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Image Fusion for Scene Classification Using Machine Learning

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Abstract: ***Image fusion is the mechanism of gathering all important information. It is not only reduce data but also more appropriate and understandable for human and machine. Scene classification is widely used in day to day lifecycle. Their importance is increasing gradually. Scene classification is a classification which classify the image according to their area of importance. In this paper, Image is segmented, features of image are extracted and information is stored in database about image. Lastly, image is classified by machine learning and output comes in the text format. We use machine learning based support vector machine for classification which is more accurate than KNN classifier. The main aim of this study is to improve the accuracy and to reduce the delay of computation for the system.***

Keywords: Scene classification, machine learning, support vector machine (SVM), KNN classifier, machine learning based SVM.

I. INTRODUCTION

Scene classification classifies the scene into various parts for object recognition. Various images are stored in database. Input scene goes from three method such as segmentation, feature extraction, scene classification. Segmentation divides the image by applying Gaussian filter for smoothened the image. Further, feature extraction extract the colour pixel, edge pixel that shows sharpening of pixel. After that KNN classifier for matching the both images and desired output. Lastly, applied machine learning for comparing accuracy of both classifier.

Support vector machine (SVM) that classify the image in two class (accepted/rejected). There are different type of image feature for that only two classes is not sufficient for that we use machine learning SVM. The machine learning SVM classify the image in five classes. That five class shows the one of the best feature from all.

Scene image classification is an important problems for applications of computer vision such as robotics, image search, geo-localization, etc. It is also a challenging problem that for scene, object recognition aren't appropriate. This is because scenes include both a holistic component, the gist of the scene, and an object based component. Furthermore, the object vocabulary is usually open-ended and it does not suffice to recognize objects, as most scenes are collections of objects in characteristic spatial layouts. There is also a need to model relationships between objects. Our problem formulation is to identify datasets for classification. Extraction of features from those datasets in order to completely define the image. Further use a machine learning based classifier to classify the image into a particular scene type.

II. LITERATURE REVIEW

"Image understanding - a brief review of scene classification and recognition", Vineeta Singh, Deeptha Girish, and Anca Ralescu MAICS 2017.[18] conclude that Scene recognition performs better when low level features are used. Local features help override the effects of occluded objects, low lighting conditions. These features can be successfully mapped into semantic image descriptors.

"Scene classification with semantic fisher vectors", Mandar Dixit, Si Chen, Dashan Gao, Nikhil Rasiwasia, and Nuno Vasconcelos. In CVPR, pages 2974–2983, 2015.[6] proposed that an effective approach to summarize them with a Fisher vector, which is non-trivial. The semantic FV provides a better classification architecture than an FV of low-level features or a even fine-tuned classifier.

"Deep Scene Image Classification with the MFAFVNet", Yunsheng Li Mandar Dixit Nuno Vasconcelos University of California, San Diego La Jolla, CA 92093 2017 IEEE International Conference on Computer Vision.The new architecture is based on a MFA-FV layer that implements a statistically correct version of the MFA-FV, through a combination of network computations and regularization When compared to previous neural implementations of Fisher vectors, the MFAFVNet relies on a more powerful statistical model and a more accurate implementation. The MFAFVNet achieves state of the art performance on scene classification.

"Scene Classification in Images", B V V Sri Raj Dutt Pulkit Agrawal Sushoban Nayak A tree classification approach very high accuracy at each and every step, else cumulation of errors at each levels and their further percolation can affect the overall accuracy of the classifier badly.

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"Remote Sensing Image Scene Classification: Benchmark and State of the Art", By Gong Cheng, Junwei Han, Senior Member, IEEE, and Xiaoqiang Lu, Senior Member, IEEE. First presented a comprehensive review of the recent progress in the field of remote sensing image scene classification, including benchmark data sets and state-of-the-art methods. Authors evaluated a number of representative state-of-the-art methods including deep-learning-based methods for the task of scene classification using the proposed data set and reported the results as a useful performance baseline for future research.

III. METHODOLOGY

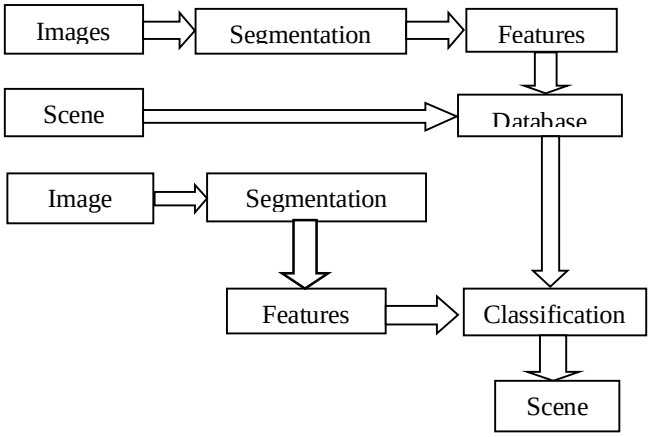


Fig 1: Overall Methodology to be employed

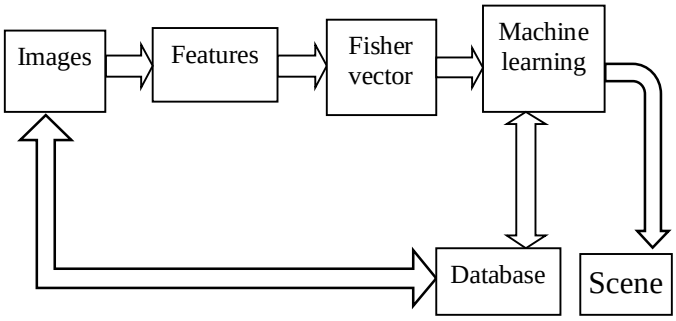


Fig 2: Overview of Machine Learning

IV. COMPARISON

Comparison shows the difference between KNN classifier and machine learning classifier. It shows the comparison of delay in computation. That comparison clarify machine learning is one of the best classifier.

Table 1: Comparison of KNN classifier & Machine learning

Size of image in pixel	Size of image in kb	Delay computation time in KNN classifier in sec	Delay computation time in machine learning classifier in sec
640*427	53.7	2.3119	1.7852
259*194	14.2	2.0069	1.7915
640*480	143	2.0324	1.1242
640*480	72	2.0718	1.8121
640*480	160	2.0305	1.7448
275*183	10.7	1.7724	1.7310
810*510	236	1.9986	1.8108

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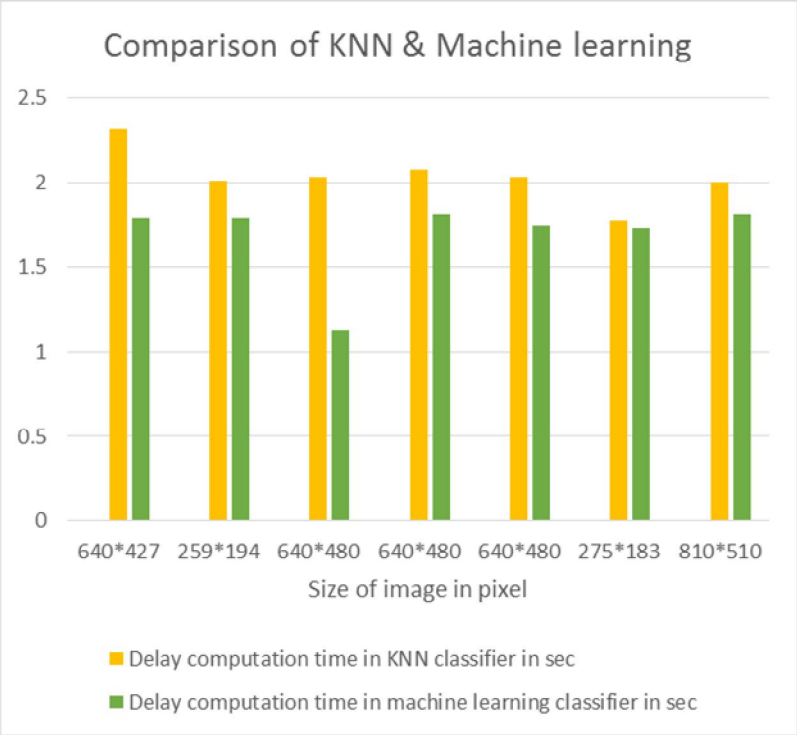


Fig 3: Graph shows the comparison of KNN & Machine learning

V. OUTPUT

Output shown by machine learning classifier

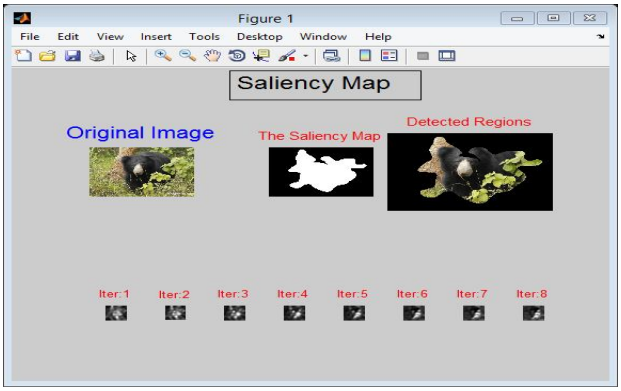


Fig 4(a): Segmentation by using saliency map

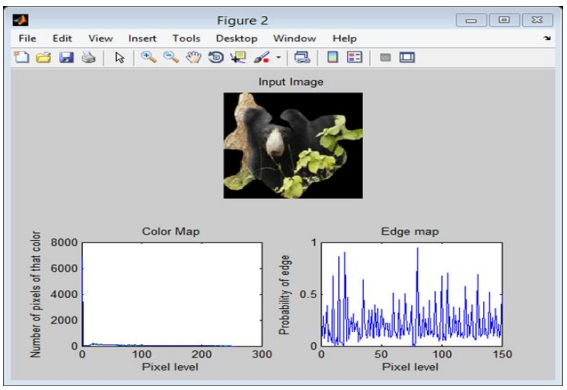


Fig 4(b): Feature extraction by using colour map & edge map

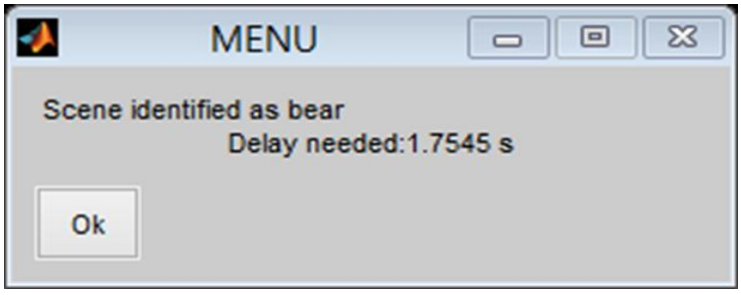


Fig 4(c): Output shows image in text format

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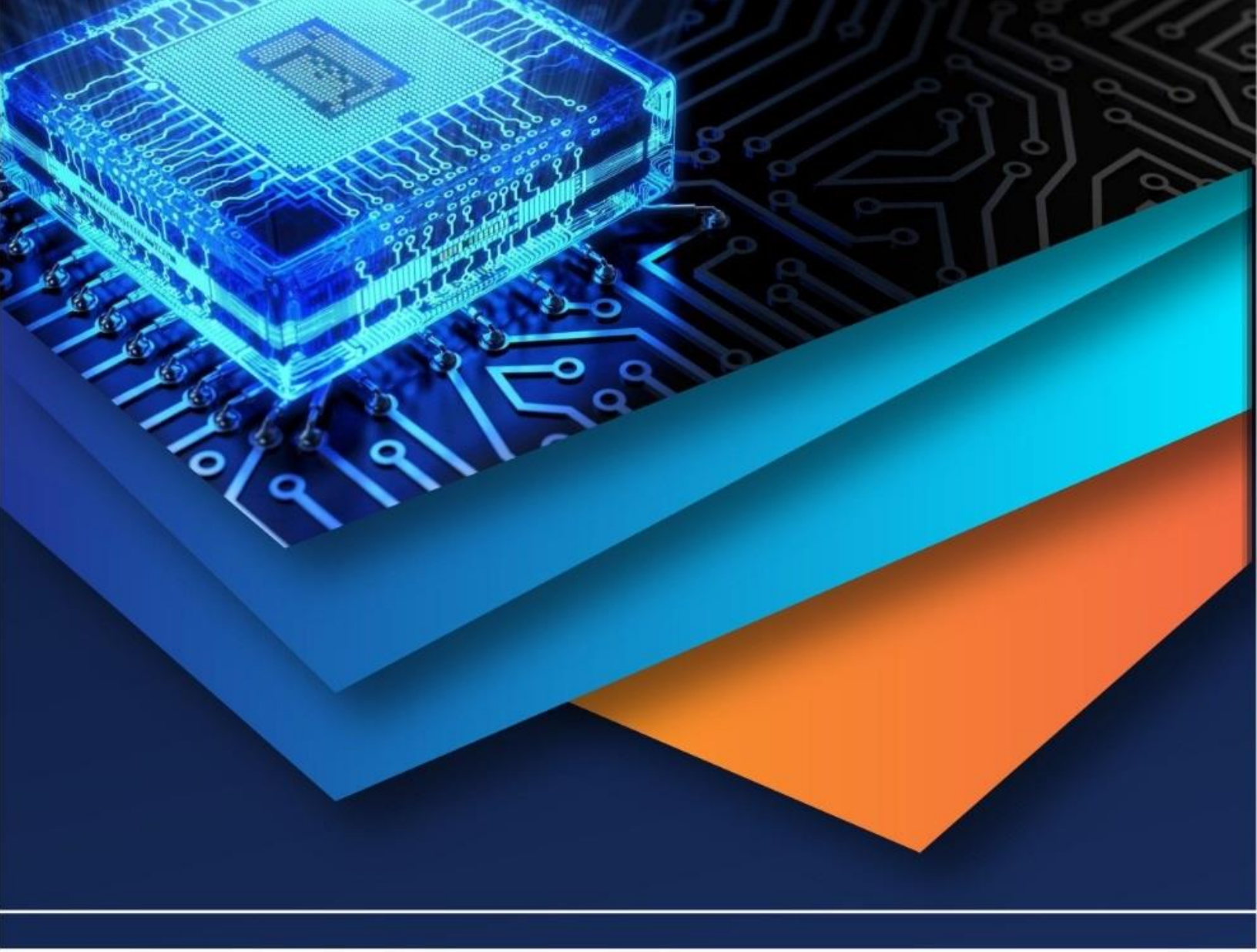
VI. CONCLUSION

Scene classification is more accurate with the machine learning. The output is error free. Machine identified scene give output correctly. It is easily understandable. Delay time for the computation in machine learning is minimum than KNN. Machine learning shows the best feature output. After comparison with KNN classifier machine learning is the best one classifier.

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