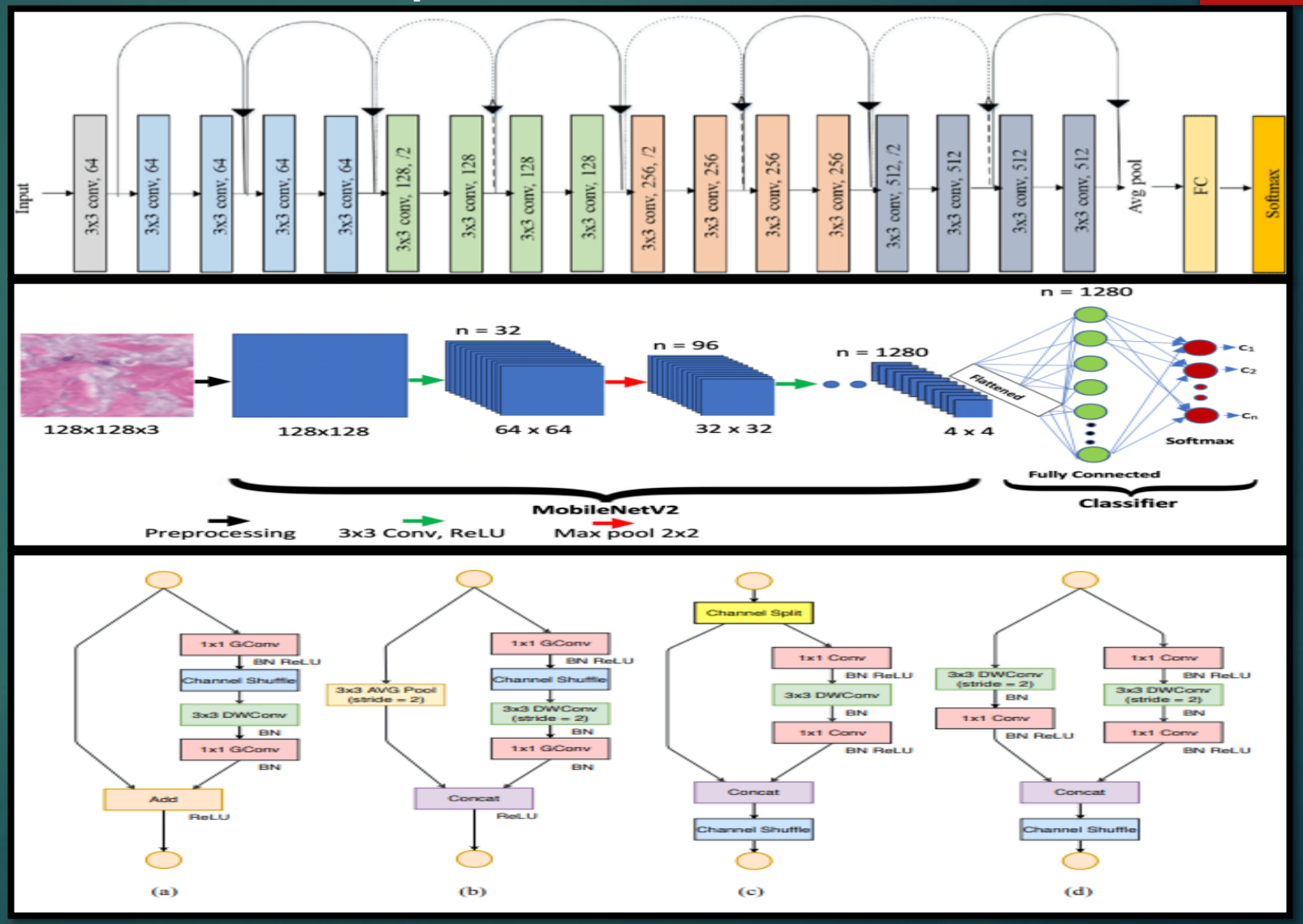
Datasets


LessThan28 (UTKFace)
0-3 (Adience)
Class_0_ Age_1To18 (APPA-REAL)
LessThan28 (UTKFace)
38-48 (Adience)
Class_2_ Age_26To32 (APPA-REAL)
LessThan28 (UTKFace)
25-36 (Adience)
Class_1_ Age_19To25 (APPA-REAL)

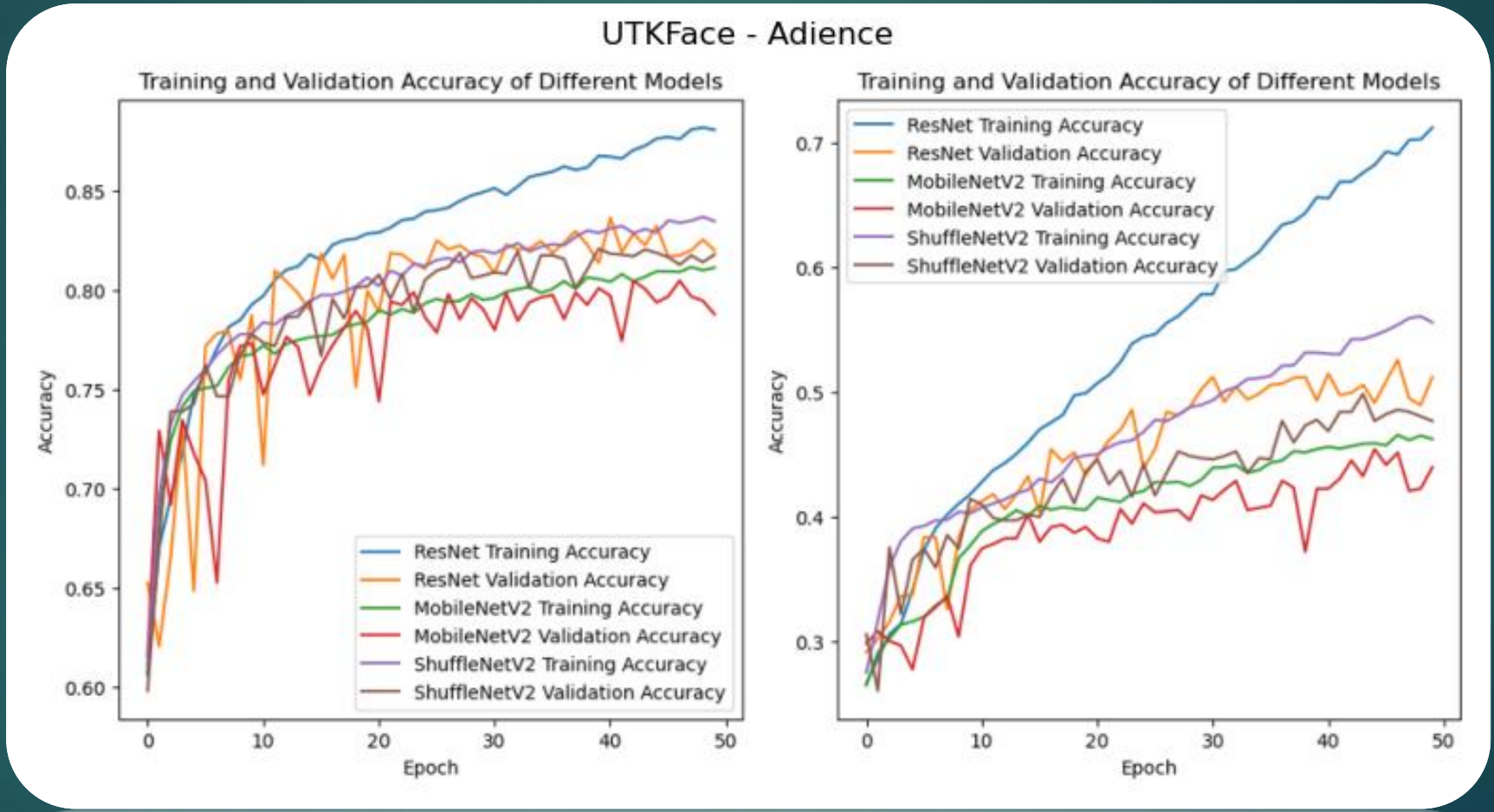

Standard Deviation per Class
Standard Deviation
0.00
0.05
0.10
0.15
0.20
0.25
UTKFace
Adience
Appa-Real
BinarySplit: GreaterThan29
Adience: 0-3
Appa-Real: Class_0_Age_1To18
BinarySplit: LessThan28
Adience: 15-23
Appa-Real: Class_1_Age_19To25
Adience: 25-36
Appa-Real: Class_2_Age_26To32
Adience: 38-48
Appa-Real: Class_3_Age_32To45
Adience: 4-6
Appa-Real: Class_5_Age_45plus
Adience: 48-58
Adience: 60-100
Adience: 8-13
Class

CNN Models and Optimization

- ResNet18
- MobileNetV2
- ShuffleNetV2



Results


UTKFace - Adience
Training and Validation Accuracy of Different Models
Accuracy
Epoch
ResNet Training Accuracy
ResNet Validation Accuracy
MobileNetV2 Training Accuracy
MobileNetV2 Validation Accuracy
ShuffleNetV2 Training Accuracy
ShuffleNetV2 Validation Accuracy
Training and Validation Accuracy of Different Models
Accuracy
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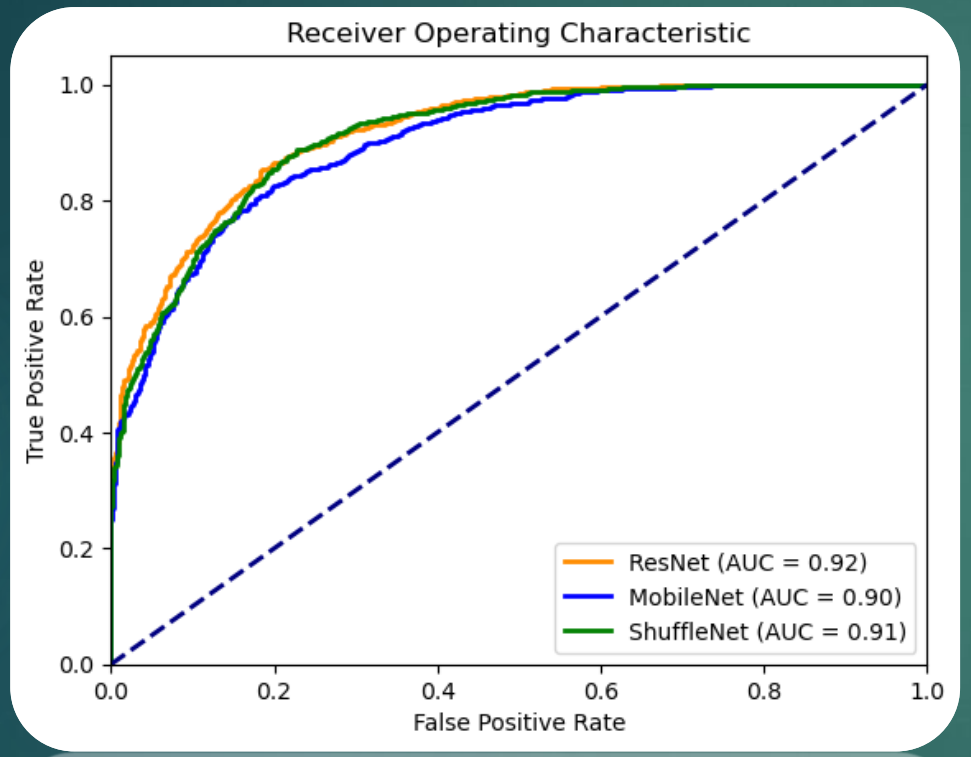
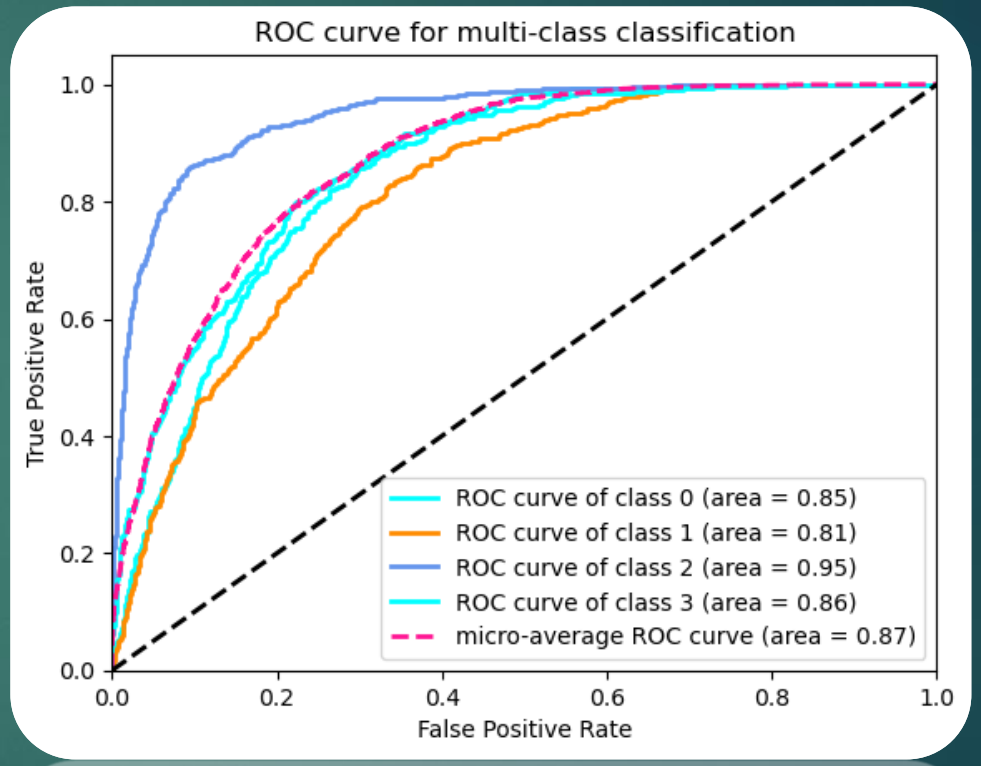
ResNet Training Accuracy
ResNet Validation Accuracy
MobileNetV2 Training Accuracy
MobileNetV2 Validation Accuracy
ShuffleNetV2 Training Accuracy
ShuffleNetV2 Validation Accuracy

Results

Model	Resnet18	MobileNetV2	ShuffleNetV2
UTKFace	83.31	79.07	81.59
Adience	53.59	46.07	52.06
Appa-Real	42.86	23.68	38.91

Results


Receiver Operating Characteristic
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
ResNet (AUC = 0.92)
MobileNet (AUC = 0.90)
ShuffleNet (AUC = 0.91)


ROC curve for multi-class classification
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
ROC curve of class 0 (area = 0.85)
ROC curve of class 1 (area = 0.81)
ROC curve of class 2 (area = 0.95)
ROC curve of class 3 (area = 0.86)
micro-average ROC curve (area = 0.87)

Model	Precision	Recall	F1-Score	Accuracy
UTKFace ResNet	0.83	0.83	0.83	0.83
UTKFace MobileNetV2	0.81	0.79	0.79	0.79
UTKFace ShuffleNetV2	0.82	0.81	0.81	0.81
Adience ResNet	0.53	0.53	0.52	0.53
Adience MobileNet	0.45	0.46	0.38	0.46
Adience Shufflenet	0.50	0.51	0.50	0.51
Appa-Real ResNet	0.41	0.43	0.41	0.42
Appa-Real MobileNetV2	0.11	0.23	0.13	0.23
Appa-Real ShuffleNetV2	0.38	0.39	0.37	0.38