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Detection of Diabetic Retinopathy Using Support Vector Machine (SVM)

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***Abstract*— Diabetic retinopathy is a micro vascular complication which is characterized by several changes in the retina. Changes occur in the diameter of the blood vessel, micro aneurysm, haemorrhage exudates, and the growth of new blood vessels. These changes need to be detected early so that steps for further handling and treatment can be determined. Laser therapy is the best therapies for patients with Diabetic Retinopathy. This is a manual examination of the scanned results of the fundus retinal image. Manual examinations that generate ophthalmologist sight differ from each other. To overcome this problem, a special program is needed to analyze the fundus image of the eye. To create a special program for analyzing the fundus images of the eye required several stages of research. The study begins by pre-processing eye fundus images, getting rid of the optic dick form the fundus of the eye and then separating the vascular tissue of the damaged area of the retina. Damaged areas of the retina consist of dark and bright lesions. Mathematical morphology methods are used to detect the presence of dark lesion. Eye fundus images are classified into, Mild Non- Proliferative Diabetic Retinopathy, Moderate Non-Proliferative Diabetic Retinopathy and Severe Non-Proliferative Diabetic Retinopathy.**

From the experimentations conducted on patients with diabetic retinopathy the following sensitivity level were obtained, specificity and AUC above 90%. This indicates that the research could help ophthalmologist in analyzing a retina that is affected by dialectic retinopathy. The results of the study showed 96.9% sensitivity, specificity 100%, positive predictive value (ppv) 100%, negative predictive value (npv) 88.19.

***Index Terms*— Fundus Features, Diabetic Retinopathy, Classification, SVM.**

I. Introduction

Diabetes, often referred by doctors as diabetes mellitus, describes a group of metabolic diseases in which the person has high blood glucose (blood sugar), either because insulin production is inadequate, or because the body's cells do not respond properly to insulin, or both. Patients with high blood sugar will typically experience polyuria (frequent urination), they will become increasingly thirsty (polydipsia) and hungry (polyphagia). Diabetes (diabetes mellitus) is classed as a metabolism disorder. Metabolism refers to the way human bodies use digested food for energy and growth. Most of what is eaten is broken down into glucose. Glucose is a form of sugar in the blood - it is the principal source of fuel for the bodies.

When the food is digested, the glucose makes its way into the bloodstream. The cells use the glucose for energy and growth. However, glucose cannot enter the cells without insulin being present - insulin makes it possible for the cells to take in the glucose. Insulin is a hormone that is produced by the pancreas. After eating, the pancreas automatically releases an adequate quantity of insulin to move the glucose present in the blood into the cells, as soon as glucose enters the cells blood-glucose levels drop. A person with diabetes has a condition in which the quantity of glucose in the blood is too elevated (hyperglycaemia). This is because the body does not produce enough insulin, produces no insulin, or has cells that do not respond properly to the insulin the pancreas produces. This results in too much glucose building up in the blood. This excess blood glucose eventually passes out of the body in urine. So, even though the blood has plenty of glucose, the cells are not getting it for their essential energy and growth requirements.

Research says that at least 90% of this disease can be cured with proper treatment and monitoring the eyes. This Disease often does not have any early warning signs.

II. Literature Survey

According to the Early Treatment Diabetic Retinopathy Study Research Group (EDTRS) [1]

Diabetic retinopathy is divided into two classes, namely Non-Proliferative Diabetic Retinopathy (NPDR) and Proliferative Diabetic Retinopathy (PDR). NPDR is a reflection of clinical hiperpermeabilitas and incompetent blood vessels caused by the blockage and capillary leak. Characteristics of non-proliferative diabetic retinopathy begins with bleeding resulting in micro aneurysm, hard exudates, cotton wools, inter retinal micro vascular and venous disorders. Some patients with pathology of diabetic retinopathy need to be diagnosed with diabetes [2]. Besides diabetic retinopathy there are additional symptoms such as hypertensive retinopathy, radiation retinopathy, ocular ischemic syndrome and vascular occlusive disease. This diagnosis is done in order to distinguish the appearance of early symptoms of bleeding points referred to as micro aneurysm [3]. Fundus scanned results is expensive and requires Ophthalmologist training [4]. However, manual procedures have some drawbacks because ophthalmologist sight differs from one another. The use of filter-based algorithm aimed to get the kernel to recognize microaneurysm,

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CONVOLUTION NEURAL NETWORKS FOR FACE RECOGNITION AND FEATURE EXTRACTION

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Abstract

A robust human identity authentication system is vital nowadays due to the increasing number of crime and losses through identity fraud. And thus, facial recognition for verification and validation has been one of the major evolutions through neural networks. However, it still remains one of the challenging problems. The main challenge is how to improve the recognition performance when affected by the variability of non-linear effects that include illumination variances, poses, facial expressions, occlusions, etc.

In the paper, robust 4-layer Convolutional Neural Network (CNN) architecture is proposed for the face recognition problem, with a solution that is capable of handling facial images.

We will outline the most important existing approaches to facial image analysis and present novel methods based on Convolutional Neural Networks (CNN) to detect, normalize and recognize faces and facial features. CNN is inspired by visual mammalian cortex of simple and complex cells. It consists of 4- 8 layers with image processing tasks incorporated into the design. CNN applies three architectural concepts in its architecture namely shared weights, local receptive field and sub sampling. They show to be a powerful and flexible feature extraction and classification technique which has been successfully applied in other contexts, i.e. hand-written character recognition, and which is very appropriate for face analysis problems.

INTRODUCTION

Face detection is a well studied problem in computer vision. Modern face detectors can easily detect near frontal faces. Recent research in this area focuses more on the uncontrolled face detection problem, where a number of factors such as pose changes, exaggerated expressions and extreme illuminations can lead to large visual variations in face appearance, and can severely degrade the robustness of the face detector. The difficulties in face detection mainly come from two aspects: 1) The large visual variations of human faces in the cluttered backgrounds 2) The large search space of possible face positions and face sizes. The former one requires the face detector to accurately address a binary classification problem while the latter one further imposes a time efficiency requirement. In the paper, we propose to apply the Convolutional Neural Network (CNN) for face detection. Compared with the previous hand-crafted features, CNN can automatically learn features to capture complex visual variations by leveraging a large amount of training data and its testing phase can be easily parallelized on GPU cores for acceleration. Convolutional nets can be used to classify images (name what they see), cluster them by similarity (photo search), and perform object recognition within scenes. They can identify faces, individuals, street signs, eggplants, platypuses and many other aspects of visual data.

I. PRINCIPLES OF CNN

Convolution is the integral measuring how much two functions overlap as one passes over the other. Think of a convolution as a way of mixing

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Fair Routing Across the Wireless Sensor Network Using Deniable Encryption and Load Balancing

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ABSTRACT: In this paper, multiple Wireless sensor networks are not overlapped on one other and are made to communicate with each other using head nodes. In turn each wireless sensor network maintains a number of nodes within it. Each node with in a wireless sensor network contains a head node which communicates and forwards packets to the intended destination. Lifetime of each head node is maintained through the load balancing. Some malicious node is detected through the hash value of the given node. Unfortunately the malicious node, if it gets the message and decrypts it, it cannot get the original data as we us deniable encryption for providing data security. Finally, as a result there is a reduction in the energy consumption and data is secured during the transmission.

KEYWORDS: sensor network, clustering, data sealing, load balancing, fair routing

I. INTRODUCTION

In the past years, wireless sensor network has become a fast growing technology. As the name suggests, sensor networks consists of nodes called sensors. these sensors senses the data i.e., accepts the real world data and forwards the data from source to the destinations. These sensors are interconnected in a wireless fashion. There is no dedicated link between any sensor nodes. For example if there are 10 sensor nodes each sensor node is connected to remaining all sensor nodes. Generalizing if n sensor nodes are present in a network, each node is connected to n-1 nodes.

The collection or group of finite number of sensor nodes form wireless sensor nodes. Likewise, many wireless sensor networks exist in the network space.

The source sense the data to the destination via one or more wireless sensor nodes as the intermediates. When the source sense the data, it divides the large block of data into finite sized sealed packets. For the purpose of security encryption algorithms can be used by the clients for providing security for its data. As many clients in the form of source outsources their data packets onto the sensor network, the security issues concerning towards data security on network must be paid at most attention. The security is a must as different sources uses different cryptographic techniques to provide security for the data they outsource on to the network.

Security concerns regarding wireless sensor networks have been delt by many authors so far. Dealing with the security at the network level has too major issues to be delt with. The first issue deals with load balancing over the wireless sensor network and the second major issue deals with detection of malicious node on the network. These issues have to be delt by the network administrator.

As described in the above part of the introduction, let us see the composition of a wireless sensor network. A wireless sensor network is composed of finite number of nodes each connected in a wireless fashion. Each sensor nodes consists of head node thrcat takes a responsibility of load sharing on the wireless sensor network. If the head node is overloaded it forwards the packets to the head nodes of the other wireless sensor network. If all wireless sensor networks are overloaded the packets are queued.

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Drifting Approach for Energy Consumption in Wireless- Sensor Networks

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Abstract

The growing technologies and several issues concerned to the wireless sensor networks keeps the remarkable change in the existing technologies of wireless sensor networks and most of the concerned issues are related to the consumption of power and crucial part of the networks are mainly deal with properties like sensing, computing, and radio but this paper mainly concerned about the a novel sleep scheduling technique and virtual backbone Scheduling where traffic is only forwarded by backbone sensor nodes, and the rest of the sensor nodes turn off their radios to save energy. In this paper, the main focusing is concerned with two approaches in which first one is deal with rotation of multiple backbones which can makes sure that the energy consumption of all sensor nodes is balanced and fully utilized inside the network and second approach is the efficient routing with minimum energy consumption of nodes where each node in the network is equipped with a learning automaton to collectively learn the path of aggregation with minimum consumption energy for each node in the network where one can achieve the remarkable drift in energy consumption at very minute level of the network.

Keywords: Remarkable, Sensing, Rotation, Automaton, Drift

1. INTRODUCTION

In real time applications of the wireless sensor network it is necessary for the nodes to achieve two things the first one is Quality of Service as well as fault tolerance for the sensing In this concept, we are dealing with the novel sleep-scheduling technique called Virtual Backbone Scheduling[1]. Where actually VBS is designed for WSNs with redundant nodes, where VBS forms multiple overlapped backbones which work alternatively to prolong the network lifetime. As concerned to this approach traffic is only forwarded by backbone sensor nodes, and the rest of the sensor nodes turn off their radios to save energy. And the second approach is mainly concerned with efficient routing with minimum energy consumption of nodes where each node in the network is equipped with a learning automaton to collectively learn the path of aggregation with minimum consumption energy for each node in the network [2]. This concept is an adaptive decision-making unit situated in a random environment of the wireless sensor network that learns the optimal action through repeated interactions with its environment. The concept of automaton reads an input from its environment existing paths to forward the traffic and then it updates n (t) to n (t+1) after choosing a successor state according to the probabilities and outputs the corresponding to the particular action. Further the automaton's environment, in turn, reads the action and sends the next input to the automaton.

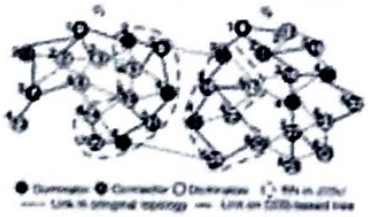

Figure 1: Link Stability in MANET

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