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Linearity of Feature Extraction Techniques for Medical Images by using Scale Invariant Feature Transform

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ABSTRACT

In Machine Learning, Pattern Recognition and in the field of image processing, Feature Extraction starts from an initial set of the measured data. Builds derived values are intended to be informative and non-redundant, facilating the subsequent learning and in some cases leading to the better human interpretations. Feature Extraction is a dimensionally reduction process, where an initial set of raw variables has been reduced to more manageable groups. Many data analysis software packages provide for feature extraction and for dimension reduction. Determining a subset of the initial features is also known as feature extraction. Common Numerical programming environments are MATLAB, SciLab, NumPy, etc.

KEYWORDS: *Feature Extraction*

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1. INTRODUCTION

MATLAB is a Matrix Laboratory which is a multi-paradigm numerical computing environment and it is developed by Math Works. MATLAB is a tool which allows Matrix manipulations, plotting of functions, implement of algorithms. MATLAB is also interfacing with the programs namely C, C++, Java and Phython. It allows access to Symbolic Computing Abilities. Simulink which adds the graphical multi domain simulation and model based design for dynamic and Embedded Systems. The users of MATLAB are from various backgrounds of Engineering, Science, etc.

2. FEATURE EXTRACTION:

Highlights, qualities of the objects of interest, if choose cautiously are illustrative of the greatest important data that the picture brings to the table for a total portrayal a lesion. Methodologies of Feature Extraction break down items and pictures to extricate the most unmistakable highlights that are illustrative of the different classes of the objects. Features are utilized as contributions to grouped that the allocate them to that speak to the class. In work, Scale Invariant Feature Transform (SIFT) and Gray Level Co-Occurrence Matrix (GLCM) features has been extracted. Feature Extraction is also a dimensionally reduction that efficiently represents interesting parts of an image as a compact vector. This Feature Extraction techniques are applied to any images to get the features of that particular image.

3. SCALE INVARIANT FEATURE TRANSFORM:

The Scale Invariant Feature Transform (SIFT) is known as feature detection algorithm in which computer vision is to detect and local features images are described**.** In the University of British Columbia, it was published by David Lowe. Scale Invariant Feature Transform is patended by them in Canada. SIFT objects are first extracted from a set of images and it stored in the database. The objects are recognized in a field of new image by individually comparison between each feature recognition from the new image. It leads to finding the features of Candidate Matching based on Euclidean distance of their feature vectors.

Lowe's technique for picture highlight age changes a picture into a huge assortment of highlight vectors, every one of which is invariant to picture interpretation, scaling, and revolution, halfway invariant to light changes and strong to nearby geometric contortion. These highlights share comparative properties with neurons in essential visual cortex that are encoding fundamental structures, shading and development for object identification in primate vision. Key areas are characterized as maxima and minima of the

aftereffect of distinction of Gaussians work applied in scale space to a progression of smoothed and resampled pictures. Low-differentiate competitor focuses and edge reaction focuses along an edge are disposed of. Predominant directions are doled out to limited key points. These means guarantee that the key points are progressively steady for coordinating and acknowledgment. Filter descriptors powerful to neighborhood relative twisting are then gotten by thinking about pixels around a range of the key area, obscuring and resampling.

3.1. SIFT ALGORITHM:

The image is convolved with the Gaussian filters at different scales. Minima or Maxima of the Difference of Gaussians which refers to as DoG that occur at the range if multiple scales. Once Difference of Gaussians images was obtained, which are identified as local minima or maxima of the Difference of Gaussians images across scales. This is done by comparing each pixel in the minimum or maximum among all compared pixels and also in images, it is selected as a candidate vector. In SIFT technique is used to find the area, volume, pixel, width, etc. of the particular image.

This keypoint recognition step is a variety of one of the mass identification strategies created by Lindeberg by identifying scale-space extrema of the scale standardized Laplacian that is, distinguishing focuses that are nearby extrema as for both space and scale, in the discrete case by examinations with the closest 26 neighbors in a discretized scale-space volume. The distinction of Gaussians administrator can be viewed as an estimate to the Laplacian, with the verifiable standardization in the pyramid additionally establishing a discrete guess of the scale-standardized Laplacian.

To begin with, for every applicant keypoint, addition of close by information is utilized to precisely decide its position. The underlying methodology was to simply find each keypoint at the area and size of the competitor keypoint. The new methodology ascertains the interjected area of the extremum, which considerably improves coordinating and strength.

3.2. Applications:

- SIFT application is in various fields includes.
- Object recogniton using SIFT features.
- Robot localization and mapping.
- Panorama stitching.
- 3D SIFT-like descriptors for human action recognition.
- Analyzing the human brain in 3D Magnetic Resonance Images.

4. GRAY LEVEL CO-OCCURRENCE MATRIX:

Gray Level Co-event Matrix is a factual technique it considers the spatial relationship of pixels. Gray Level Co-Occurence Matrix is otherwise called the Gray-level spatial reliance matrix. The spatial relationship is characterized as the pixel of intrigue and pixel to its quick right (on a level plane adjoining), yet you can indicate other spatial connections between the two pixels. Each component is spoken to as (I,J).In the resultant GLCM is just the entirety of the occasions that the pixel with esteem 'I' happened in the predefined spatial relationship to a pixel with esteem 'J' in the info image. Research works which incorporates Contrast, Correlation, Homogeneity and Information proportion of Correlation.

Given a picture made out of pixels each with a power (a particular dark level), the GLCM is a classification of how regularly various blends of dim levels co-happen in a picture or picture segment. Surface element figurings utilize the substance of the GLCM to give a proportion of the variety in intensity. A measurable strategy for looking at surface that considers the spatial relationship of pixels is the dim level co-event lattice (GLCM), otherwise called the dim level spatial reliance framework.

These measurements give data about the surface of an image. The property Contrast is otherwise called fluctuation and dormancy. The property Energy is otherwise called consistency, consistency of vitality, and rakish second minute. 'Homogeneity' Returns a worth that quantifies the closeness of the appropriation of components in the GLCM to the GLCM corner to corner.

4.1. GLCM Algorithm:

The surface channel capacities give a factual perspective on the surface depends on the picture histogram. These capacities can give valuable data about the surface of the image. But can't give data about the shape, the spatial connections of pixels in an image. Another measurable strategy that considers the spatial relationship of pixels in the GLCM is otherwise called Gray level spatial reliance matrix. The tool kit gives capacities to make the GLCM and gets measurable estimations.

4.2. GLCM Applications:

- Whether considering the grayscale values of the image (or) various dimensions of colour.
- Co-occurrence matrix can measure the texture of the images.
- Features techniques are called Haralick features.
- Because, it was developed by Robert Haralick.
- Aspects of an image that are rotationally invariant.

5. Conclusion:

By Comparing the image with the SIFT and GLCM techniques, we can able to conclude that the accuracy of the image classification is more in SIFT when compared with GLCM technique. Because of its linearity in nature, SIFT will give better accuracy.

In our future work, the above problem will be tested by using classifiers like Artificial Neural Network (ANN) and Convolutional Neural Networks (CNN). And all these will be carried out by using Python programming.

REFERENCES

[1] Abe, Shigeo. "Feature selection and extraction." In *Support Vector Machines for Pattern Classification*, pp. 331-341. Springer, London.

[2] Sutton, Jacob, Ruhi Mahajan, Oguz Akbilgic, and Rishikesan Kamaleswaran. "PhysOnline: An Online Feature Extraction and Machine Learning Pipeline for Real-Time Analysis of Streaming Physiological Data." *IEEE Journal of Biomedical and Health Informatics* (2019).

[3] Guo, Feng, Jie Yang, Yilei Chen, and Bao Yao. "Research on image detection and matching based on SIFT features." In *Control and Robotics Engineering (ICCRE), 2019 3rd International Conference on*, pp. 130-134. IEEE, 2019.

[4] Choudhary, Shivali, Nitish Ojha, and Vrijendra Singh. "Real-time crowd behavior detection using SIFT feature extraction technique in video sequences." In *Intelligent Computing and Control Systems (ICICCS), 2019 International Conference on*, pp. 936- 940. IEEE, 2019.

[5] Venkateswari, R., and R. Devi Kala. "Brain Tumor Segmentation Based on GLCM Feature Extraction using Probabilistic Neural Network." *International Journal of Engineering Science* 14031 (2017).

[6] Khan, Abdul Rehman, Nitin Rakesh, Rakesh Matam, and Shailesh Tiwari. "GLCM Feature Extraction for Insect Bites Pattern Recognition." In *Networking Communication and Data Knowledge Engineering*, pp. 279-286. Springer, Singapore, 2018