Emotion recognition using facial images

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Abstract— **Facial emotion is vital path for human contact and also used in numerous real applications. Facial expression identification has in recent times become a hopeful investigate area. Their applications include human-computer interface, human emotion examination robot control, driver state surveillance and medical fields. This paper aims to perform emotion classification scheme to identify six dissimilar facial emotions, such as anger, fear, sad, happy, disgust and surprise by using JAFFE database. This was done by extracting patch based type from the image by using PCA. After patches are matched to the trained image. The scheme of patch harmonizing operations has been used to construct features for object identification and action categorization, which stay on vigorous when there are change in location, scale, and direction. The smallest value is chosen as the last feature for emotion categorization. The consequential distance characteristics are fed into the Random Forest Classifier to get accurate results for emotion recognition**

Key words- Facial Emotions, Features, PCA, Classifier

I. INTRODUCTION

Facial emotion recognition plays a major role in human communication. Since it contain serious and essential matter about emotion. The job of mechanically recognize dissimilar facial lexis in human-computer interaction is major and demanding. Here using database for emotion recognition, Such as (Japanese Female Facial Expression) JAFFE database. Most difficult thing is to extract facial emotional features for emotion recognition.

Past works used different methods for feature extraction. G.Guo *et al.* [1] adopted Gabor and FSLP (Feature Selection via Linear Programming) for feature extraction process. Their appreciation rate is 91.0% using JAFFE database. W.Yuwen *et al.* [2] tested fuzzy integral for feature extraction. Their recognition rate is 83.2% in using JAFFE database. Z.Wenming *et al.* [3] used KCCA (Kernel Canonical Correlation Analysis). Their recognition rate is 77.05% in JAFFE database. C.Zhengdong *et al.*[4] used WMMC(Weighted Maximum Margin Criterion). Their recognition rate is 65.77%. C.Shan *et al.*[5] adopted Boosted-LBP. Their recognition rate is 81.0% for JAFFE database and 95.1% for CK database. In this paper, patch based features are accurately extracts from the image to find emotions and established to be vigorous, even in the situation of face misalignment. To give the correct recognition rate using JAFFE database. The remining of this paper is planned as follows. Section 2 describes materials and database. DescribesJAFFEdatabase. Section 3 shows proposed frame work. Section 4 represents the experimental results and conclusion.

II. MATERIALS AND DATABASE.

Software

The proposed algorithm has been implemented with MATLAB7.0.

Database

JAFFE database

The JAFFE database [6] contains 213 gray images of seven different facial expressions such as (neutral, happy, sad, angry, disgust, fear and surprise) pose of 10 Japanese women. Every image has a declaration of 256*256 pixels. All pictures have three or four frontal images for every faces and their faces are placed in the center of the images. Six emotions are explained by 60 images.

FIGURE 1.samples of expresser containing seven different facial expressions

III. P R O P O S E D
SYSTEM

```
┌──────────┐     ┌──────────┐     ┌──────────┐
│  Face    │ ──▶ │ Feature  │ ──▶ │  Patch   │
│detection │     │extraction│     │ matching │
└──────────┘     └──────────┘     └──────────┘
                                        │
                                        ▼
                                 ┌──────────┐
                                 │ Feature  │
                                 │selection │
                                 └──────────┘
                              Test image │
                                        ▼
                 ┌──────────┐     ┌──────────┐     ┌──────────┐
                 │  Patch   │ ──▶ │Classifier│ ──▶ │ Emotion  │
                 │ matching │     │          │     │          │
                 └──────────┘     └──────────┘     └──────────┘
```
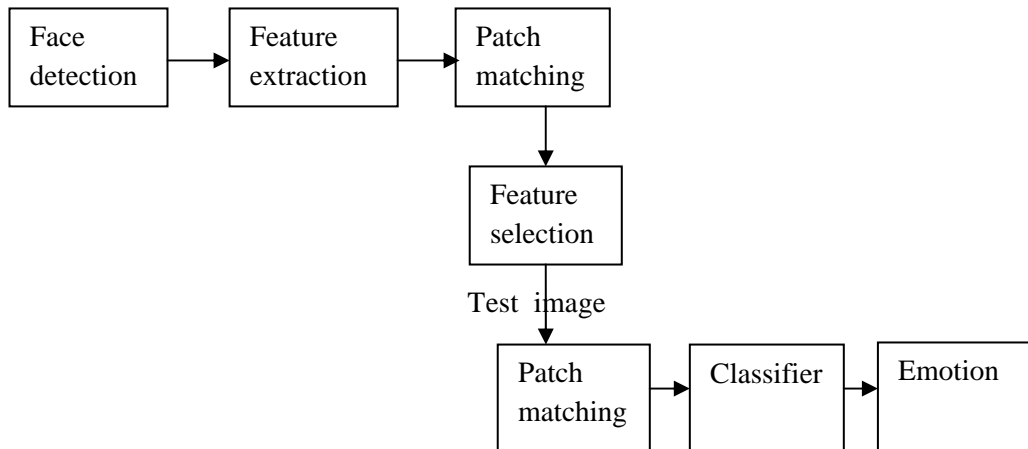
Figure 2.Block diagram of proposed work

IV. METHODOLOGY

Fig 2.represents the planned frame works. Face is detected and physically crop from record images as a resolution of 256*256 pixels. Then, an entire set of patch are extract from the imagery. Then a patch harmonizing process is takes place. Here change the extract patches into distance facial appearance. To detain the facial group of patches.Where the least amount rule is use to discover the accurate matching features in space. Then a group of "main" patch are preferred .After giving a test image s i m i l a r patch harmonizing process is performed using "most important" patch. The consequential distance facial appearances are given to the random forest classifier to recognized six essential emotions of (sad, happy, fear, disgust, surprise, disgust and anger).

Face detection and feature extraction

A face is detected from the whole image and manually cropped from the image. A set of random patches with different size is extracted from the image. The patch set is collected by scanning all rows and columns in the face region. PCA algorithm is used for feature extraction process.

Patch matching

Patch matching aims to find the majority similar features located within a space for action categorization [8], [9] and object identification [10]. The matching helps to reduce the error. Patch matching performed to change the extract patch into reserve facial appearance. This distance features are finding by harmonizing these patches among every patches with its corresponding training image. Here taking two as input values and select one minimum value as final. The least value is selected for finding emotions

Feature selection and patch matching

A group of most important patch only chosen for reduces the computation time. After giving a test image, equal patch harmonizing is perform on the salient patches in testing images, resulting in distance features are fed into the random forest classifier.

Random forest classifier

Random forest has many categorization trees. To categorize a new thing from an input, give the input under every trees in the forest. Each tree provides a classification, and says the tree "votes" for that class. The random forest had choose the most votes for categorization.

V. EXPERIMENTAL RESULT

MIN VALUES FOR EMOTIONS USING PATCHES						
	FE	DI	HA	AN	SU	SA
FEAR (FE)	29.0	1	0	6	0	3
DISGUST (DI)	7	42.8	5	4	0	6
HAPPY (HA)	0	0	40.7	2	6	0
ANGER (AN)	3	9	0	34.5	2	7
SURPRISE (SU)	0	4	8	0	43.5	0
SAD (SA)	0	5	0	9	5	44.2

Figure3. Minimum values for six emotions

MAX VALUES FOR EMOTIONS USING PATCHES						
	FE	DI	HA	AN	SU	SA
FEAR(FE)	42.8	5	0	7	3	2
DISGUST(DI)	6	52.4	0	5	0	1
HAPPY(HA)	0	4	46.9	0	7	3
ANGER(AN)	9	23	0	45.6	0	5
SURPRISE(SU)	8	34	45	0	56.7	0
SAD(SA)	23	32	0	12	5	51.1

Figure 4. Maximum values for six emotions

VI . CONCLUSION

We did emotion recognition by using patch based feature extraction. Minimum distance is taken into an account for best matching of test image with training set of images. We get accuracy as high when patch matching has minimum distance value. We can justify emotion of given image by using Random forest classifier.

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