

01

人脸感情识别
Facial Emotion Recognition



More Accurate Facial Emotion Recognition

Oral presentation

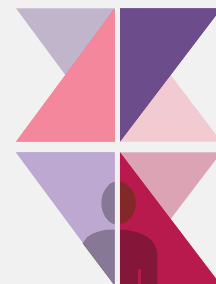
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Xuechao Wang

02

Media and Recognition
Course Presentation





Index

Facial Emotion Recognition:
Introduction, Related works, Models and Methods & Results

1. Introduction

Classify one static image into 8 different emotions

2. Related Works

Machine Learning: Flourishing Mainstream

3. Proposed Method

4. Results





01

Introduction

Classify one static image into 8 different emotions

Introduction

Classify one static image into 8 different emotions



Problem: Image Classification

Classify one static image into 8 different emotions





02

Related Works

Machine Learning: Flourishing Mainstream

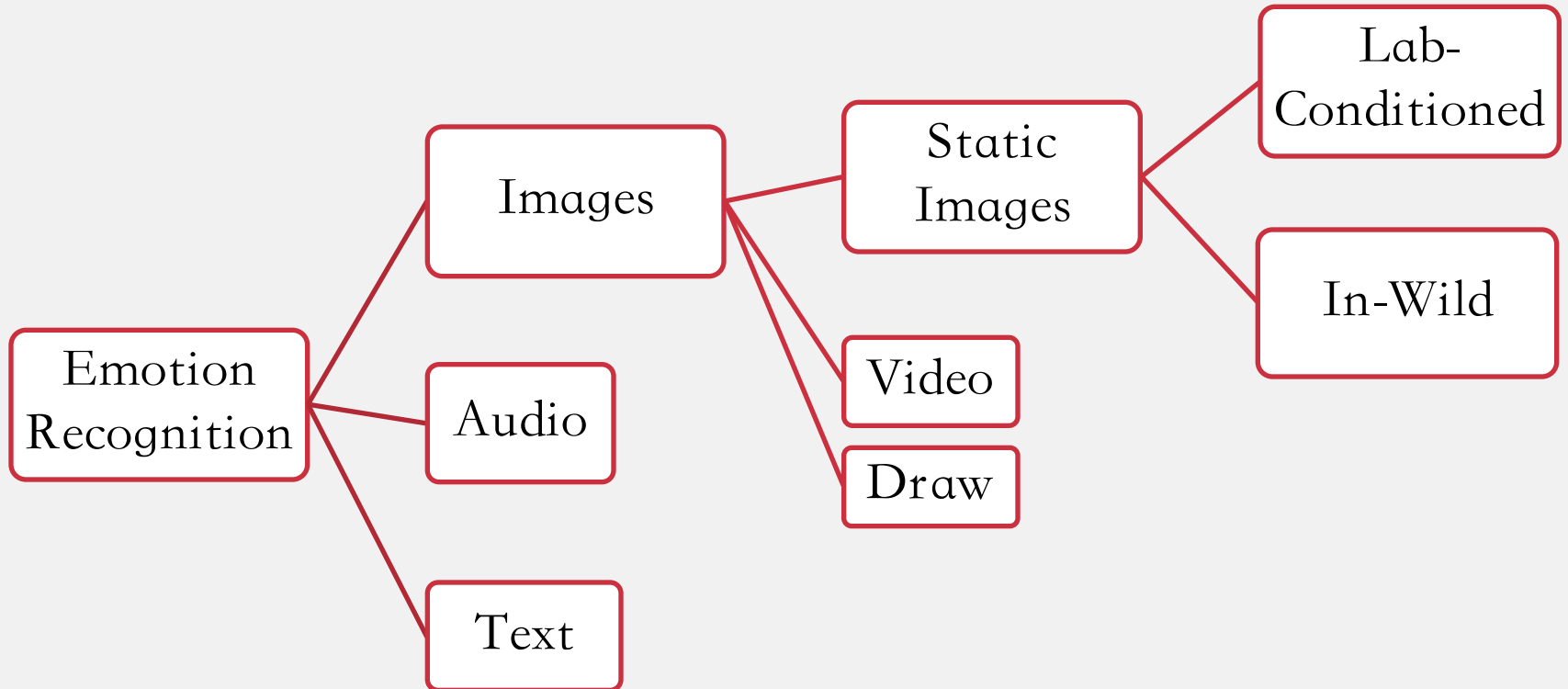
Related Works

机器学习算法是主流



Emotion Recognition

Widely studied human-computer interaction



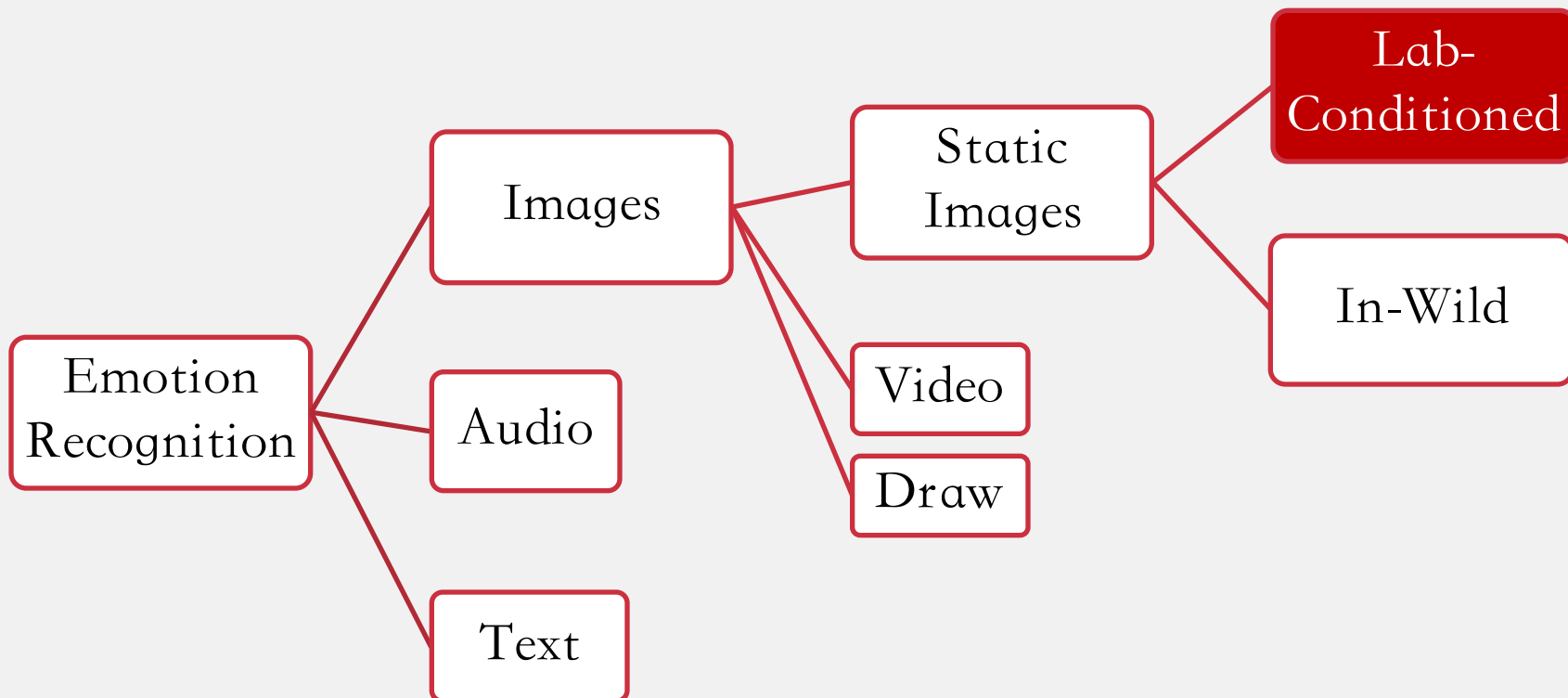
Related Works

机器学习算法是主流



情感识别

被广泛研究的人机接口方式，可依据媒体对象不同进行分类。



Related Works

机器学习算法是主流



Machine Learning: Flourishing Mainstream

Mathematical Models based on Feature Extraction

Related Works

机器学习算法是主流



Machine Learning: Flourishing Mainstream

Mathematical Models based on Feature Extraction

面部行为编码系统(FACS)

It is the most popular standard currently used to systematically categorize the physical expression of emotions and it has proven useful both to psychologists and to animators.



几何特征

Geometrical Features



Pixels Statistic Features



CNN

Conventional Neural Network





03

Proposed Method

Proposed Method



Classic Pattern Recognition(PR) Pipeline

Pre-processing

Classification



Feature Extraction

Multi-modeling merging

Proposed Method

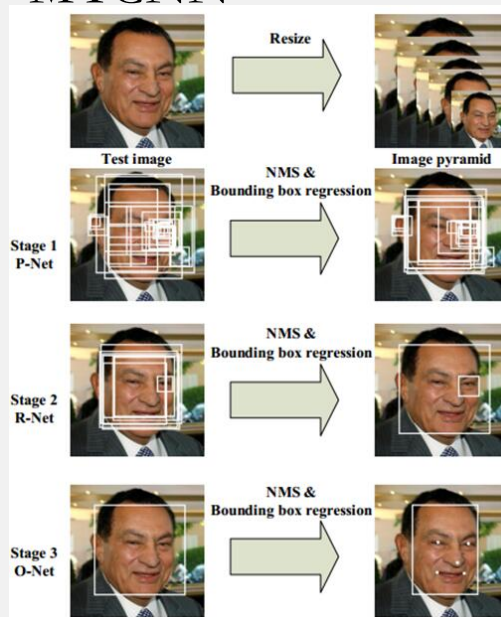


Image
Processing

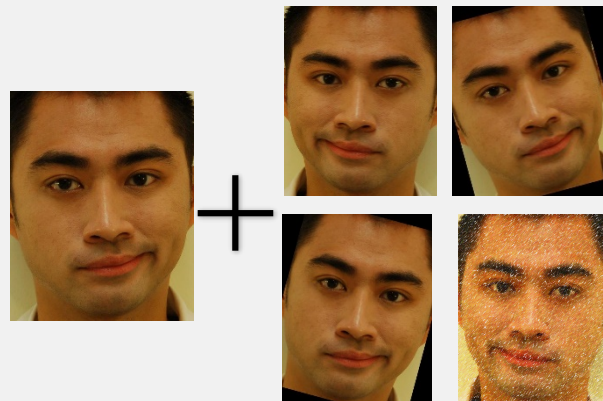
Cropping
Transformation

.....

Face Recognition
MTCNN



Training on
Databases



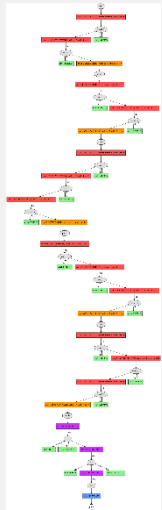
Proposed Method



Features: CNN + SIFT + HOG + LBP + LPQ

CNN: Fine-tuning on Different Databases in Different Steps

VGG-16



VGG-FACE



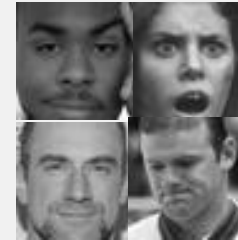
#: 2.6M
Pre-trained Model

FER 2013
Public Test



#: 3k
10 epoch

FER 2013
Private Test



#: 3k
5 epoch
Layer Freeze

Target
Database

CK+
JAFPE
KDEF
FTEID

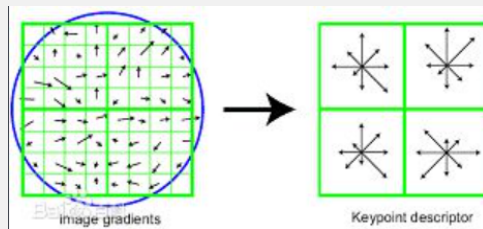
#: 12k
10-100 epoch

Proposed Method

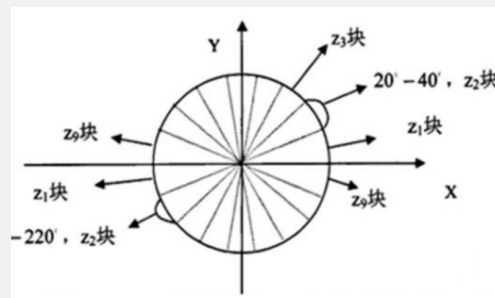


Features: CNN + SIFT + HOG + LBP + LPQ

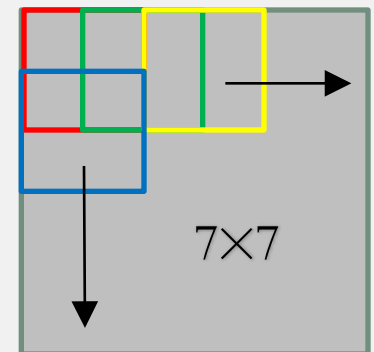
SIFT



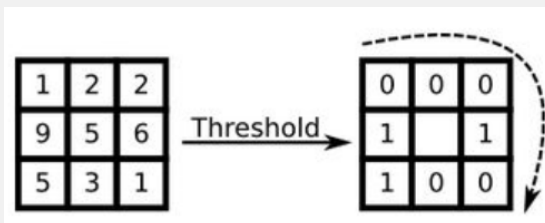
HOG



Scanning



LBP



LPQ

2D-DFT + Sampling

Proposed Method

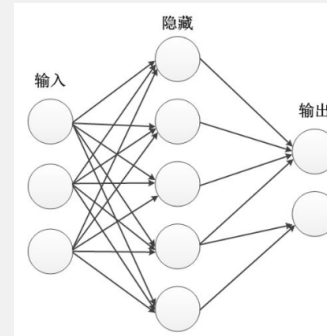
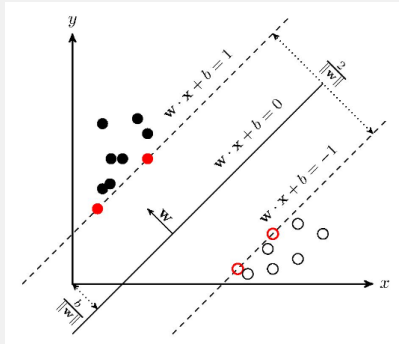
整合多种流行方法



posterior probability distribution

$$x \rightarrow p(c_i | x)$$

Classifiers: SVM, MLP



Proposed Method

整合多种流行方法



Results from different posterior probability distribution

$$\{p(c_i | x_j)\} \rightarrow p(c_i | \{x_j\})$$

$$p(x_i | c) \perp p(x_{j(\neq i)} | c) \rightarrow p(c_i | \{x_j\}) = \prod_j p(c_i | x_j)$$

$$\dots \sim p(c_i | \{x_j\}) \propto \sum_j p(c_i | x_j)$$

$$p(c_i | \{x_j\}) \propto \sum_j w_{ij} p(c_i | x_j) \quad \left(\sum_j w_{ij} = 1 \right)$$



04

Results

Result

More Accurate Facial Emotion Recognition



CK+

Test platform

Methods	Precision
Wang. et al. 2013	88.80%
Liu. et al. 2016	92.40%
Kaya. et al. 2017	98.47%
Ours	94.38%



**Thank
you**