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CREATING A SECURITY ALERT FOR THE CARE TAKERS IMPLEMENTING A VAST DEEP LEARNING

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Abstract - *Many senior citizens are often careless and helpless on their health. Deep learning are useful for monitoring the senior citizen and also at the same time inspection for detection of untrustworthy people and object kept in public places. It will provide the low cost, and a high accuracy. This paper is performed by collecting the dataset of human routine activities. Over recent times, deep learning has been challenged extensively to automatically read and interpret characteristic features from large volumes of data. Human Action Recognition has been experimented with a variety of techniques like wearable devices, mobile devices, etc. but they can cause unnecessary discomfort to people. Since it is very vital to monitor the movements of humans in unattended scenarios, this project focuses on image based HAR using deep learning. This project showcases a smart human action recognition method to automatically identify the human activities from skeleton joint motions and combines the competencies of both deep learning and image processing.*

Key Words: Human Activity Recognition, Skeleton joints, AlexNet, ReLU, ELU, Deep learning.

1. INTRODUCTION

Human Activity Recognition (HAR) is a challenging time series classification task. It involves estimating the action of a person based on sensor data and usually involves deep domain expertise and methods from signal processing to correctly engineer features from the raw data to suitable a machine learning model.

In recent times, deep learning methods such as convolutional neural networks and recurrent neural networks have shown capable and even achieve state-of-the-art results by automatically learning features from the raw sensor data.

In this paper, you will discover the problem of human activity recognition, and the deep learning methods that are achieving state-of-the-art performance on this problem. We know that, Activity recognition is the problem of guessing the crusade of a person, often indoors, based on sensor data, such as an accelerometer in a smartphone. Stream of sensor data are divided into sub-sequences called windows, and each window is associated with a broader activity, called a sliding window approach. Convolutional neural networks, and long short-term memory networks, and perhaps, both together, are best suited to learning features from raw sensor data and forecasting the associated movement.

Human activity recognition is a broad field of study concerned with identifying the specific movement of a person based on sensor data. Movement is often typical activities performed indoors, such as walking, talking, standing, and sitting. They may also be focused activities such as those types of activities performed in a kitchen or on a factory floor. The sensor data may be remotely recorded, such as video, radar, or other wireless techniques. Consecutively, data may be recorded directly on the subject such as by carrying custom hardware or smart phones that have accelerometer and gyroscopes. Historically, sensor data for activity recognition was challenging and costly to collect, requiring custom hardware. Now smart phones, and personal tracking devices used for fitness and health monitoring are cheap and ubiquitous. As such, sensor data from these devices are cheaper together, more common, and therefore is a more commonly studied version of the general activity recognition problem.

The problem is to forecast the activity given a snapshot of sensor data, typically data from one or a few sensor types, generally, this problem is framed as a univariate or multivariate time series classification task. It is a challenging problem as there are no direct ways to relate the recorded sensor data to specific human activities, and each subject may perform an activity with major variation; resulting in variations in the recorded sensor

data. The intent is to record sensor data, and corresponding activities for specific subjects, fit a model from this data, and generalize the model to categorize the activity of new unseen subject from their sensor data.

2. RELATED WORK

Over recent times, deep learning has been challenging extensively to automatically read and interpret characteristic features from large volume of data. Human Action Recognition (HAR) has been tested with a variety of methods likes wearable devices, mobile devices, etc. but they can cause unnecessary discomfort to people, especially elderly and children. Since it is very vital to monitor the movements of elderly and children in unattended scenarios, this project focuses on HAR. This project showcases a smart human action recognition method to automatically identify the human activities from skeletal joint motion and combines the competencies. Along with the human activities, human gestures are also recognized. In this project provides a way to help the senior citizens and children from any kind of mishaps and health issues.

A. Jin Qi, Zhangjing Wang, Xiancheng Lin, and Chunming Li proposed "Learning Complex Spatio-Temporal Configurations of Body Joints for Online Activity Recognition" this method achieves real time performance with PCA dimension reduction.

B. Dapeng Tao, Lianwen Jin, Member, IEEE, Yuan ,Senior Member, IEEE, and Yang Xue proposed "Ensemble Manifold Rank Preserving for Acceleration-Based Human Activity Recognition" , compared to the classical spectral geometry algorithms, such as PCA,LDA,GMSS,LSDA and MFA,EMRP shows many attractive and competitive properties to measure the similarity between different acceleration signals.

C. Wanru Xu, Zhenjiang Miao, Member, IEEE, Xiao-Ping Zhang, Senior Member, IEEE, Yi Tian proposed "A hierarchical Spatio-Temporal Model for Human Activity Recognition" this experimental result show that the HSTM can successfully classify human activities with higher accuracies on single person actions(UCF).

D. LeiWang, Student Member, IEEE, XuZhao*, Member, IEEE, Yunifei Si, Liangliang Cao, Member, IEEE, and Yuncai Liu, Member, IEEE proposed "Context-associative Hierarchical Memory Model for Human Activity Recognition and prediction", it achieves remarkable performance on high-level activity recognition, due to the joint contributions from all the context elements.

3. PROPOSED SYSTEM

The objective of the project is to recognize Human Activity using movements of skeleton joints and human gestures used for communication. To design an intelligent human action and human gesture recognition system which can spontaneously recognize the human routine activities using the human skeleton information, combining the techniques of an image processing, and deep learning. Here we are going to capture the different skeleton images of human actions, and collect it as a data sets, train the data based on algorithms using deep learning. To collect the dataset from the combination of different images to apply different algorithms such as GoogleNet, ResNet, Logistic Regression, etc. and to predict the highest accurate algorithm. To apply noise removing techniques to increase the accuracy. Evaluating the trained model by giving real time data. Human action recognition and human gesture recognition system which can automatically recognize the human routine activities using the currently prevailing deep learning. The proposed system discusses the development of an effective skeleton information based HAR along with gesture recognition. Uses AlexNet, VGG16, GoogleNet, Logistic Regression, ResNet algorithms to achieve the purpose. Optimizing technique like A Stochastic Gradient Descent (SGD) and regularization methods like ReLU and ELU to increase the accuracy. Along with the human activities human gestures are also recognized. Accuracy of the prediction will be increased by using different efficient techniques and algorithms.

4. DATASET

Below screenshot show the dataset collection done for Human Activity Recognition system.

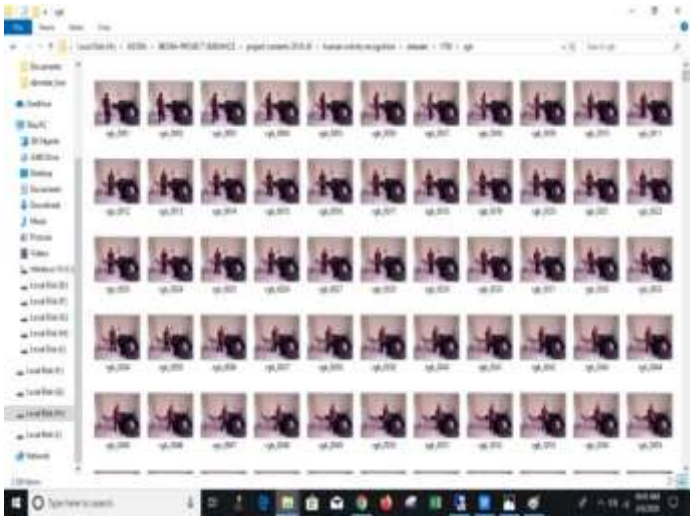


Fig -1: Dataset collection

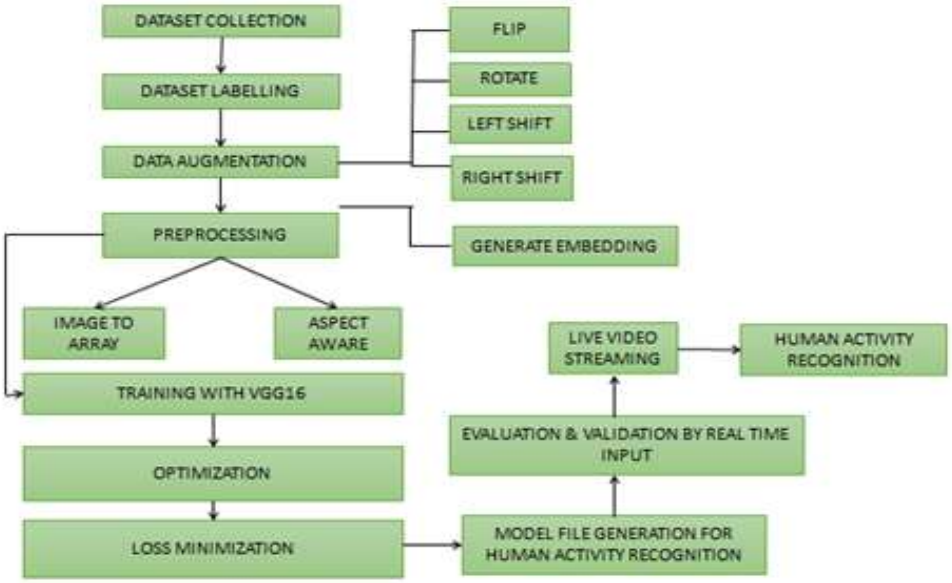
After this we will be perform data augmentation process to improve my dataset number which increase as the accuracy. Below screenshot show the actual Human Action.

Fig -2: Actual Human Action

The output image after data augmentation can be seen below.

Fig -3: Output Image

5. ARCHITECTURE DIAGRAM



6. MODULE

a. Dataset Preprocessing Module
b. Feature Extraction With Hdf5 Dataset Generator
c. Fine Tuning With Network Surgery
d. Optimization
e. Loss Minimization

6.1 DATASET PREPROCESSING MODULE

Dataset preprocessing module has three steps involving dataset collection, data augmentation as well as data preprocessing. In the dataset collection process we collect different forms of data suitable for our application. Data augmentation includes a wide range of techniques used to generate new training models. In the data preprocessing steps, we will preprocess the data using different methods to get the exact output such as mean preprocessing, simple preprocessing, and image to array conversion and label encoding.

Fig -4: Dataset Preprocessing Module

6.2 FEATURE EXTRACTION WITH HDF5 DATASET GENERATOR

HDF5 is binary data format created by the HDF5 group to store gigantic numerical datasets on disk while facilitating easy access and computation on the rows of the datasets. Data in HDF5 is stored hierarchically, alike to how a file system stores data. The feature extraction includes the following steps.
1. We input an image to the network.
2. The image forward propagates through the network.
3. We obtain the concluding classification probabilities from the end of the network.
However, there is no, "rule" that says we must allow the image to forward broadcast through the entire network. Instead, we can stop the propagation at an arbitrary layer, such as an activation or pooling layer, extract the values from the network at this time, and the then use them as feature vectors.

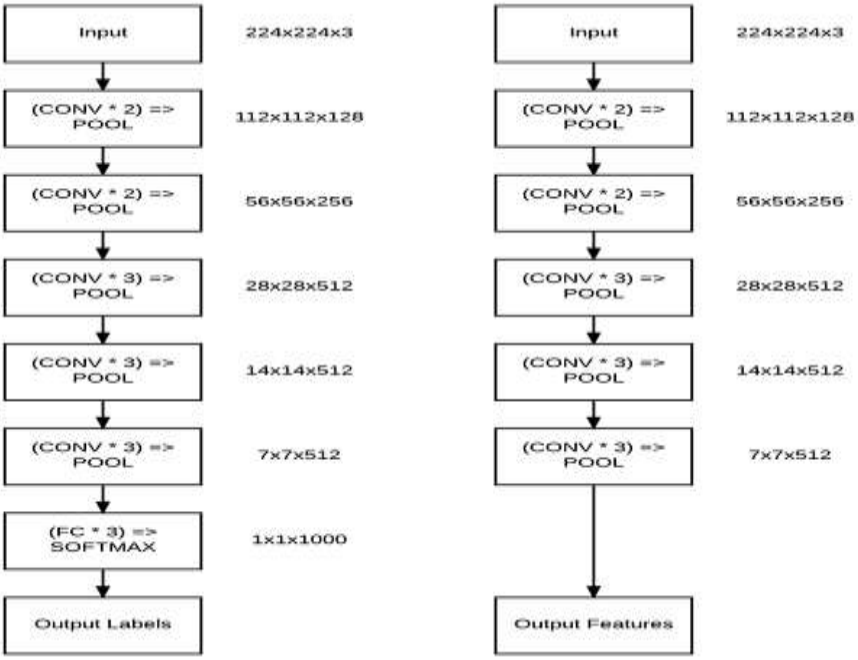


Fig -5: Feature Extraction

6.3 FINE TUNING WITH NETWORK SURGERY

Fine-tuning is a type of transfer learning. We apply fine- tuning to deep learning models that have previously been trained on a given dataset. Typically, these networks are state-of-the-art architectures such as ResNet, and Inception that have been trained on the ImageNet dataset. These networks contain rich, discriminative filters that can be secondhand on datasets and class labels outside the ones they have already been trained on.

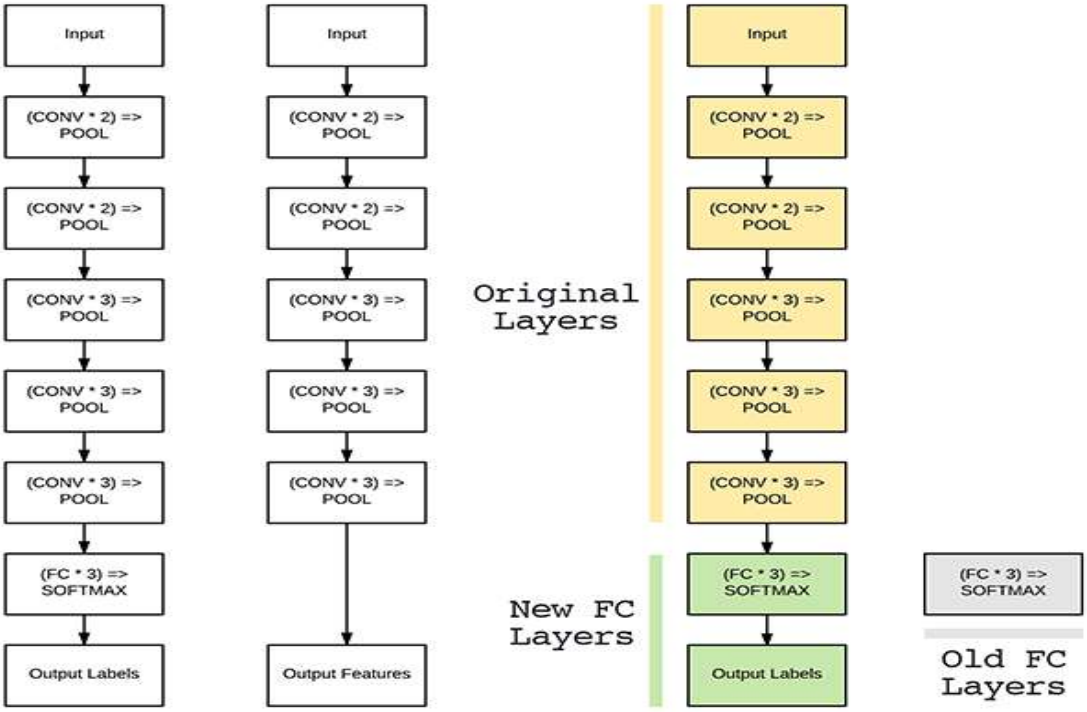


Fig -6: Preforming Network Surgery

6.4 OPTIMIZATION

Optimization algorithm supports us to minimize an objective function E(x) which is a mathematical function reliant on the model's internal learnable parameter. , E.g. we use the weights (W) and the Bias (b) values of the neural network as its internal learnable parameters which are used in computing the output values and are learned and restructured in the direction of optimal solution i.e. reducing the loss by the network's training process, and also play a major role in the training process of the Neural Network Model. The internal parameters of a model play a very important role in efficiently and effectively training a model and produce perfect results. This is why we use numerous optimization strategies and algorithms to update and calculate appropriate and optimum values of such model's parameters which influence our model's learning process and the output of the model.

STOCHASTIC GRADIENT DESCENT

Stochastic Gradient Descent (SGD) on the other side it performs a parameter update for each training example. It is usually much faster technique. It performs one update at a time.

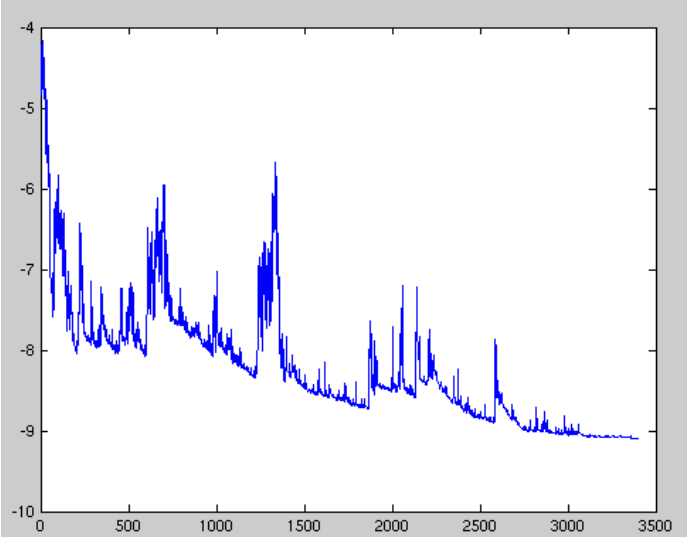


Fig -7: Stochastic Gradient Diagram

6.5 LOSS MINIMIZATION

Training a model means erudition good values for all the weights, and the bias from labelled examples. In supervised learning, a machine learning algorithm figures a classic by inspecting many specimens and attempting to find a model that minimizes loss; this process is called loss minimization. Cross entropy loss, suits the portion of an arrangement whose outcome is a probability value between 0 to 1. Cross entropy loss increases as the expected probability diverges from the actual table. So expecting a probability of point .012 when the actual observation label is 1 would be bad, and result in a high losses value. A perfect model should have a cross entropy loss of 0.

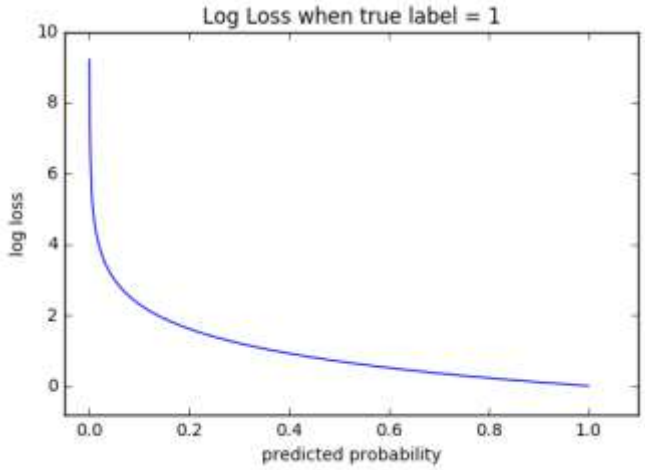


Fig -8: Predicted probability

7. RESULT AND FUTURE WORK

The project of Human Action recognition and human gesture recognition system which can automatically recognize the human routine activities using the currently prevailing deep learning approach. We develop an effective skeleton information based HAR along with gesture recognition. It will recognize the human activities and human gesture. So, we can save our grandparent from sudden health issues. In the coming future, we review the application of the human activity sensing technology in recognition field, and it can promote for all types of recognition with more accuracy compare to this project. In this field there have more chance to develop are convert this project in many ways. Then provide accuracy of the prediction will be increased by using different efficient techniques and algorithms. Avoids mishaps with elderly as well as children.

REFERENCES

[1].Deep learning for Electromyographic Hand Gesture Signal Classification using transfer learning Cheikh Latyr Fall, Alexandre Drouin, Alexandre Campeau Lecores, Kyrre Glette, and Benoit Gosselin, vol.1534-4320, March.2019.

[2]. Learning complex Spatio-Temporal Configurations of body joints for onlineactivity recognition Jin Qi, Zhangjing Wang, Xiancheng Lin, and Chunming Li, IEEE 2018,Volno: 2168-2291.

[3]. A Hierarchical Spatio-Temporal model for Human activity recognition Wanru Xu, Zhenjiang Miao, Member, IEEE, Xiao-ping Zhang, Senior Member, IEEE, Yi Pian, Vol: 1520-9210, 2017.

[4]. Ensemble Manifold Rank Preserving for Acceleration-Based Human Activity Recognition Dapeng Tao, Lianwen Jin,Member, IEEE , Yuan Yuan, Senior Member, IEEE and Yang Xue, Vol: 2162- 237X, JUNE 2016.

[5]. Context-Associative Hierarchical Memory Model for Human Activity Recognition and Prediction. Lei Wang, Students Member, IEEE, Xu Zhao*, Member, IEEE, Yunfei Si, Liangling Cao, Member, IEEE, and Yuncai Liu, Member, IEEE, Vol: 1520- 9210, Sep.2016.

[6]. Fuzzy Temporal Segmentation and probabilistic recognition of continuous human daily activities Hao Zhang Member, IEEE, Wenjun Zhou, Member, IEEE and Lynne E. Parker, Fellow, IEEE, Vol: 2168-2291, 2015.