

# Hybrid Approach Of SVM and KNN to detect abdominal diseases with high classification accuracy

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## Abstract

In this paper, effective approach for early detection of abdominal disease using segmentation and classification is proposed. Abdominal images contains distortion in terms of noise initially, hence filtering is required in order to remove noise from the image. Segmentation is the next step used to extract lesion area. Results of segmentation are compared against various well known measures and result obtained is commendable. Support vector machine and fuzzy neural technique is used for classification. Results show significant improvement over SVM+KNN. Accuracy is improved by 45%, and error rate is decreased by 30%.

## Keywords

Inflammatory Bowel disease, Pre-processing, Segmentation, SVM, KNN

## Introduction

Inflammatory Bowel disease (IBD) constitutes a significant medicinal services issue in the world besetting more than 1 million citizens. A significant level of the patients suffers from Crohn's disease (CD). It affects the stomach torments by considering the auto safe response in CD, which includes weight reduction, weariness and weakness. In spite of the fact that the disease can happen in individuals of all ages, the run of the mill onset is in adolescence or youthful adulthood. CD is described by episodes of compounding interspersed with periods of remission. Because there is no known cure for this relapsing and unending disease, most patients require long haul medications, and numerous require hospitalization and surgery. This presently horrible prognosis adversely impacts the wellbeing and personal satisfaction of influenced patients, with severe dietary restrictions and substantial loss in monetary profitability (accumulating yearly per person costs of thousands of Euros and billions of Euros at a bigger scale). Precise automatic identification of CD can help in quick diagnosis and possibly decrease the time and cost associated with treatment arranging and patient prognosis. Magnetic resonance (MR) images of the diseased area shows the thickening of gut divider which can be recognized by radiologists with sufficient preparing. For a significant commitment to CD treatment, computerized methods must have the capacity to segment the CD influenced territory with sufficient precision. This data thus helps to compute the length of diseased part, thickness of entrail divider and exact visualization. Rate of contrast upgrade of the influenced area can be resolved from

pre-registered dynamic contrast enhanced (DCE) MR images of the same patient. These are essential parameters to identify presence of disease and grade its severity using a standard scale called Crohn's Disease Endoscopic Index of Severity (CDEIS). Eventually, we will probably offer a contrasting option to the invasive CDEIS for assessment of disease severity by endoscopy. Before segmenting the diseased area, a volume of interest (VOI) is recognized which is suspected to most likely contain diseased tissues. Each voxel inside this VOI is then broke down for disease movement. In this paper we propose an incorporated structure for recognizing and segmenting regions in stomach MR images of the entrail which are influenced by CD.

## LITERATURE SURVEY

[2]Effective techniques are required to detect crohn disease at early stage. Technology helps to detect cancer as early as possible so that cure is within the reach of humans. Segmentation and feature extraction is critical towards this aspect. This section discusses mechanisms that enhance performance of Tumors detection process.

[14]Tumor detection is compulsory at early stage to avoid deadly effects within human body. Death rate is enhanced considerably if detection is at 4<sup>th</sup> stage. Recovery rate is greatly enhanced if it is detected at 2<sup>nd</sup> or early stage of lesion. Support vector machine is one of the effective images processing segmentation mechanism used to detect distinguished part from the original part.

[15]proposed crohn disease detection strategies. These strategies includes X-ray and CT scans. The capturing mechanism may include abnormality. The abnormality detection mechanism or enhancement mechanism is not specified in the studied literature. This literaturehowever focused on detection of cohrn disease only but enhancement using image processing sureties is missing in this literature.

[16]Melanoma spreads through metastasis, and in this way, it has been ended up being exceptionally deadly. Factual proof has uncovered that the greater part of passings coming about because of skin tumor are thus of melanoma. Advance examinations have demonstrated that the survival rates in patients rely on upon the phase of the disease; early recognition and mediation of melanoma involve higher odds of cure. Clinical conclusion and anticipation of melanoma are trying, since the procedures are inclined to misdiagnosis and mistakes because of specialists' subjectivity. Harmful melanomas are hilter kilter, have sporadic fringes, indented edges, and shading varieties, so examining the shape, shading, and surface of the skin sore is critical for the early discovery and counteractive action of melanoma. This paper proposes the two noteworthy parts of a noninvasive genuine.

[17] Time automated skin lesion analysis system for the early detection and prevention of melanoma. The first segment is a real-time caution to enable clients to anticipate skin damage brought on by sunlight. The second component is an automated image analysis module, which contains picture obtaining, hair identification and prohibition, injury division, highlight extraction classification. The proposed system uses PH2D dermoscopy image database from Pedro Hispano Hospital for the advancement and testing purposes. The picture database contains an aggregate of 200 dermoscopy pictures of injuries, including kind, atypical, and melanoma cases. The test comes about demonstrate that the proposed framework is efficient, accomplishing classification of the benign, atypical, and melanoma pictures with exactness of 96.3%, 95.7%, and 97.5%, individually.

[18] In any case, division of these regions is troublesome. In this work, we display a programmed division device for ELM and TLM pictures that likewise gives extra decisions to client determination and connection with versatile learning. Our apparatus utilizes a mix of k-means bunching, wavelet investigation, and morphological operations to portion the injury and blood volume, and afterward gives the client six division recommendations for both ELM and TLM pictures. The last determination of division limit may then be iteratively enhanced through scoring by numerous clients. The proportion of TLM to ELM sectioned ranges is a marker of dysplasia in skin injuries for identification of skin growths, and this proportion is found to demonstrate a measurably noteworthy pattern in relationship with sore dysplasia on an arrangement of 81 pathologically approved sores ( $p = 0.0058$ ). We at that point exhibit a bolster vector machine classifier utilizing the outcomes from the intelligent division strategy alongside proportion, shading, surface, and shape components to portray skin injuries into three degrees of dysplasia with promising precision.

[19] Skin tumor gives off an impression of being a standout amongst the most hazardous sorts among others by the nearness of harmful melanoma as one of pigmented skin injury shapes. Robotized framework with the end goal of pigmented skin sore determination specified through that paper is prescribed as a non-obtrusive analysis apparatus. To hinder the issue of subjective translation, two diverse picture sets are utilized to look at the proposed framework, an arrangement of pictures procured by standard camera (clinical pictures) and another arrangement of dermoscope pictures caught from the amplified dermoscope. Pictures are upgraded and portioned to isolate the sore from the foundation. Diverse geometric and chromatic components are removed from the area of enthusiasm coming about because of division process. At that point, the most unmistakable elements that can bring about an impact are chosen by various determination strategies; which are the Fisher score positioning and the t-test strategy. Most conspicuous elements were acquainted with two distinct classifiers; counterfeit neural system and Support vector machine for the segregation of the two gatherings of injuries. Framework execution was measured with

respect to Specificity, Sensitivity and Accuracy. The manufactured neural system planned with the consolidated geometric and chromatic components chosen by fisher score positioning empowered an indicative exactness of 95% for dermoscopic and 93.75% for clinical pictures.

[20]proposed precise segmentation strategy. Precise segmentation of the infected area along with surrounding area is critical for accurate analysis and diagnosis of lesion. Improved ALDS based on probabilistic approach is followed. Neural network decision theory is used to detect the melanoma. The member ship function decide melanoma if obtain value is within the range specified for particular member function. To minimize the energy consumption active contour is used. The energy function used is listed as under

$$E_{Total} = \int_0^1 E_{int}(V(s)) + E_{img}(V(s)) + E_{con}(V(s))$$

As proposed by [20],In the initial observation results were not consistent, hence similarity index was observed, using the following equation

$$SSIM = \frac{(2u_x u_y + c_1)(\sigma_{xy} + c_2)}{(u_x^2 + u_y^2 + c_1)(\sigma_x^2 + \sigma_y^2 + c_2)}$$

After this step feature extraction and comparison is performed using SVM and ANN techniques. Obtained results suggest optimality of this technique.

### Proposed methodology

- I. Input the crohns diseased image.



Figure 1: Colonoscopy of crohn disease

- II. Extract the entire feature from image and perform intensity statistics and texture entropy on the image
- III. Perform the KNN on image.

### K-Nearest Neighbors

K-Nearest Neighbors is a standout amongst the most fundamental yet basic order calculations in Machine Learning. It has a place with the oversight learning region and discovers outrageous application in plan affirmation, data mining and intrusion acknowledgment. It is extensively unimportant, everything considered, circumstances since it is non-parametric, which implies, it doesn't make any fundamental suppositions about the scattering of data.

Algorithm:

Let  $m$  be the number of training data samples. Let  $p$  be an unknown point.

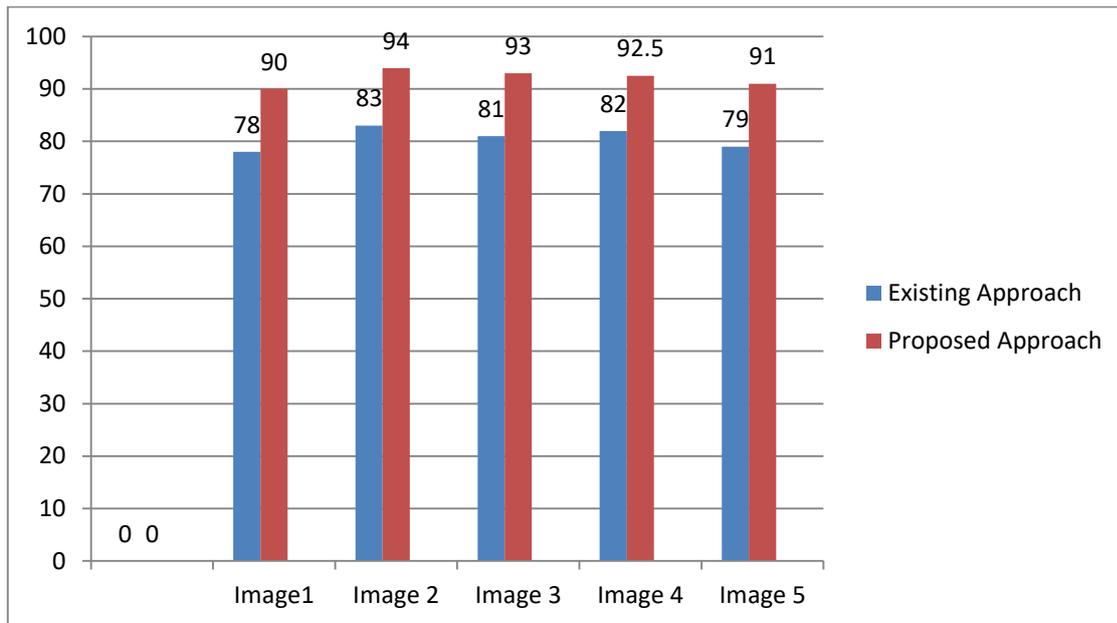
1. Store the training samples in an array of data points  $arr[]$ . This means each element of this array represents a tuple  $(x, y)$ .
2. for  $i=0$  to  $m$ :
3. Calculate Manhattan distance  $d(arr[i], p)$ .
4. Make set  $S$  of  $K$  smallest distances obtained. Each of these distances corresponds to an already classified data point.
5. Return the majority label among  $S$ .

### RESULTS

The proposed system generates better results in terms of accuracy and Error.

Image	Existing Approach (78-85)	Proposed Approach (90-95)
Image1	78	90
Image 2	83	94
Image 3	81	93
Image 4	82	92.5
Image 5	79	91

**Table 1:- Result Comparison for parameter Accuracy of existing and proposed system**

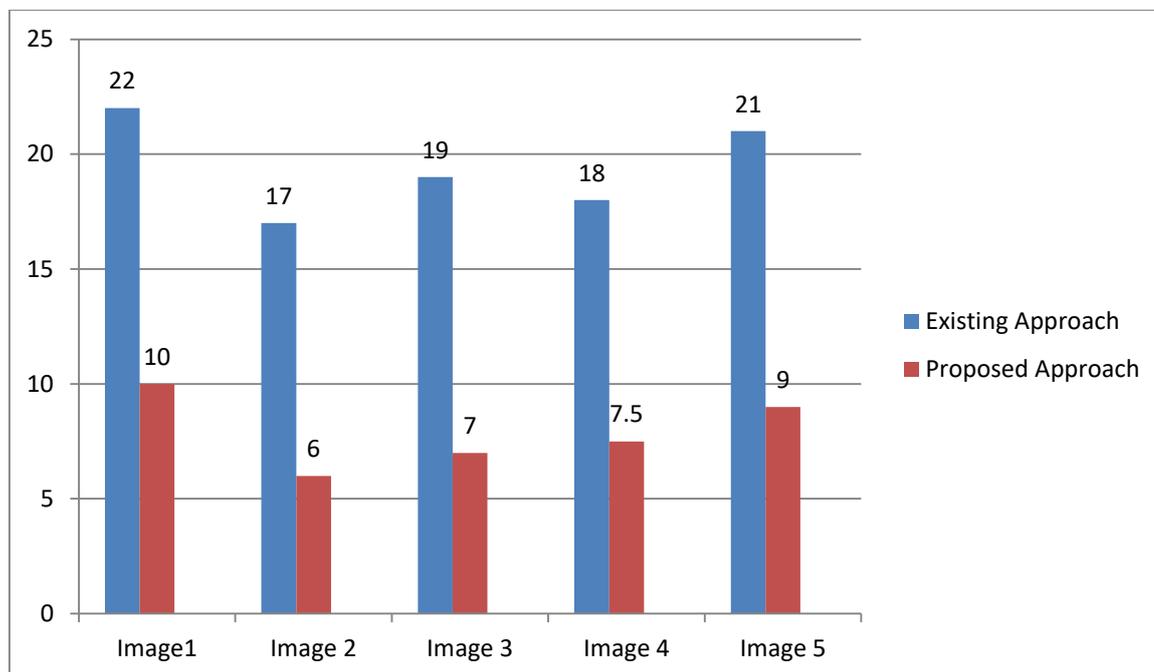


**Figure 8:- Result Comparison for parameter Accuracy of existing and proposed system**

**Error rate**

Image	Existing Approach	Proposed Approach
Image1	22	10
Image 2	17	6
Image 3	19	7
Image 4	18	7.5
Image 5	21	9

**Table 3:- Result Comparison for parameter Error rate of existing and proposed system**



**Figure 9:- Result Comparison for parameter Error rate of existing and proposed system**

#### CONCLUSION AND FUTURE SCOPE

The technique that is proposed in this paper is used to detect the crohn's disease. Higher ask for power and surface bits of knowledge, and shape asymmetry information are isolated at various scales and used to isolate between debilitated, conventional, and back-ground territories. Given a test volume we first finished fragment it utilizing KNN division, and order every super voxel with force, surface and recurring pattern highlights. The outcome demonstrates that the proposed system exactness is 12 % more than the current one.

This must be further extended by the use of inverse filtering mechanism and also classification can be done using convolution matrix mechanism.

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