Deep Learning for Image processing – Review

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Abstract- Image processing deals with the analysis of image and has different sub branches like medical imaging, medical image mining, web mining, image mining etc. The present article gives brief insight into the usage of deep learning Algorithm in segmenting of image. Deep learning methods, especially in convolution neural networks (CNN), have importance in analyzing medical images. This article presents an overview of various possibilities of deep learning which can be adopted into image mining. It also throws an insight of retrieving images based on content and identifying a flaw in the medical image. Short overviews are mentioned on application area: musculoskeletal, retinal, digital pathology, neuro, abdominal, breast, pulmonary, cardiac. Finally conclude with a point of the current up to date, a significant argument of open challenges and guidelines for further research.

Index Terms: Image processing, image analysis, medical imaging, web mining and deep learning.

1. INTRODUCTION

Image processing deals with two main objectives namely enhancing the images and analyzing the images. Among image enhancement techniques, works are projected in the literature showcasing various applications where the need of enhancement is clearly identified. It also helps to analyze the images to have better understanding about the image and during these process techniques like clustering, classification is mostly considered. With the advancements of technologies, many applications of image processing came into existence ranging from ordinary image processing to analyzing of medical images. As the number of medical cases are increasing in proportion to number of individuals, to need a better understanding about the diseases one need to have a comprehensive study about the images. In order to achieve this objective, many medical image segmentation techniques are evolved based

on different methodologies such as edge based enhancements, shape based enhancements, region based descriptors, texture based technique, color based technique [1] [2] [3] [4] [5] [6] [7] [8] [9]. The above said techniques are considered to be de-generative models and apart from these models other models like pattern based technique, future based technique, depth based technique and model based techniques are also highlighted in the Literature [10] [11][12][13]. However, it is assumed that model based techniques or generative approaches are considered to be more effective since in this process, the analysis is based on estimation of the parameters and whole analysis is bases on these parameters [skpal, NR.pal 1993]. Apart from these approaches with the latest insights in the field of machine learning, deep learning techniques came into existence. Deep Learning is a type of machine learning which enables machines to exactly do this. Formally: Deep Learning consist of Machine Learning paradigms, which consent to machines to be trained from knowledge, and recognize the world in terms of a pecking order of concepts, where each concept is distinct in terms of its relation to other simpler concepts. These techniques assume to be more promising in particular for analyzing the medical tissues. In this article, a comprehensive study is carried out to present the various fields of image processing where deep learning algorithms are more suitable. Section2 of the article presents an overview of convolutional neural networks. The applications of deep learning algorithms into content based image retrievals are presented in section3. The advantages of the current proposed deep learning algorithms in various disciplines are highlighted in section4 of the article. The concluding section5 summarizes the article with various feature directions.

2. CONVOLUTIONAL NEURAL NETWORKS (CNN)

Convolutional neural networks are a part of machine learning techniques which deals with knowledge representation and deep

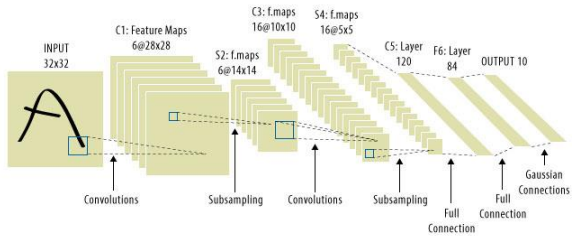

Fig1: CNN model

learning methodology is a sub field of convolutional neural networks which is more adaptive for analyzing the visual images. This deep learning algorithm help in better understanding of the parameters in the form of dividing the images into layers such that each individual layer is scrutinized and can be more perfectly analyzed when compared to the conventional analysis procedure. The number of layers that are formulated upon the application of deep leaning approach includes of horizontal layer, vertical layer, input layer and output layer. The number of hidden layers can be identified by using the product of horizontal vertical and the number of channels being used.

3. CONTENT BASED MEDICAL IMAGE RETRIEVAL (CBMIR)

In order to Retrieve the image effectively, features are most predominantly used. These features "include low level features, high-level features, semantic features, low level features and high level features are assumed to lose some of the inherent meaningful patters which are of core necessity during the analysis of the images are retrieval of the images. Since CBIR is assumed to be a retrieval methodology based on the features effectual data is not promising when these features are considered since they are assumed to miss sum of the visual information. To overcome this semantic based approaches which maintains the semantic representations are mostly preferred. Hence the paradigm is shifted towards retrieval of content based on CBIR. Since deep learning approach is most promising in the consideration of deep learning approach, they are mostly preferred.

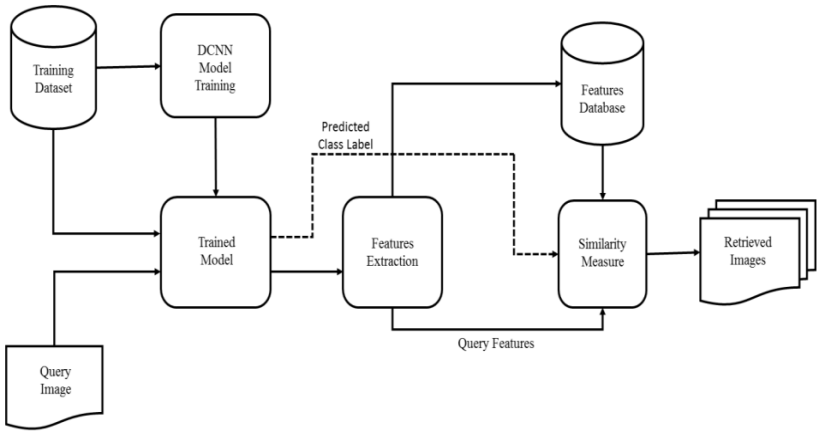

Fig2: framework for content based medical

4. APPLICATIONS OF DEEP LEARNING METHODS

Deep learning is one of the promising field focusing on medical image analysis. Deep learning open possibilities in areas like bio-imaging, neuro-imaging and DNA sequencing deep learning algorithms help in automatic medical imaging segmentations with focus on various features extracted from the medical image dataset. It provides a new way of identifying abnormalities and bring plausible out comes with better diagnosis.

5. CONCLUSION

The computer-assisted study for better interpreting images have been very old issues in the medical imaging ground. On the image-accepting front, current advances in machine learning, particularly, in the way of deep learning, have made a big bound to help recognize, categorize, and calculate patterns in medical images. Specifically, exploiting hierarchical mark representations learned exclusively from data, instead of handcrafted features mostly designed based on domain-specific facts, lies at the core of the advances. In that way, deep learning is quickly proving to be

the state-of-the-art base, achieving enhanced performances in various medical applications. This article briefly brings out the various fields where deep learning can be considered. The advantage of deep learning algorithm is particular in the field of medical image quite processing and hence various areas that can be of potential use for the application of deep learning algorithms are highlighted.

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