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Age Group Classification in the Wild with Deep RoR Architecture

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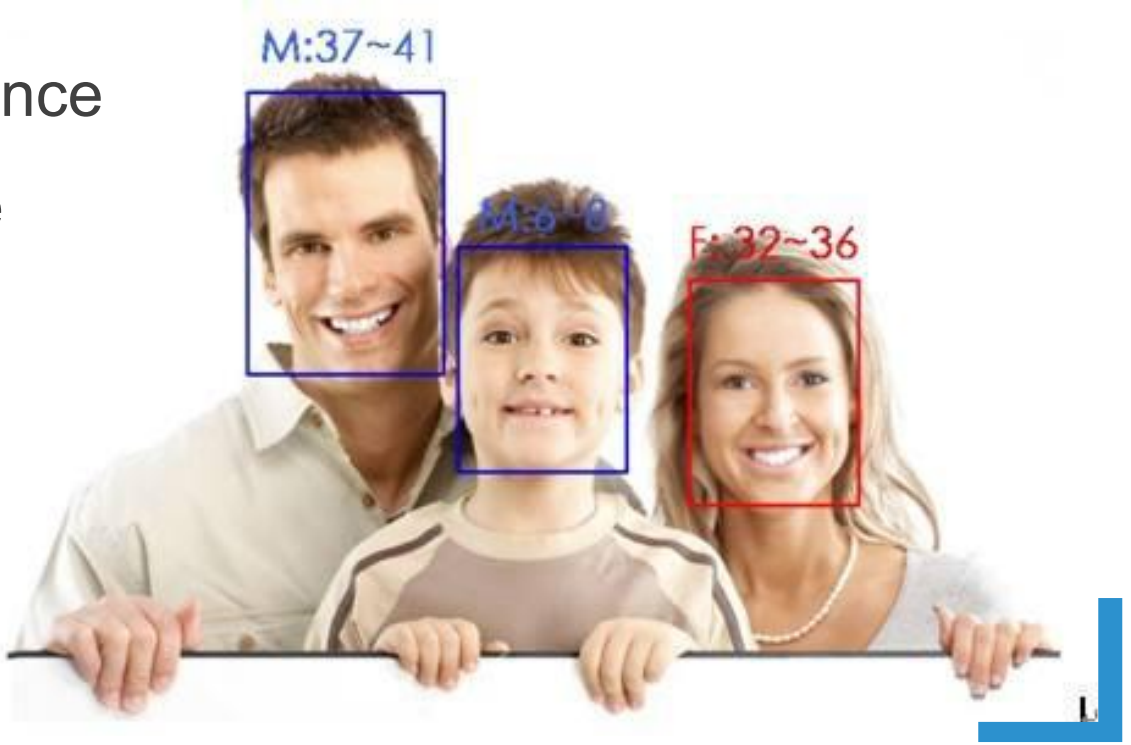
Outline

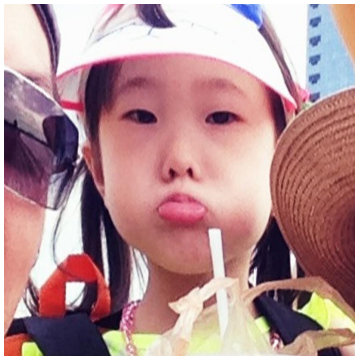
Introduction

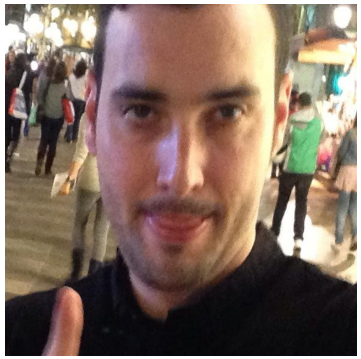
- access control
- human-computer interaction
- law enforcement
- marketing intelligence
- visual surveillance



Introduction

- Adience dataset
- large variations in appearance, noise, pose and lighting






Introduction

- All of previous methods were only proven effective on constrained benchmarks, and could not achieve respectable results on the benchmarks in the wild.

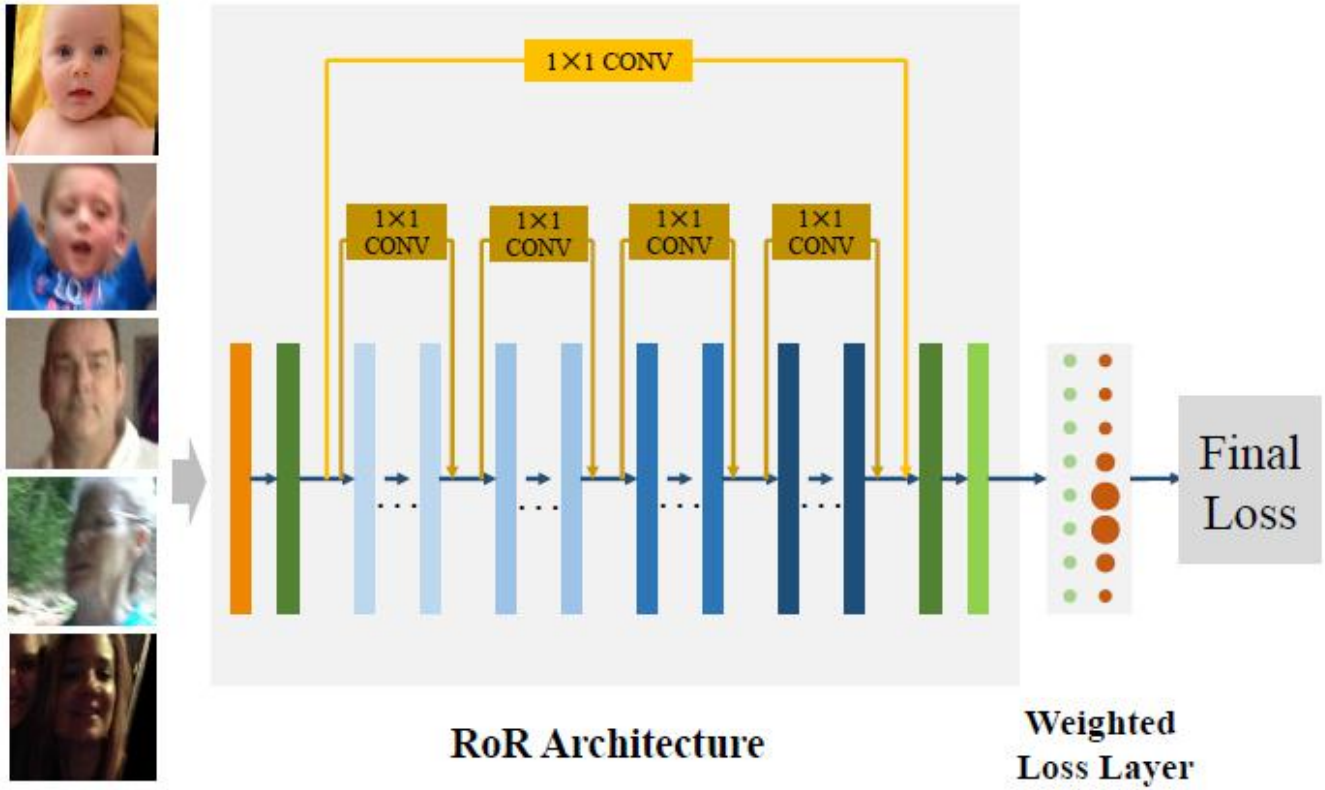
Methodology

contribution:

- construct RoR for age group classification
- pre-trained CNN by gender
- weighted loss layer
- achieve the new state-of-the-art results on Adience dataset

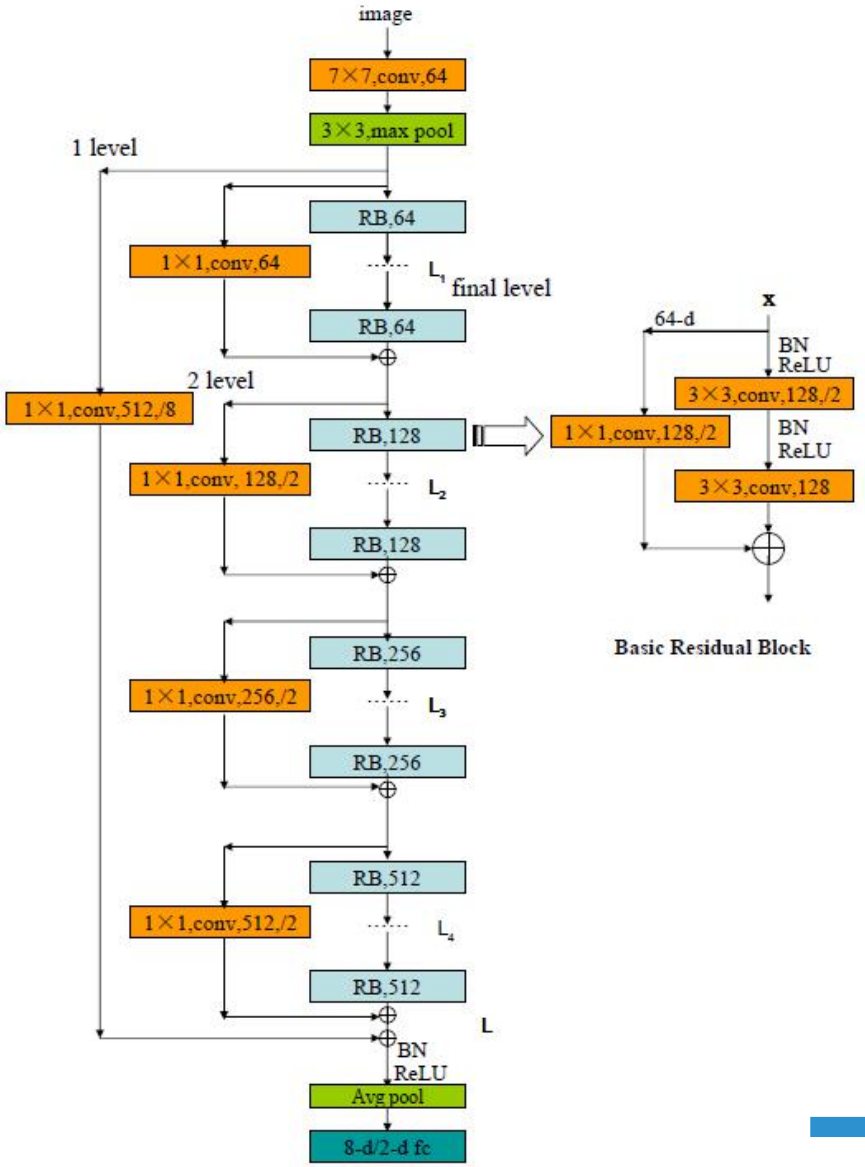
Methodology

- Overview of RoR architecture for age classification



Methodology

- RoR architecture for age classification



Methodology

Pretraining with gender:

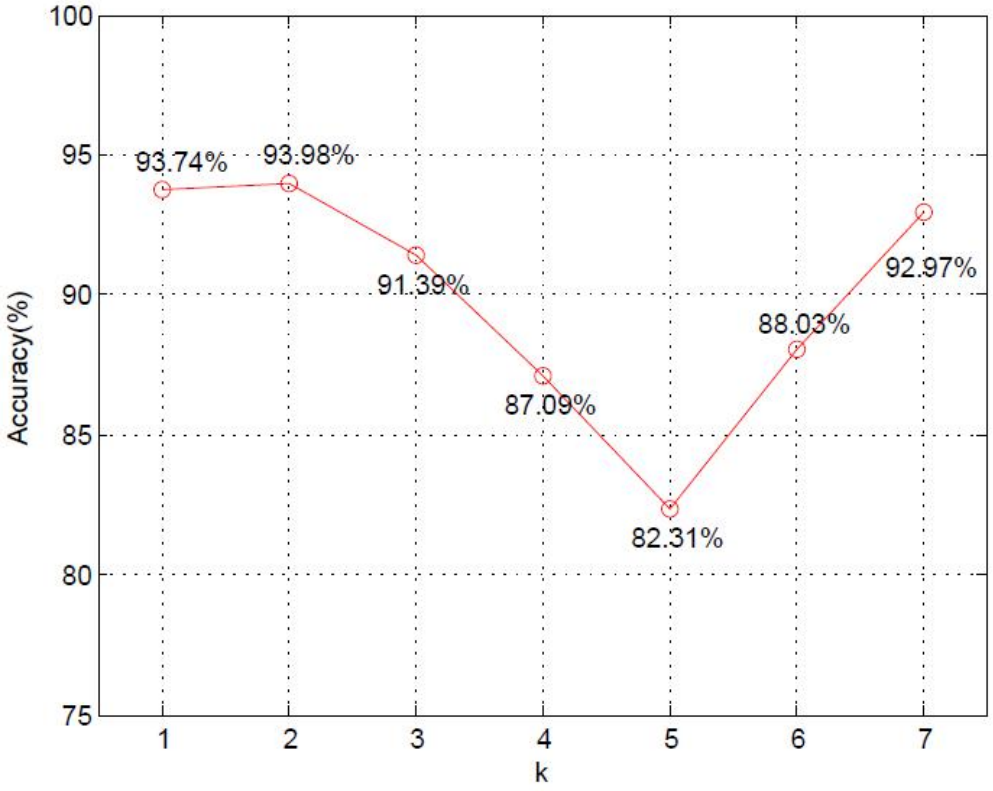
- We train CNN by gender initially, then replace the gender prediction layer with age prediction layer, and fine-tune the whole CNN structure at last.

Methodology

Training with weighted loss layer:

- Interrelated age groups are more difficult to distinguish.
- Human aging processes show variations in different age ranges.

Name	Loss Weight Distribution
LW0	(1,1,1,1,1,1,1,1)
LW1	(1,1,1,0.9,0.8,0.8, 0.9,1)
LW2	(1,1,1,1.1,1.2,1.2,1.1,1)
LW3	(1,1,1,1.3,1.5,1.5,1.3,1)



Experiments

Age group classification by Pre-RoR:

Method	Exact Acc(%)	1-off(%)
4c2f-CNN	52.62±4.37	88.61±2.27
VGG-16	54.64±4.76	54.64±4.76
Pre-ResNets-34	60.15±3.99	90.90±1.67
Pre-RoR-34+SD	62.35±4.69	93.55±1.90
Pre-RoR-58+SD	62.50±4.33	93.63±1.90
Pre-RoR-82+SD	62.14±4.10	93.68±1.22

Experiments

Comparisons with state-of-the-art results:

Method	**Exact Acc(%)**	**1-off(%)**
SVM-dropout	45.1±2.6	79.5±1.4
R-SAAFc2	53.5	87.9
DEX w/o IMDB-WIKI pretrain	55.6±6.1	89.7±1.8
DEX w/ IMDB-WIKI pretrain	64.0±4.2	96.60±0.90
4c2f-CNN	52.62±4.37	88.61±2.27
4c2f-CNN with two mechanisms	53.96±3.80	90.04±1.54
VGG-16	54.64±4.76	54.64±4.76
VGG-16 with two mechanisms	56.11±5.05	90.66±2.14
Pre-ResNets-34	**60.15±3.99**	**90.90±1.67**
Pre-ResNets-34 with two mechanisms	**61.89±4.16**	**93.50±1.33**
Pre-RoR-58+SD	**62.50±4.33**	**93.63±1.90**
Pre-RoR-58+SD with two mechanisms	**64.17±3.81**	**95.77±1.24**

Conclusion

- We propose a Residual networks of Residual networks architecture (RoR) for high-resolution facial images age classification in the wild.
- Two modest mechanisms, pre-training by gender and training with weighted loss layer.
- By Pre-RoR with two mechanisms, we obtain new state-of-the-art performance on Adience dataset for age group classification in the wild.

THANKS

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