A Comparative Study of CNN, RNN, and Transfer Learning Models for Facial Emotion Recognition in Gaming

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**Datasets:**

There are total 3 dataset employed in this research Study:

1. CK Dataset:

This is publicly available dataset on Kaggle repository. Dataset is created specifically for face emotion analysis so datapoint captured are in specific lighting and frame. Dataset contains more than 900 face image data points. For research purpose dataset is stored in dataset folder above. It can be downloaded from :

<https://www.kaggle.com/datasets/shuvoalok/ck-dataset>

1. FER2013:

This is dataset is publicly available on Kaggle dataset repository. The dataset contains more than 35 thousand of face image data points divided into train and test folder. For research purpose dataset is stored in dataset folder above. It can be downloaded from :

<https://www.kaggle.com/datasets/msambare/fer2013>

1. Custom Dataset:

This dataset is created by author this research purpose only. It contains 52 face image datapoint and 193 game scene data points. For research purpose dataset is stored in dataset folder above. It can be found in in google drive : <https://drive.google.com/drive/folders/1baVXc_xjc4L4cJ58jhzz0zAz0iXNurit?usp=sharing>

**Datasets Usage:**

There are total 3 dataset employed in this research Study and their usage is as follows:

1. CK dataset: The dataset contains only around 950 images and for training all models whole dataset is used in combination with custom dataset
2. FER2013: This is large dataset containing more than 35 thousand data points of face images. The dataset is divided into train and test from source location only. The data from Train folder which is around 28 thousand images is used to train all model in combination with custom dataset.
3. Custom dataset: custom dataset is relatively smallest and is created by author for this research. The total datapoints in this dataset is 52 and 195 so in total around 255 only. All dataset is used in respective models training for face image and game scene image models.

**Dataset folder Structure:**

Dataset folder have 3 folders and multiple sub folders as follows:

1. CK+48 : As dataset have datapoints in standardized format so no need of preprocessing so dataset is directly used. There are 7 subfolders according to 7 emotions and contains datapoints inside
2. Custom dataset: The custom dataset contains mainly 2 subfolders and excel file which describes datapoint descriptive information. 1st sub folder is Face and contains 2 folders Train and Preprocessed. Train folder contains datapoints collected and preprocessed folder contains datapoints ready to train model. These folders also have more subfolders which are according to 7 emotions. 2nd folder contains game scene data and have subfolders train, test3-preprocessed data and test4-preprocessed data. Train folder have ordinal image and other two folder contains preprocessed data, test4-preprocessed data is latest folder with all datapoints preprocessed and ready for training. These folders also have more subfolders which are according to 7 emotions.
3. FER2013: FER2013 datapoints contains all images standardized format so no preprocessed image needed. The folder contains train and test folder. These folders also have more subfolders which are according to 7 emotions.

**Code Sequence:**

For researching purpose and computational limitations codes are divided in 3 parts for methods.

In codes folder there are 4 subfolders :Data validation, Method 1, Method 2 Method 3.

Note: Please save dataset and files on drive and according to location make changes in code part.

Data validation : this folder contains for data validation purpose only

Method 1: Method 1 contains 3 files Method\_1\_face\_data, Method\_1\_game\_scene\_code, and Method\_1\_Combine\_models. In order to run these files please run Face data file first and then game scene model (Preprocessing is part is run and saved here). Save both models to desired location and in 3rd file call it for model combination.

Method 2: Method 2 contains 3 files Method\_2\_face\_data, Method\_2\_game\_scene\_code, and Method\_2\_Combine\_models. In order to run these files please run Face data file first and then game scene model. Save both models to desired location and in 3rd file call it for model combination.

Method 3: Method 3 contains only one file. All of method 3 all models are kept in single file so it consumes more computational power. Please change directory and saved models, features address according to run.