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ADVANCE LEGACY MONUMENTS CATEGORISING

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ABSTRACT

A monument is a physical structure built or created that is dedicated to a person, event or purpose. Monuments become relevant to a group as a part of their history or culture due to their artistic, historical, political, technical, or architectural importance. Monument recognition is a challenging problem in the domain of image classification due to huge variations in the architecture of different monuments. Different orientation of the structure plays an important role in the recognition of the monuments in their images. People belonging to the various cultures, castes, creeds and religions takes pride in their culturally rich heritage bestowed upon them in the form of monuments. There is a need to digitally recognize and archive the monuments as an important historical and cultural heritage site.

The main objective of our project is the application of techniques based on deep learning for the classification of images of heritage, specifically through the use of convolutional neural networks.The state-of-the-art Deep Convolutional Neural Networks (DCNN) is used for the recognition of monuments through satellite images of monuments. Machine Learning and Deep Learning are advancing, spurring progress in image recognition. Heritage Identification combine traditional machine learning with computer vision techniques.

1.INTRODUCTION

India is a country endowed with rich cultural heritage especially renowned architectural sites of which 40 are UNESCO listed heritage sites. Cultural heritages connects generations over time and we need to preserve them. Architects, historians, travelers etc. They visit many historical sites where it often becomes difficult for them to identify and get historical details about the monument they are interested in. The task of archiving, documenting and sharing the knowledge of these cultural assets is challenging due to the scale and reliability of the information. The present state of art of machine learning techniques can be harnessed to atomize the classification of images. The advent of high processing computing resources, state of art machine learning and deep learning algorithms provide tangible solutions.

Monument recognition system is important because, the people belonging to the various cultures, castes, creeds and religions takes pride in their culturally rich heritage bestowed upon them in the form of monuments. There is a need to digitally recognize and archive the monuments as an important historical and cultural heritage site. This poses as an impactful feature not only for tourists but also for the local people in order to gain knowledge regarding their own cultural heritage. Over period of time as the generation changed, the architecture styles of the buildings also changed. The classification of the images taken during the measurement of an architectural asset is an essential task within the digital documentation of cultural heritage.

The main objective of our project is the application of techniques based on deep learning for the classification of

images of architectural heritage, specifically through the use of convolutional neural networks. Our work provides reliable information on the state of landmarks, monuments and buildings, thus facilitating their conservation, maintenance and rehabilitation. Various types of Deep Learning architectures have been used to recognize monuments and achieve a good performance.

Ultimately, our project strive to spare the importance of preserving and maintaining information for a cultural heritage digitally. The results of the applied architectures are analysed to give the technique with the highest performance.

2.LITERATURE SURVEY

1) Image based Indian Monument Recognition using Convoluted Neural Networks

AUTHORS: Aradhya Saini T,Tanu Guptha Panwar, Rajat Kumar,Akshay Kumar Gupta, Ankrush Mittal.

A monument implies a structure that has been constructed in order to commemorate a person, event or which has become an important part to a social group as a part of them remembering historic times or cultural heritage, or as an example of the historic architecture. The people belonging to the various cultures, castes, creeds and religions takes pride in their culturally rich heritage bestowed upon them in the form of monuments. This paper considered hundred monuments in the dataset for classification with 90% accuracy. The images are previously processed according to the GBVS method, whichis in order to either keep the SURF or SIFT features , which are corresponding to the present actual monuments while the background “noise” which has been minimized

1) Model is trained on representations of different Indian monuments obtained from cropped images. Each monument has images with different angular views.
2) CBIR- Content Based Image Retrieval, in which images are indexed on the criteria of lowlevel features, colour, texture and shape.
3) MSER- Maximally Stable External Region are used as a method of blob detection in images

3.PROBLEM STATEMENT

EXISTING SYSTEM

1. **Monuments Recognition Using GBVS method and identified by CBIR method** Monument Recognition using GBVS method involves identifying visually salient regions within an image containing a monument .This approach enhances feature extraction and reduces complexity by pinpointing the most distinctive parts of the image. In tandem, the CBIR method aids in monument recognization by comparing the visual features of an input image with those in a database of known monuments. Integrating GBVS and CBIR, the system focuses on relavent regions, improving the accuracy of recognition and making it well suited for diverse and complex recognition scenarios.
2. **Appwas developed using Xcode and Android Studio (IDE)& SWIFT programming language** The application was developed using Xcode and Android Studio, two popular integrated development environments (IDEs) catering to iOS and Android platforms respectively. The development process involved leveraging the SWIFT programming language for iOS and Java/Kotlin for Android. Xcode provided a comprehensive environment for designing, coding, testing, and debugging the iOS app, while Android Studio offered a similar

suite of tools for the Android version. The choice of SWIFT and Java/Kotlin facilitated efficient coding, enabling seamless interaction with device features and platform-specific functionalities. Through Xcode and Android Studio, the development team effectively harnessed the capabilities of these IDEs and programming languages to create a polished and functional app experience for both iOS and Android users.

3. **Monument Recognition using SVM** Monument Recognition using Support Vector Machines (SVM) involves employing a machine learning technique to classify and identify monuments within images. SVM is a supervised learning algorithm that works by finding the optimal hyperplane to separate different classes of data points in a feature space. In the context of monument recognition, features extracted from images—such as texture, color, and shape—are used to train the SVM model. This trained model can then classify new images, determining whether they contain a monument or not. SVM's ability to handle non-linear relationships and its strong generalization capabilities make it a suitable choice for recognizing monuments with varying backgrounds, scales, and orientations. Once trained, the SVM model can efficiently classify new images, determining whether they depict monuments or not based on the learned patterns. SVM's strength lies in its ability to handle complex, non-linear relationships between features, which is particularly valuable when recognizing monuments with diverse appearances and backgrounds. This method contributes to accurate and automated monument recognition by leveraging the power of machine learning to decipher the nuanced visual cues that define these historical landmarks.

1.1 DISADVANTAGES OF EXISTING SYSTEM

- Accuracy of monument recognition is not up to the mark as the area occupied by the monuments is vast.
- The concept of visual saliency can be subjective and may not always align with what humans consider important. Cultural and contextual factors can influence perceived saliency.
- The GBVS method might miss intricate details that are important for accurate monument recognition, especially in cases where the monument's distinguishing features are small or subtle.
- This recognises the objects it does not identify the monument.
- Developing separate versions for iOS and Android can lead to duplication of efforts, as code needs to be written and maintained for each platform individually.
- Outline of the monument will be identified so that identifying the monument is much more difficult.
- SVM aims to find the optimal separating hyperplane, which can be sensitive to noisy or mislabeled data. Noisy data points can negatively impact the model's accuracy.
- While SVM provides accurate predictions, it might not offer intuitive insights into why certain decisions are made, making it challenging to understand the model's reasoning.
- Errors from both GBVS and CBIR methods can compound when used together, leading to potential false positives or negatives.
- Maintaining code consistency between the iOS and Android versions can be challenging, potentially leading to inconsistencies in user experience and functionality.

4.SYSTEM REQUIREMENTS SPECIFICATIONS

HARDWARE REQUIREMENT

- Processor: Windows 10 or above/macOs/LinuxProcessor intel i3 or high
- Ethernet Connection (LAN of Wi-Fi)
- Hard Drive: 100GB or more
- Memory (RAM): 4GB or more

SOFTWARE REQUIREMENTS/ TOOLS AND TECHNOLOGIES

CONVOLUTIONAL NEURAL NETWORK (CNN)

In deep learning, a convolutional neural network (CNN) is a class of artificial neural network most commonly applied to analyze visual imagery. CNNs use a mathematical operation called convolution in place of general matrix multiplication in at least one of their layers.CNNs are regularized versions of multilayer perceptrons. Multilayer perceptrons are usually fully connected networks, that is, each neuron in one layer is connected to all neurons in the next layer. They are specifically designed to process pixel data and are used in image recognition and processing

5 DESIGN PHASE

DATA FLOW

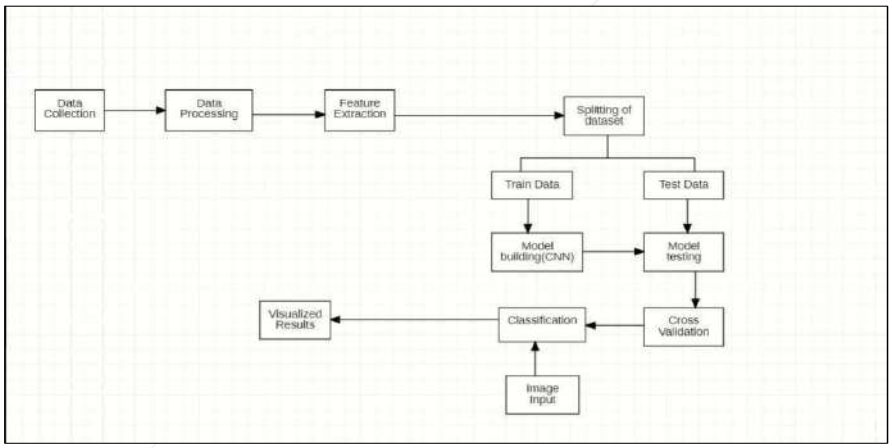


Figure 5.1 : Data Flow

- In the first step ,Create and Upload the dataset.
- Preprocess the dataset. In preprocessing we have to resize the image and convert the image into gray scale
- Next, Using the LBP (local Binary Pattern) and MSD (Mean Standard Deviation) approaches, extract the features from the preprocessed images.
- Split the dataset into training and testing data. By using CNN a deep learning algorithm train and test dataset.
- After developing the model, we must evaluate it using Cross Validation.
- Build UI for data input and results display using Streamlit framework.
- Upload a satellite image of a monument.
- The monument recognition and heritage identification results are displayed.

6.METHODOLOGY

Heritage identification of monuments is an important task in the field of cultural heritage preservation.

Deep learning models such as convolutional neural networks (CNNs) are effective for image processing. The methodology for image recognition and classification using a Convolutional Neural Network (CNN) typically involves several key steps, such as

1) **Dataset Preparation**: Collect and preprocess a dataset of labeled images for training and validation.

2) **Feature Extraction** : Extract the features from the preprocessed images using LBP (local Binary Pattern) and MSD (Mean standard deviation) techniques.

3) **Architecture Design:** Define the architecture of the CNN, including the number and type of convolutional, pooling, and fully connected layers, as well as the activation functions. The architecture should be designed based on the specific requirements of the image recognition task and the characteristics of the dataset.

4) **Model Training:** Train the CNN using the prepared dataset.Training is typically performed for multiple epochs (iterations over the entire dataset) to allow the model to learn from the data and converge towards optimal weights.

5) **Model Evaluation:** Evaluate the trained CNN using the validation dataset to assess its performance. The evaluation results provide insights into the model's performance and help identify potential areas for improvement.

6) **Model Optimization:** Fine-tune the CNN based on the evaluation results. This may involve adjusting hyper parameters such as learning rate, batch size, and regularization strength. The optimization process is typically iterative, involving multiple rounds of training, evaluation, and adjustment to achieve the best possible performance.

7) **Model Testing:** After optimizing the CNN, test its performance on a separate test dataset that was not used during training or validation. This provides a final assessment of the performance and its ability to accurately recognize images in real-world scenarios.

8) **Deployment:** Once the CNN has been trained and optimized, it can be deployed in a production environment for image recognition and identification tasks.

7.IMPLEMENTATION

Installing Anaconda Navigator:

1. To download and install Anaconda Navigator visit the official page of Anaconda

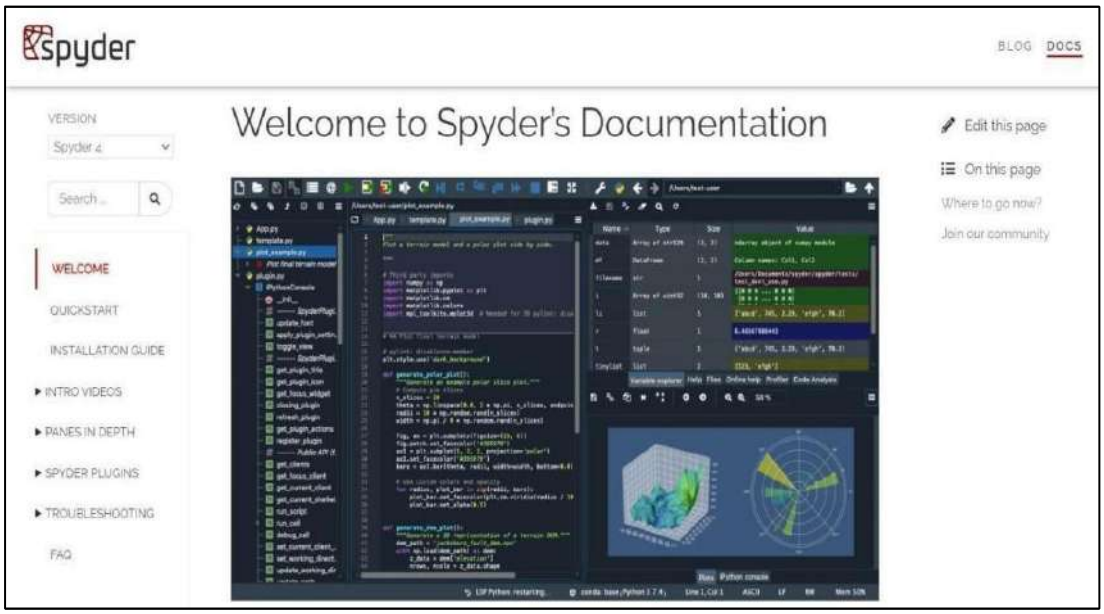
https://docs.anaconda.com/free/navigator/

Figure 7.1: Anaconda Navigator

2. Once the download is complete, run the exe for installing Anaconda. Now click on install now.
3. You can see Anaconda installing at this point.
4. When it finishes, you can see a screen that says the setup was successful.

Installing and Importing Spyder IDE:

5. Run the following commands in your Anaconda Prompt



8. TESTING

After finishing the development of any computer-based system the next complicated time- consuming process is system testing. During the time of testing only the development company can know that, how far the user requirements have been met out, and so on.

Software testing is an important element of the software quality assurance and represents the ultimate review of specification, design and coding. The increasing feasibility of software as a system and the cost associated with the software failures are motivated forces for well-planned through testing.

TESTING OBJECTIVES

These are several rules that can save as testing objectives they are:

- Testing is a process of executing program with the intent of finding an error.
- A good test case is one that has a high probability of finding an undiscovered error.

TESTING PROCEDURES

System testing is done for checking the server name of the machines being connectedbetween the customer and executive.

- The product information provided by the company to the executive is tested against the validation with the centralized data store.
- System testing is also done for checking the executive availability to connected to the server.
- The server name authentication is checked and availability to the customer
- Proper communication chat line viability is tested and made the chat system function properly.
- Mail functions are tested against the user concurrency and customer mail date validates

9.CONCLUSION

We have successfully developed a system to recognize and identify the heritage of the monument.A dataset of satellite imagery of monuments served as the foundation for the development of a deep learning algorithm called Convolutional Neural Network.To do this, we first preprocessed the images in the dataset and then extracted the features from those preprocessed photos along with splitting of dataset, building and evaluating the model. Finally, the findings demonstrate the accuracy and ability to forecast the type of monuments and whether they are patrimony or not. Overall, this effort emphasises how critical it is to use contemporary technologies to preserve our cultural history. The identification and preservation of our cultural legacy could be revolutionised by the use of deep learning in heritage identification, which is a promising area of research. Our heritage monuments can be preserved for future generations with the aid of cutting-edge technologies and deep learning algorithms. However, there are still a number of issues that must be resolved, including the need for more diverse datasets and a lack of adequate documentation.

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