

Status Report: Face To BMI

Trung Pham • 29.05.2020

Overview

Expected delivery

May 28, 2020

Recent progress

- Train setting
- Train model for BMI
- Train model for Height
- Train model for Weight
- Cross validation train for BMI
- Cross validation train for Height
- Cross validation train for Weight
- Fixing crop face function
- Analyze test result for western data
- Analyze test result for asian data
- Train pretrained model to train on asian data

Train Setting

1. Training, Validation, Testing ratio: 0.72, 0.08, 0.2
 - a. Training size 752 images/1026 images
 - b. Validation size 96 images/1026 images
 - c. Testing size 208 images/1026 images
2. Face detection algorithm
 - a. Using dlib library -> fhog_object_detector

Train model for BMI, Weight, Height

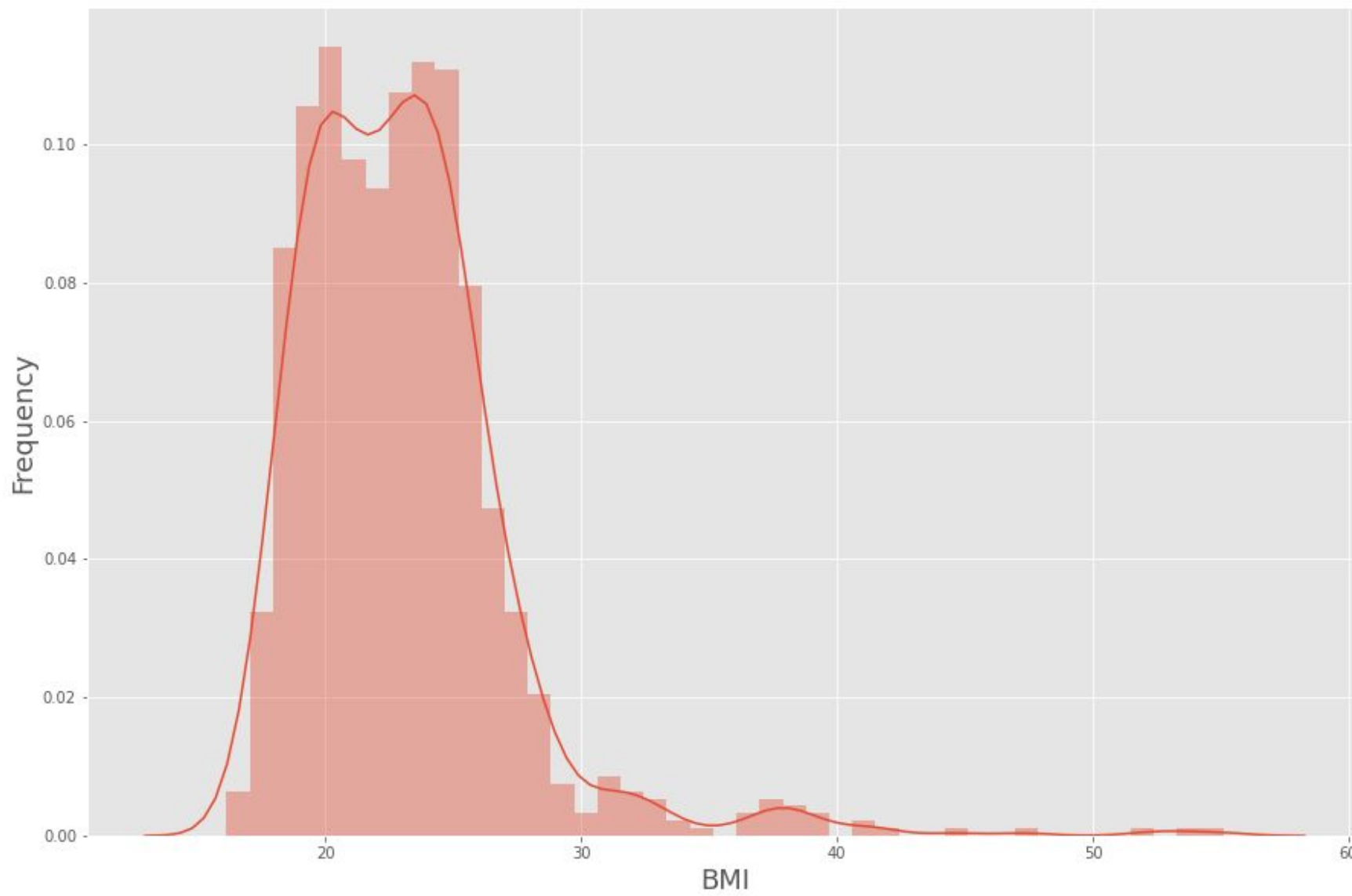
Sample training: epochs = 500

Cross Validation train: 20 times, each with 500 epochs

Final train: epochs = 5000

Cross validation train for BMI

Distribution of BMI

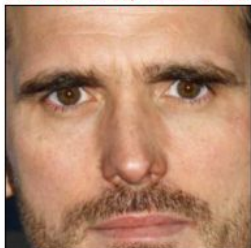


Cross validation train for BMI - Sample

Predicted:18.11/ Actual: 19.72



Predicted:22.30/ Actual: 24.49



Predicted:20.66/ Actual: 20.57



Predicted:22.55/ Actual: 18.83



Predicted:22.32/ Actual: 21.73



Predicted:25.27/ Actual: 20.05



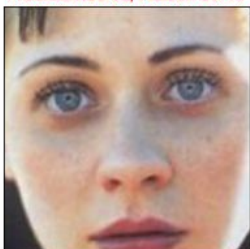
Predicted:20.67/ Actual: 38.14



Predicted:21.12/ Actual: 25.20



Predicted:21.62/ Actual: 19.49



Predicted:19.71/ Actual: 21.21



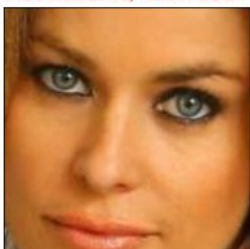
Predicted:20.05/ Actual: 18.04



Predicted:28.35/ Actual: 26.00



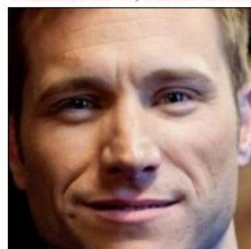
Predicted:23.01/ Actual: 22.27



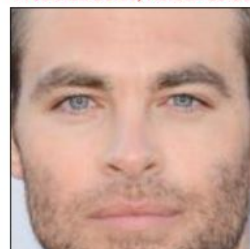
Predicted:24.69/ Actual: 23.37



Predicted:22.47/ Actual: 24.30



Predicted:21.65/ Actual: 23.29



Testing result distribution for cross validation on BMI

Error distribution

Count : 206

Mean: 2.148342

Std: 2.702871

Min: 0.010359

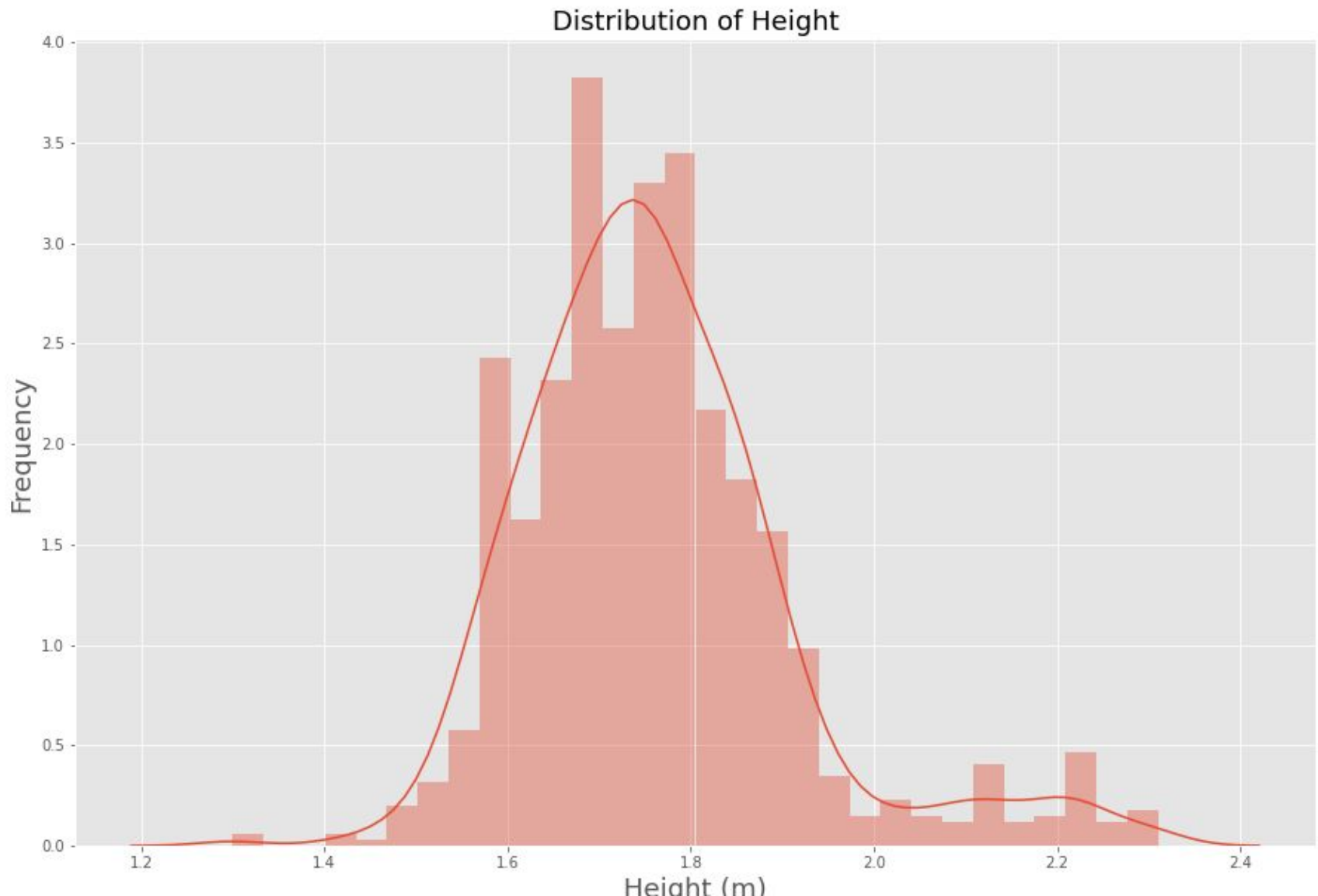
25%: 0.622971

50%: 1.658

75%: 2.722138

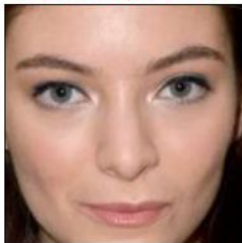
Max: 31.54

Cross validation train for Height

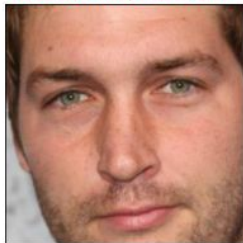


Cross validation train for Height - Sample

Predicted:1.72/ Actual: 1.65



Predicted:1.68/ Actual: 1.77



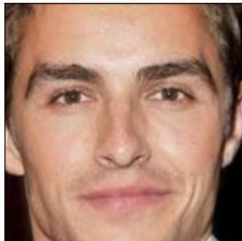
Predicted:1.69/ Actual: 1.89



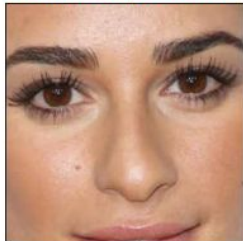
Predicted:1.90/ Actual: 1.80



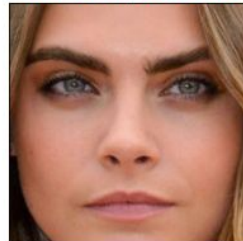
Predicted:1.70/ Actual: 1.70



Predicted:1.63/ Actual: 1.59



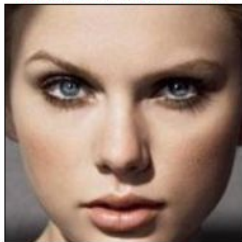
Predicted:1.70/ Actual: 1.73



Predicted:1.92/ Actual: 1.78



Predicted:1.52/ Actual: 1.79



Predicted:1.77/ Actual: 1.85



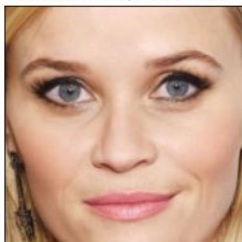
Predicted:1.93/ Actual: 1.83



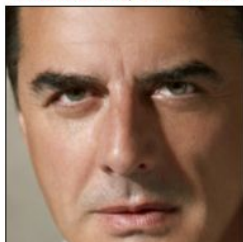
Predicted:1.63/ Actual: 1.70



Predicted:1.76/ Actual: 1.55



Predicted:1.65/ Actual: 1.85



Predicted:1.68/ Actual: 1.83



Predicted:1.95/ Actual: 1.88



Testing result distribution for cross validation on Height

Error distribution

Count : 206

Mean: 2.148342

Std: 2.702871

Min: 0.010359

25%: 0.622971

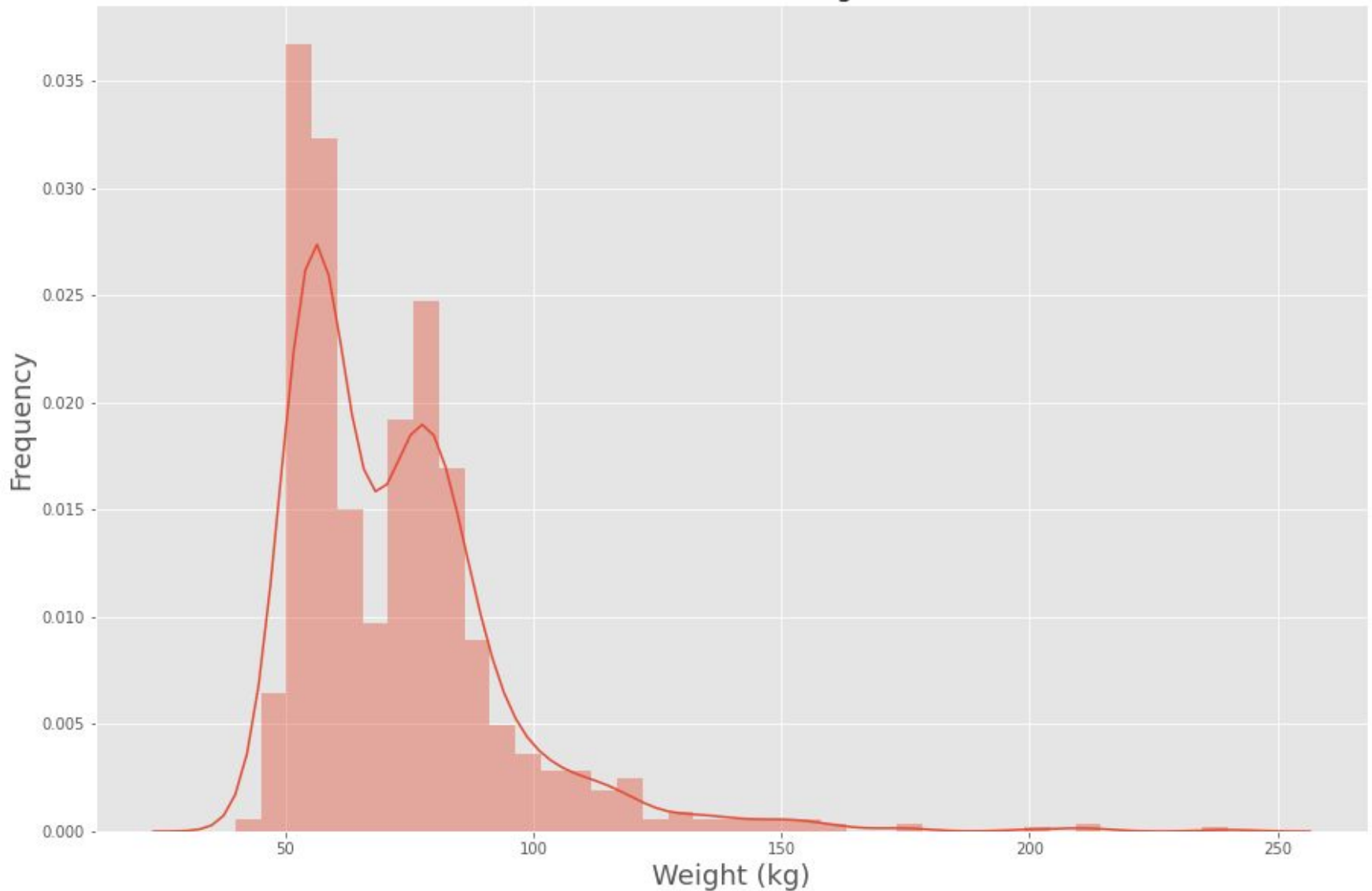
50%: 1.658

75%: 2.722138

Max: 31.54

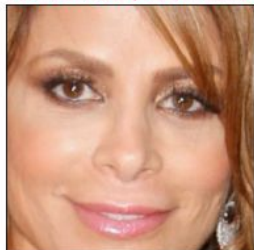
Cross validation train Weight

Distribution of Weight



Cross validation train Weight - Sample

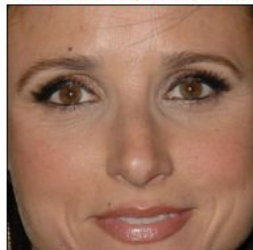
Predicted:62.27/ Actual: 53.00



Predicted:65.30/ Actual: 52.00



Predicted:67.26/ Actual: 54.00



Predicted:65.32/ Actual: 150.00



Predicted:61.58/ Actual: 66.00



Predicted:60.53/ Actual: 61.00



Predicted:57.95/ Actual: 77.00



Predicted:60.01/ Actual: 52.00



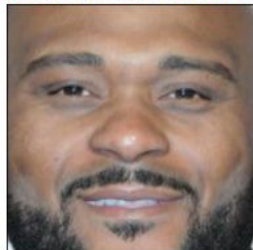
Predicted:68.08/ Actual: 102.00



Predicted:60.02/ Actual: 60.00



Predicted:67.69/ Actual: 155.00



Predicted:80.64/ Actual: 61.00



Predicted:61.44/ Actual: 56.00



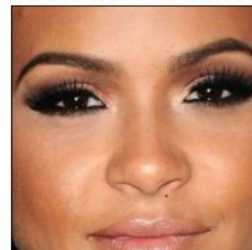
Predicted:85.34/ Actual: 81.00



Predicted:64.56/ Actual: 55.00



Predicted:62.78/ Actual: 54.00



Testing result distribution for cross validation on Weight

Error distribution

Count : 206

Mean: 2.148342

Std: 2.702871

Min: 0.010359

25%: 0.622971

50%: 1.658

75%: 2.722138

Max: 31.54

Fixing crop face function

New crop no margin/ Average Error: 3.170



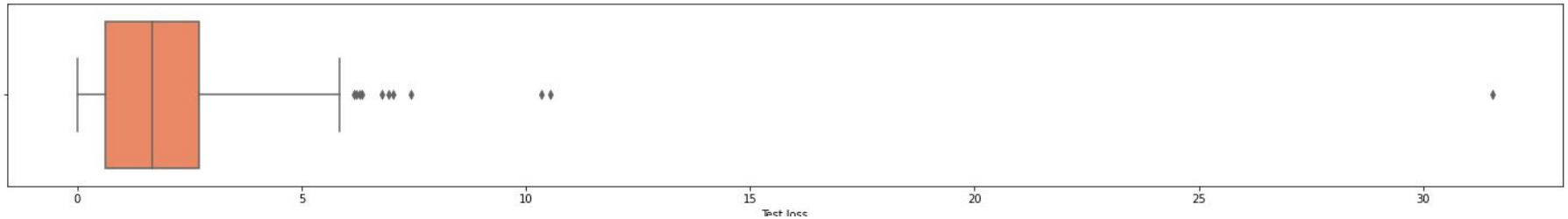
Old crop with 10% margin/ Average Error: 3.273



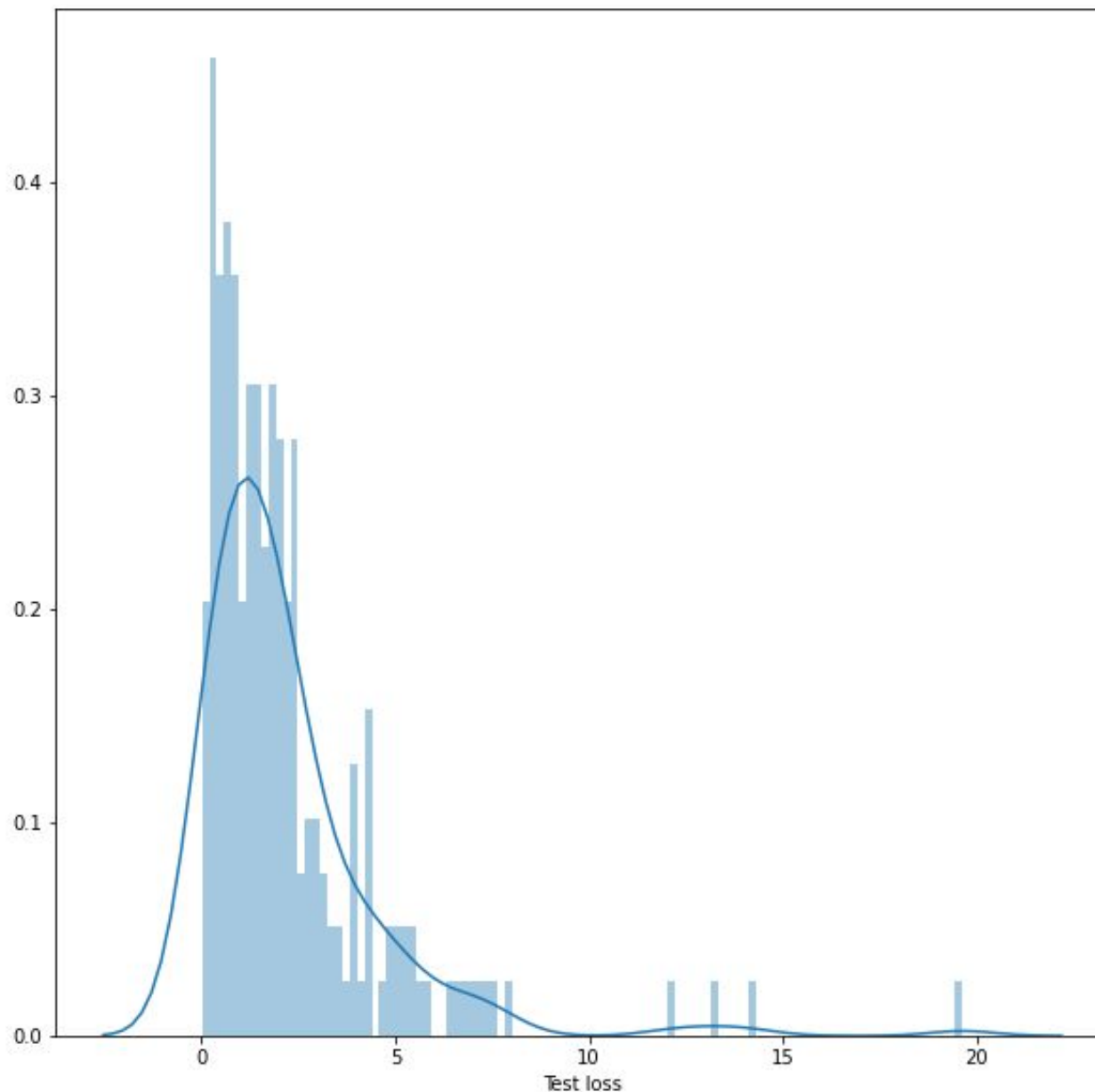
Analyze test result for western data

Analyze BMI test result for western data

Count : 206
Mean: 2.148342
Std: 2.702871
Min: 0.010359
25%: 0.622971
50%: 1.658
75%: 2.722138
Max: 31.54



Analyze test result for western data

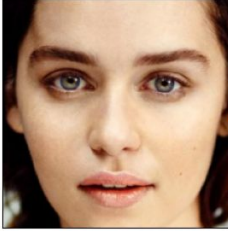


Error distribution

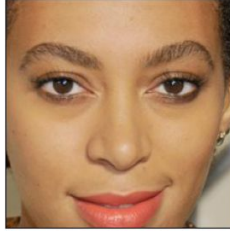
Count : 206
Mean: 2.148342
Std: 2.702871
Min: 0.010359
25%: 0.622971
50%: 1.658
75%: 2.722138
Max: 31.54

Analyze test result for western data - Sample

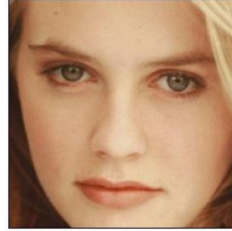
Predicted:21.59/ Actual: 23.53



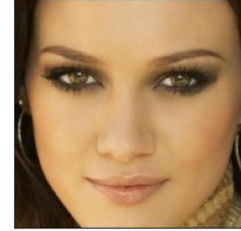
Predicted:20.03/ Actual: 18.93



Predicted:19.14/ Actual: 20.94



Predicted:19.13/ Actual: 22.31



Predicted:17.89/ Actual: 18.42



Predicted:19.94/ Actual: 19.57



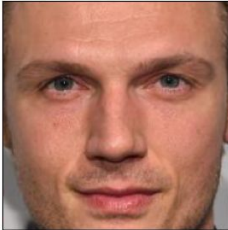
Predicted:25.02/ Actual: 23.45



Predicted:23.15/ Actual: 23.20



Predicted:22.78/ Actual: 21.50



Predicted:21.23/ Actual: 21.08



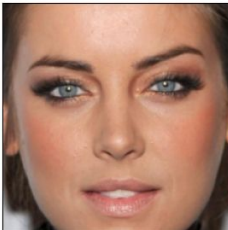
Predicted:20.61/ Actual: 21.19



Predicted:23.01/ Actual: 20.07



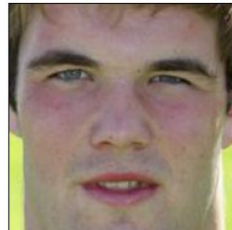
Predicted:19.30/ Actual: 18.38



Predicted:25.49/ Actual: 25.74



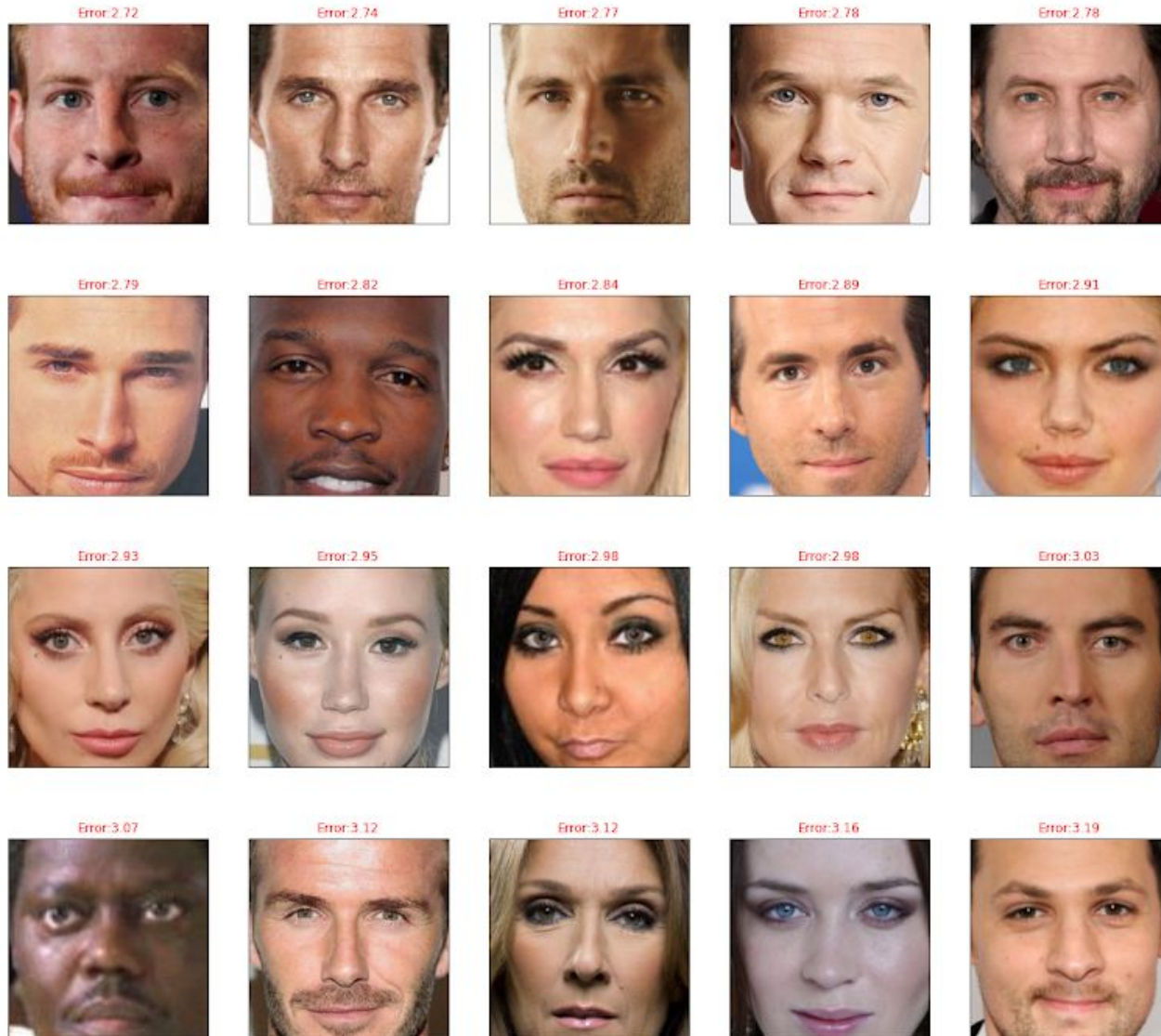
Predicted:22.81/ Actual: 28.98



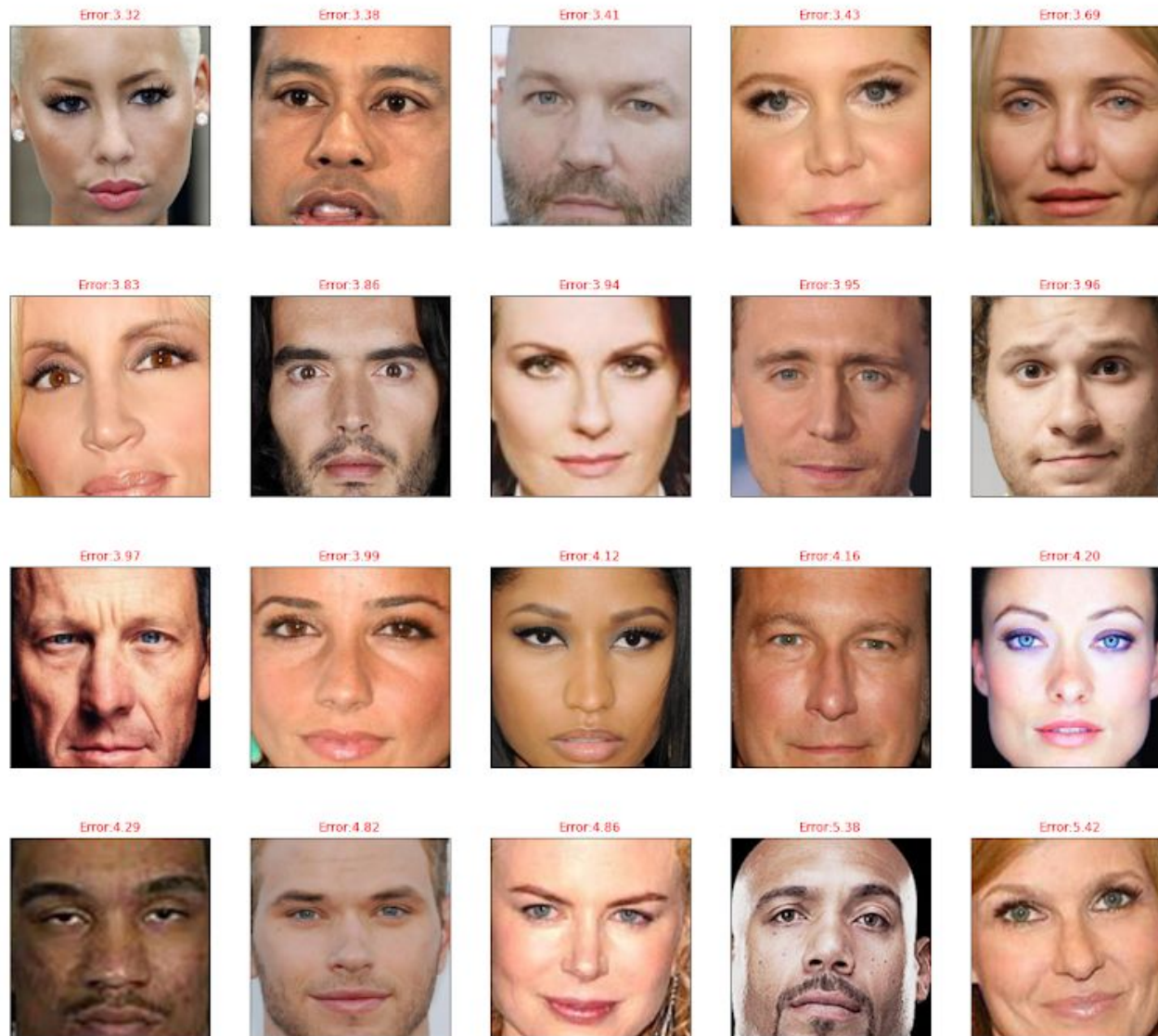
Predicted:25.69/ Actual: 22.92



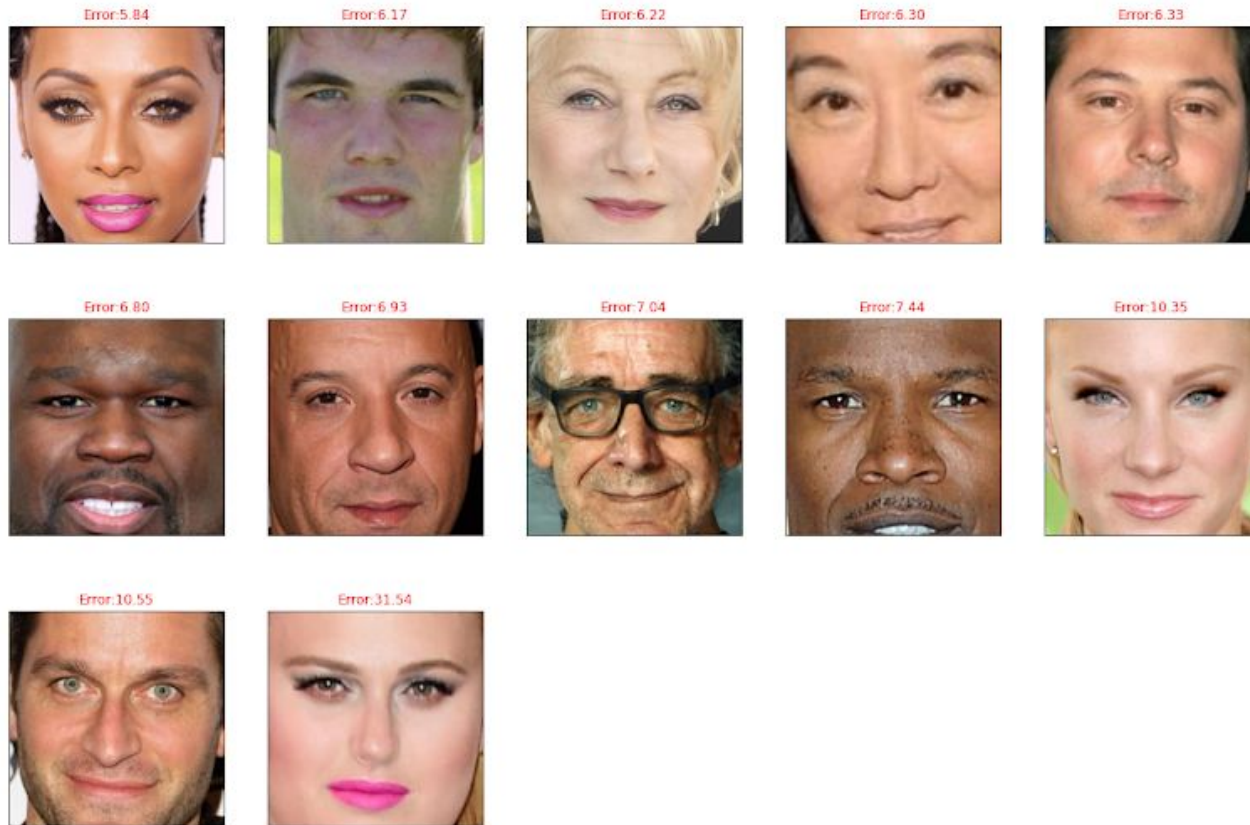
Test result for western data - Biggest error (≥ 2.72)



Test result for western data - Biggest error (≥ 2.72)



Test result for western data - Biggest error (≥ 2.72)



Analyze test result for western data - Biggest error

Reasons for error:

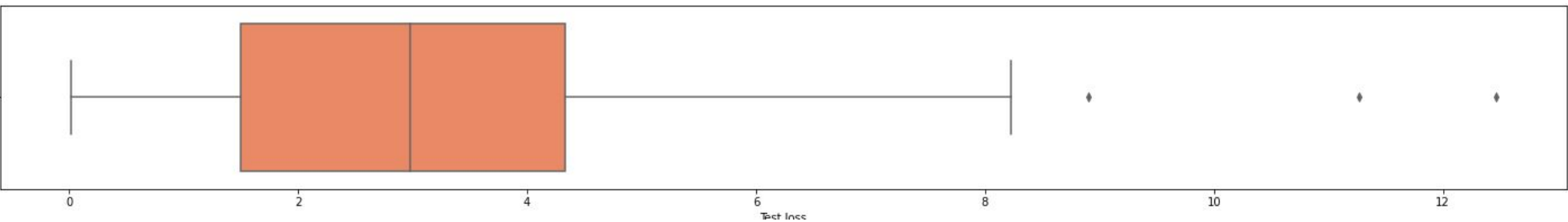
1. Bad image: not complete face, losing some parts of face
2. Bad data:
 - a. Image and values are not taken at the same time
 - b. Incorrect data
3. 29/52 largest error cases are male
4. White people have larger error (43/52 are white people)

Main reason: bad data

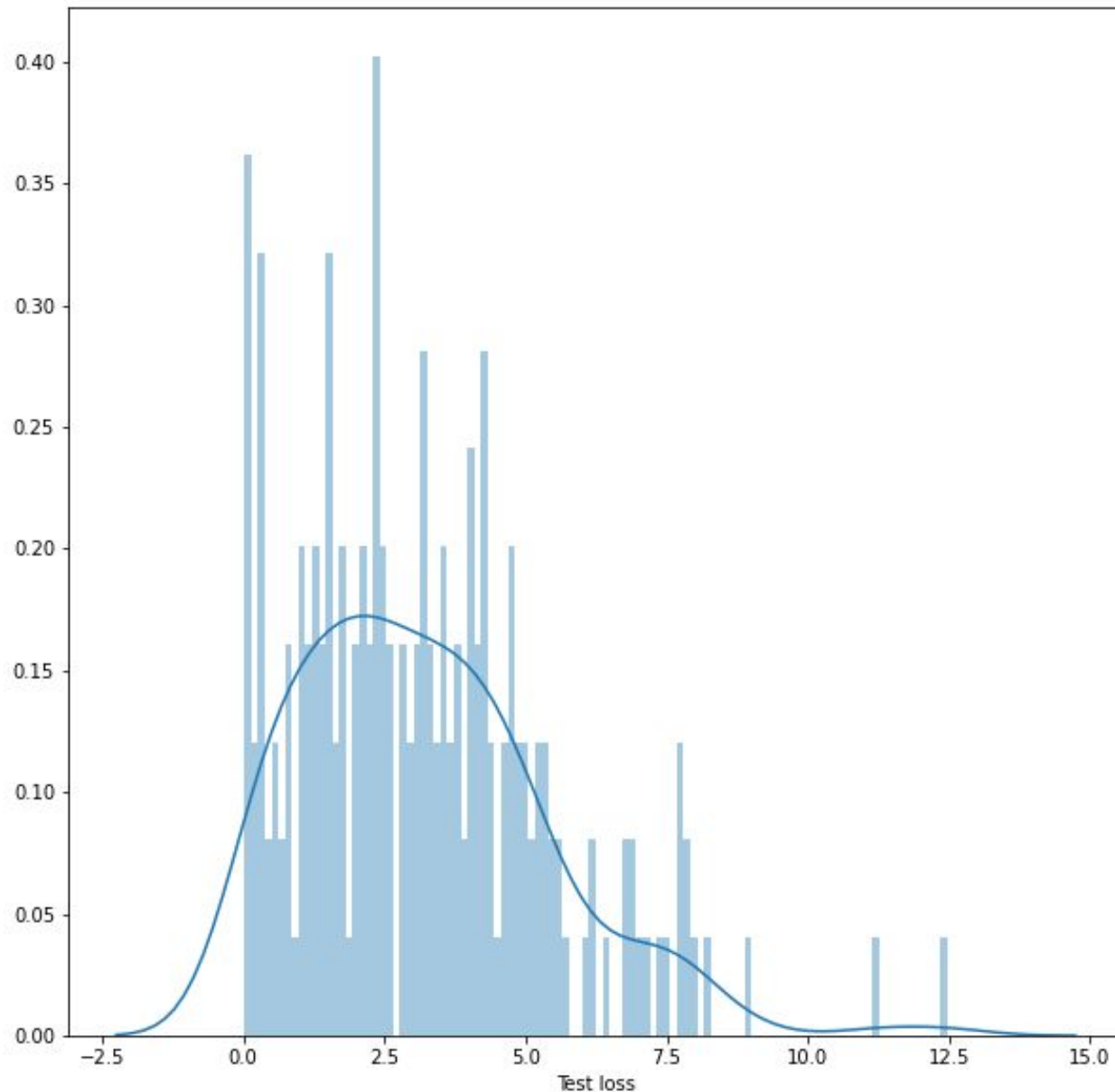
Analyze BMI test result for Asian data

Analyze test result for asian data

Count : 208
Mean: 3.170377
Std: 2.212229
Min: 0.019562
25%: 1.492668
50%: 2.976602
75%: 4.336589
Max: 12.460855



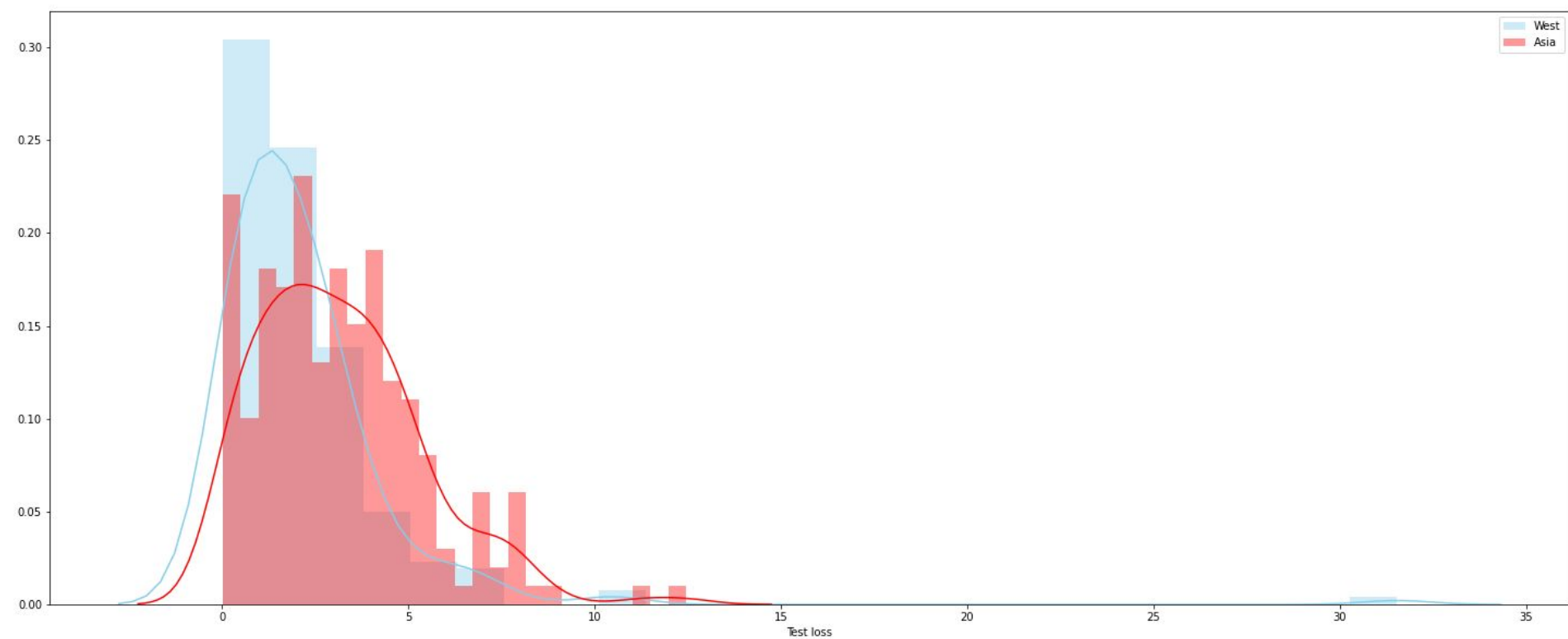
Analyze test result for asian data



Error distribution

Count : 208
Mean: 3.170
Std: 2.212
Min: 0.019
25%: 1.492
50%: 2.976
75%: 4.336
Max: 12.46

Error distribution West vs Asia



Analyze test result for asian data - Sample

Predicted:24.92/ Actual: 23.77



Predicted:21.44/ Actual: 19.49



Predicted:17.95/ Actual: 16.94



Predicted:19.67/ Actual: 19.84



Predicted:25.15/ Actual: 21.22



Predicted:22.68/ Actual: 18.00



Predicted:18.13/ Actual: 18.47



Predicted:22.00/ Actual: 16.96



Predicted:25.12/ Actual: 20.99



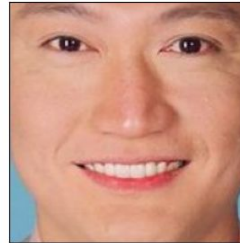
Predicted:20.53/ Actual: 17.42



Predicted:18.29/ Actual: 18.07



Predicted:21.37/ Actual: 23.67



Predicted:23.08/ Actual: 23.20



Predicted:23.45/ Actual: 22.21



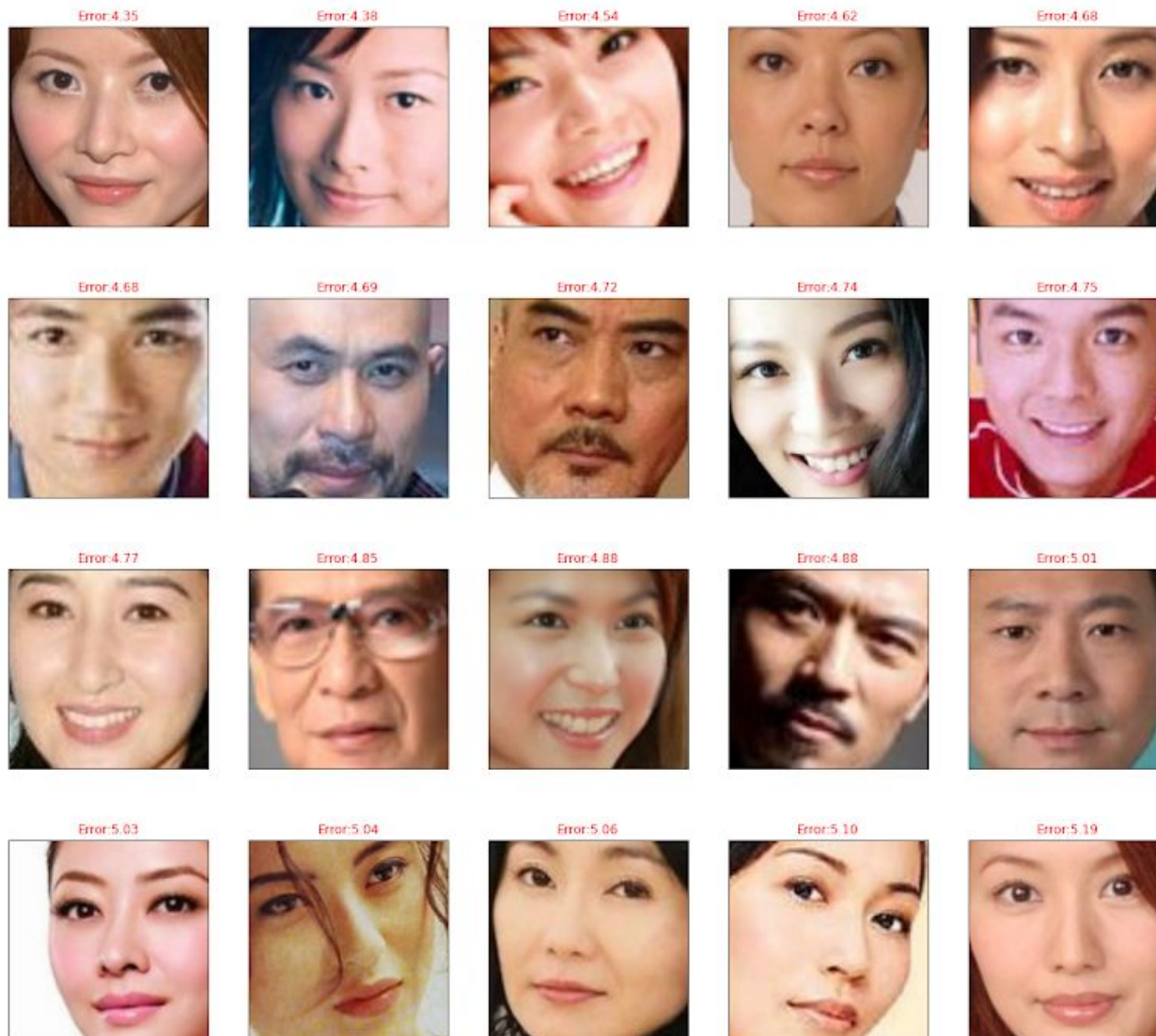
Predicted:20.37/ Actual: 18.78



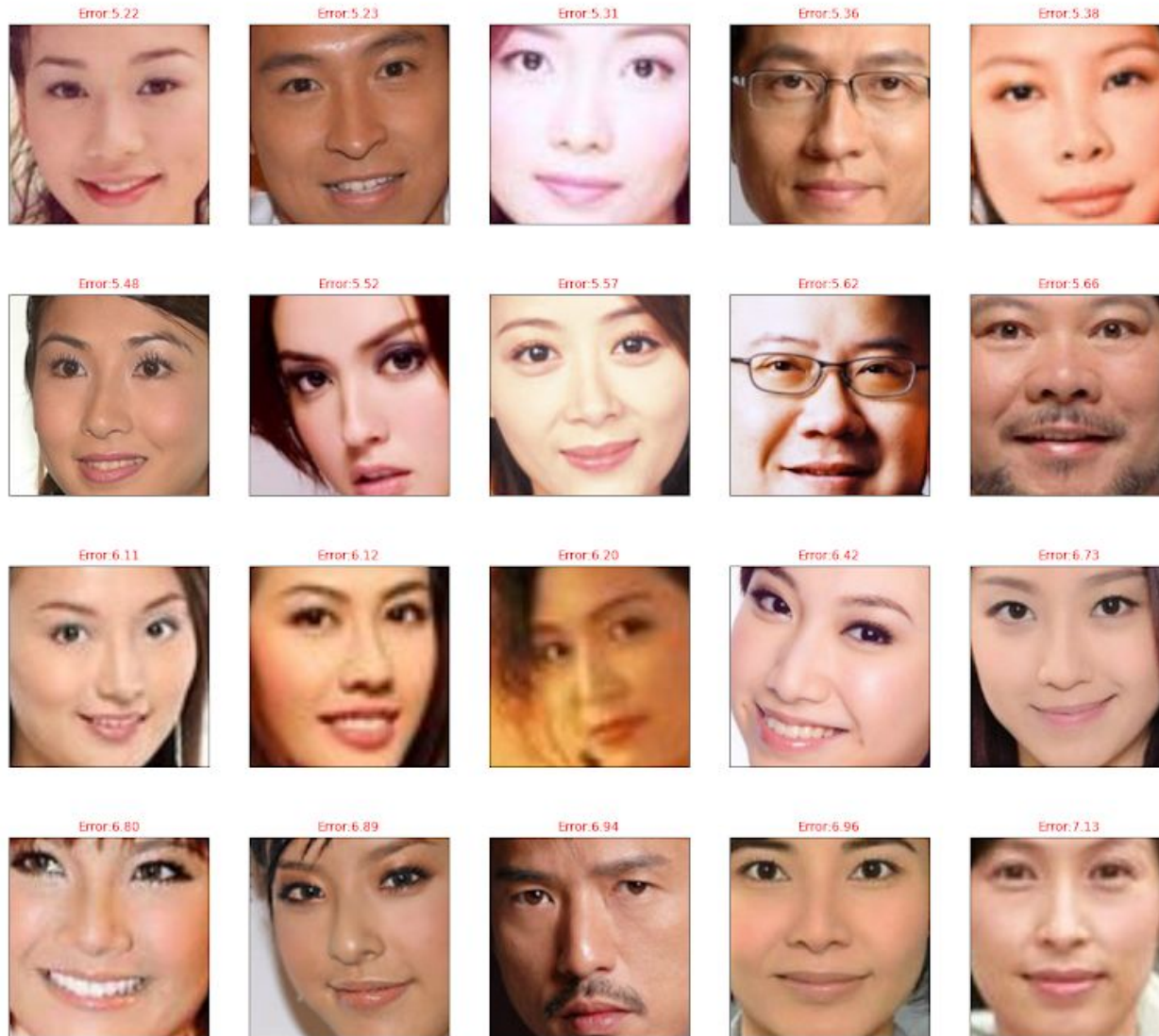
Predicted:23.19/ Actual: 15.79



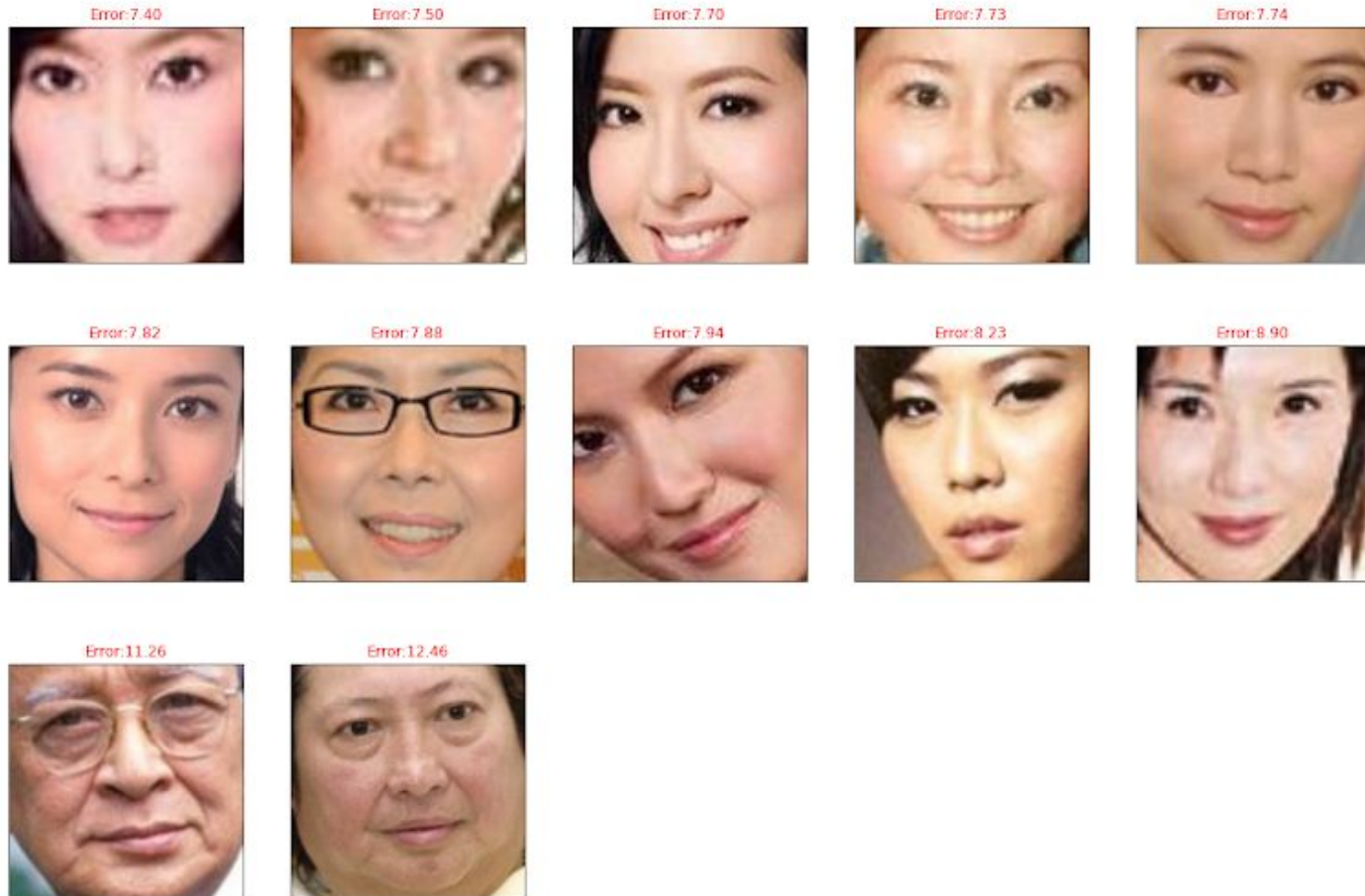
Test result for asian data - Biggest error (≥ 4.33)



Test result for asian data - Biggest error (≥ 4.33)



Test result for asian data - Biggest error (≥ 4.33)



Analyze test result for asian data - Biggest error

Reasons for error:

1. Bad image: not complete face, losing some parts of face
2. Bad data:
 - a. Image and values are not taken at the same time
 - b. Incorrect data
3. Women have larger error (40/52 are women)

Main reason: bad data

Train pretrained model to train
on asian data

Model after training on asian data

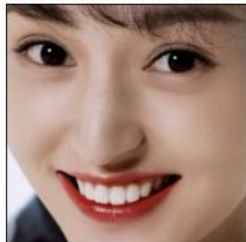
Testing loss with asia data is: 1.818 (Before training is 3.17)

Asian model testing - Sample

Predicted:20.13/ Actual: 16.36



Predicted:17.54/ Actual: 15.97



Predicted:21.86/ Actual: 22.49



Predicted:17.44/ Actual: 21.56



Predicted:16.93/ Actual: 16.85



Predicted:16.30/ Actual: 15.24



Predicted:19.52/ Actual: 25.71



Predicted:22.47/ Actual: 21.10



Predicted:18.48/ Actual: 18.22



Predicted:18.04/ Actual: 18.31



Predicted:18.57/ Actual: 17.15



Predicted:18.55/ Actual: 20.66



Predicted:18.72/ Actual: 15.43



Predicted:22.58/ Actual: 19.71



Predicted:18.29/ Actual: 18.37



Predicted:20.51/ Actual: 20.96

