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Designing Deep Leaning frameworks for Image Aesthetics

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Abstract: ***Aesthetic is the measure or appreciation of beauty. In photography, it usually means that an image appeals to the eye. The existing method of machine learning is used to analyze the image aesthetics but this method has limited to the rules of photography. That's why we decided to develop an application to find whether the image is aesthetically pleasing or not and rate image Aesthetics using Convolutional Neural Network(CNN) models. In our project, we are using a double CNN module. We build our dataset for first CNN and FLICKER-AES dataset is used to train second CNN. Dataset generation for cnn1 is done by using a handcrafted mechanism and deep learning approach, outliers are removed manually. In the handcrafted mechanism, we have used various photography rules (Rule of Third, Figure to Ground, Depth of Field) in this mechanism. The CNN-1 model is trained using the generated dataset of labeled images to classify the image into one of six classes. The CNN-2 model is trained using the dataset of rated images (FLICKER-AES) to rate images based on their aesthetics. This trained CNN model helps us to rate our images. We use CNN because it is very effective in areas such as image recognition and classification. The main goal of this project is to classify the image into 5 photography rules to suggest improvements in the image and rate image aesthetics.***

Keywords: Deep Learning, Convolutional Neural Network(CNN), Rating Images, Image Aesthetics..

I. INTRODUCTION

The field of image aesthetics deals with the creation and appreciation of beauty in images. A wide range of psychological and perceptual factors play a role in our appreciation of the aesthetic value of an image, including the presence of an object and their position, image sharpness, contrast, colorfulness, and color harmony.There are various existing methods which are developed for analyzing the aesthetic nature of images. But they have some flaws like some models only concentrate on human-centric images, some are developed in machine learning. The research shows that machine learning has less accuracy than deep learning that's why we are trying to develop an application that will rate the image based on their aesthetics using deep learning.

Definition of beauty varies from person to person so we can't use machine learning for that's why deep learning is the best option for rating image aesthetics. Use of deep learning techniques to develop an application for the user which will show one of five rules of photography which image follows and rate the image based on aesthetic qualities.

We are using a double CNN module to train our application. First CNN will classify the image into 5 rules of photography. The Role of the first CNN is to suggest improvements in the image. Dataset for first CNN is built with the help of machine learning and deep learning approach. The outliers in the dataset are removed manually. The rule suggested by this CNN will we given to the user as an improvement in their image. Second CNN is used to rate image Aesthetics. For training Second CNN (FLICKER-AES) dataset is used. this dataset contains 40,000 images rated by 4 ATM workers. but this dataset also contains many outliers. The images in the dataset are rated between 1-5. This dataset is used to train the second CNN module.UI of our project is designed with the help of HTML, CSS, javascript and it is a webpage. Backend is given with the help of the Django framework of python.

II. LITERATURE SURVEY

In this section, we review the existing methods that have been explored for image aesthetics. The existing methods to analyze image aesthetics are limited to the rules of photography. Research has found that accuracy can be improved with the help of deep learning. In the machine learning approach, users need to manually extract the feature form dataset. It works only for small datasets but this technique will not work if the dataset is large. CNN automatically extracts Features from images. Many people try to rate image aesthetics with the help of CNN but they had some limitations like a small amount of data, some consider only human-centric images.

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In [2] two columns are jointly trained using two input sources: One column takes a global view as the input, and the other column takes a local view as the input. This approach allows them to capture both global and local visual information of images. In [9] They train a regression model that improves the prediction accuracy of the aesthetic scores over state of the art & Further exploration of applications using their aesthetics prediction models will be conducted in the future. In [5] They had proposed a conditional random field(CRF) based color harmony model for image aesthetics assessment. In [7] They had developed a region search method to find auto set of reasonable attractive regions, assessing and ranking the attractiveness of these regions by measuring their aesthetically relevant attributes.

III. PROPOSED ARCHITECTURE

Proposed architecture is different from existing methods. We developed the system which uses a CNN and applies the rules of photography to classify images according to photography rules and rate the image based on their aesthetic.The proposed system architecture is shown in Fig 1.

A. Need for new System

1) Accuracy for machine Learning approach is very less.
2) Machine Learning approach is limited to 5 rules of photography for rating image aesthetics.
3) Research has shown that deep learning performs better than machine learning on a large dataset
4) An existing approach that uses deep learning has some limitations like some only considers the human-centric image. some models failed due to less dataset.

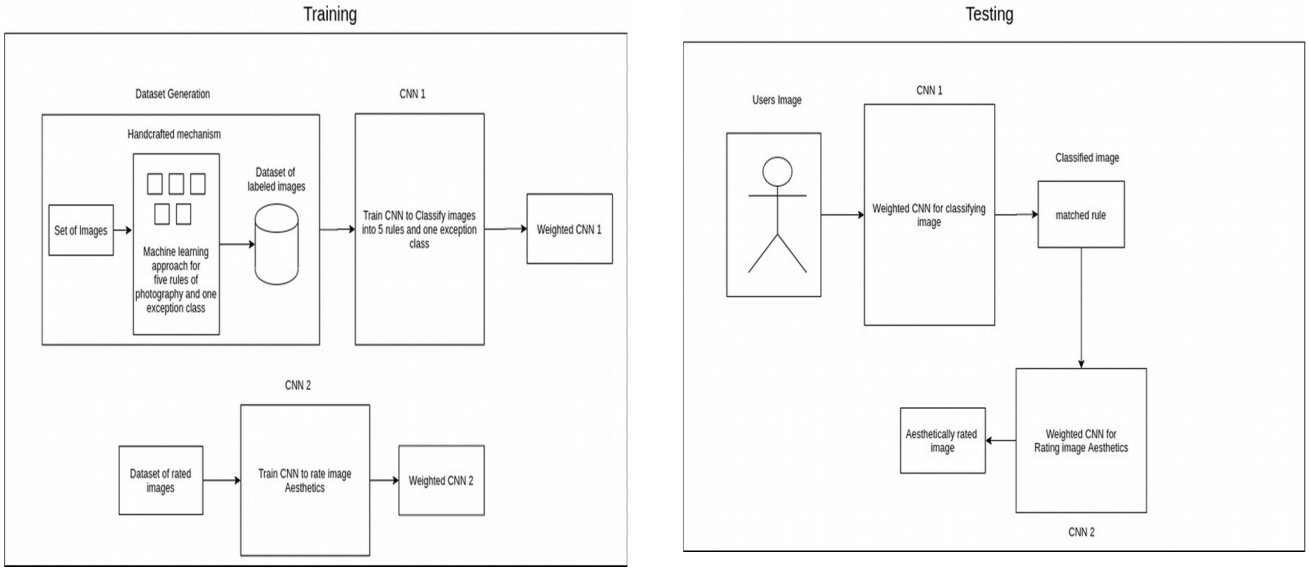

Fig 1 : Proposed System Architecture for Training and Testing

B. Dataset Generation

We are Using 5 Rules of photography for rating image Aesthetics. But we don't have an already available dataset for that. So we build a dataset using machine learning algorithms. Standard algorithms for the depth of field, Rule of thirds, Figure to the ground are available so we are using Machine Learning Algorithm for them, and for the other two algorithms i.e symmetry and pattern we are using deep learning. The Images which are not matched by any of these rules are labeled as Exception. With the help of Machine Learning and deep learning, we have generated the dataset for CNN1

1) *CNN-1 Design:* We generated the Training dataset for CNN1 in the first step. In this step, we are designing the CNN module for Classification of image According to five rules and one Exception class.
2) *CNN-2 Design:* We have downloaded the Flicker-Aes dataset. It contains Rated Images. So with the help of this dataset, we have designed CNN which will rate image Aesthetics.

C. Working

1) A set of 13000 images are classified into five photography rules using machine learning and deep learning.
2) The dataset of labeled images and dataset of the rated image is given for training to CNN-1 and CNN-2.
3) After completion of training Weighted CNN1 and CNN2 modules are generated
4) CNN will get tested using test images.
5) Based on test image weighted CNN-1 classifies the image according to rules of photography.
6) This classified image passed to weighted CNN-2 for aesthetic rating.
7) We get the rated image and suggestion if any.

D. Experimental Results

For testing of our model we have used 100 images per rule to produce result. The result of testing is shown in following Table 1.

Table 1: Results of Testing

SrNo	Rule	Testing Images	Correctly Classified Images	Accuracy (in percentage)
1	Rule of Third	100	88	88
2	Depth of Field	100	92	92
3	Figure to Ground	100	80	80
4	Symmetry	100	82	82
5	Pattern	100	84	84
6	Other	100	80	80

1) User Interface: Fig 2 and Fig 3 depict the user interfaces for uploading the image,rating with classification

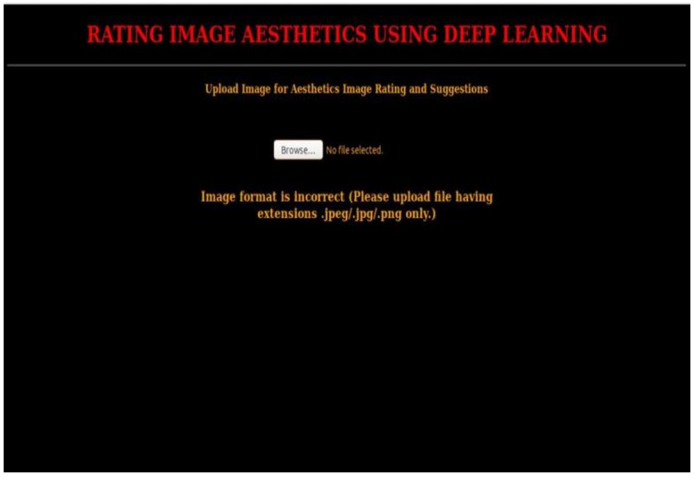

Fig 2 . User Interface for Uploading Image

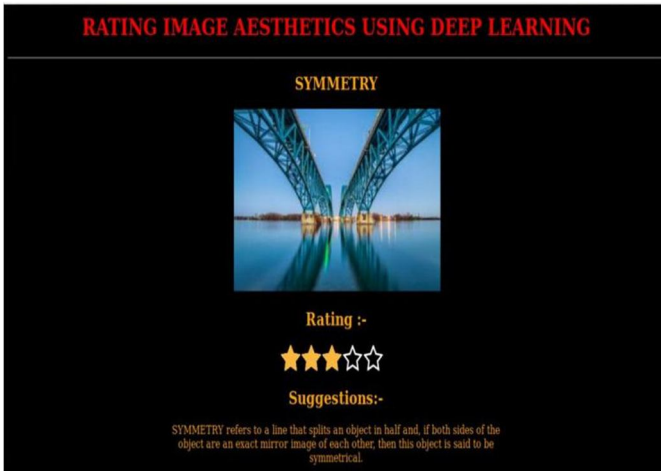

Fig 3. Classified and Rated Image

IV. CONCLUSION

In this project, we propose a Convolutionl Neural Network for rating image aesthetics based on 5 Rules of Photography and features. We have designed the system which contains 2 CNNs. First CNN will classify the images according to photography rules to provide suggestions to the user and the second CNN will Rate image Based on its Aesthetics quality.

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V. FUTURE SCOPE

In future CNN will train for more rules photography like diagonals rule natural frames rule etc. We will try to explore more about the human brain and aesthetic nature of images.

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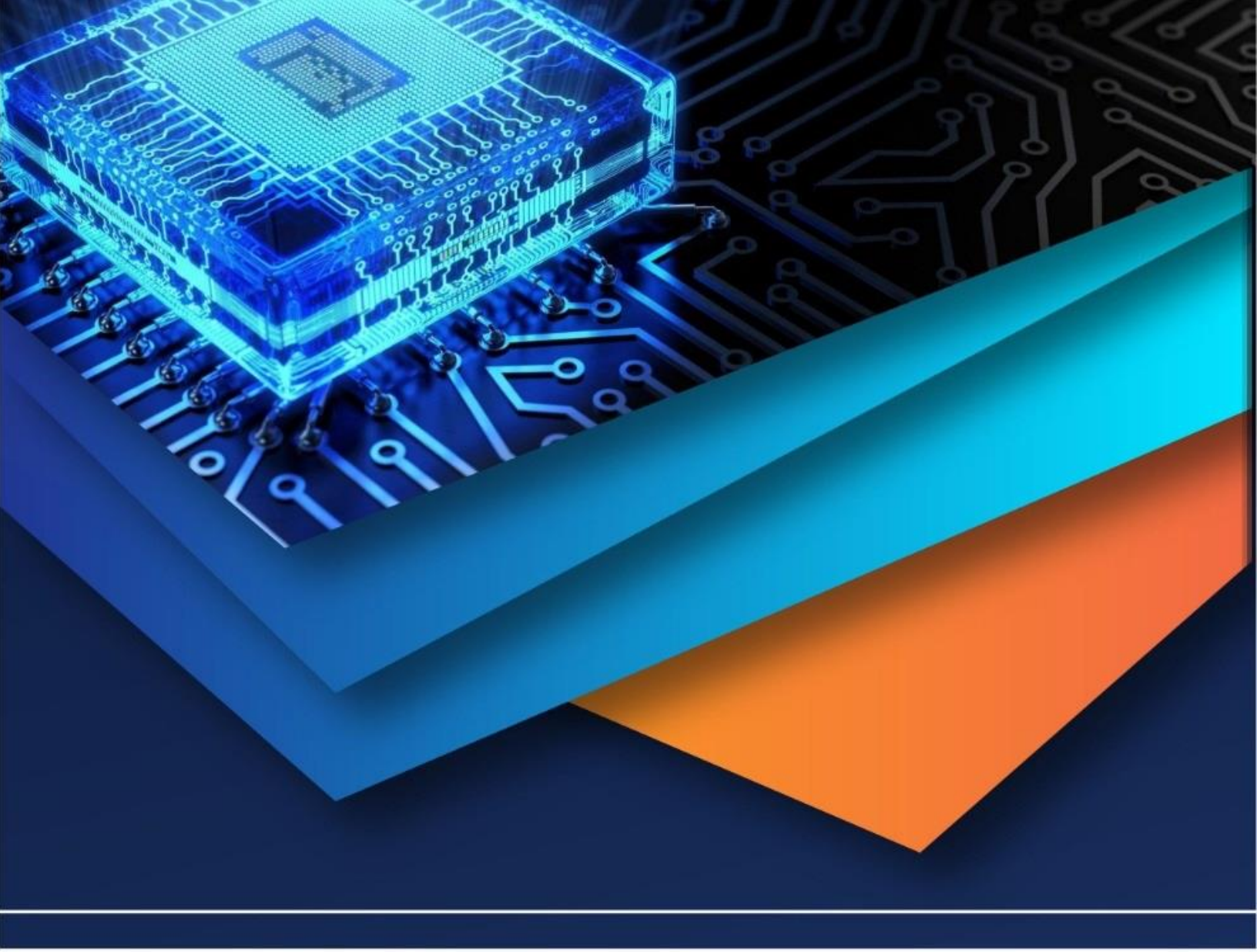

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