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Human Activity Recognition using Machine Learning

Puneeth[1*], Sowmya[2], Salith Ziyan[3], M. R. Manu[4]
[1,3,4]*Student, Department of Information Science and Engineering, Srinivas Institute of Technology, Mangalore, India*
[2]*Assistant Professor, Department of Information Science and Engineering, Srinivas Institute of Technology, Mangalore, India*

***Abstract*: The subject of Human Activity recognition (HAR) could also be a prominent research area topic within the sector of computer vision and image processing area. It has privileged state-of-art application in various sectors, surveillance, digital entertainment and medical healthcare. It is interesting to watch and intriguing to predict such quite movements. Several sensor-based approaches have also been introduced to review and predict human activities such accelerometer, gyroscope, etc., it's its own advantages and drawbacks. Convolutional neural networks (CNN) with spatiotemporal 3 dimensional (3D) kernels are trained using data set which has Three classes that depicts activities of humans in their everyday life and work. The trained model show satisfactory performance altogether stages of coaching, testing. The ability to acknowledge various human activities enables the developing of intelligent system. Usually the task of act recognition is mapped to the classification task of images representing person's actions. This system provides the comparison study on these methods applied for human activity recognition task using the set of images representing five different categories of daily life activities.**

***Keywords*: CNN, Human activity recognition, 3D.**

1. Introduction

The topic which has increased its importance in last few decades in the domain of Computer Vision and A.I. is "Human Activity Recognition". As the concepts of the human activity recognition helps in understanding the concepts and issues of the human action understanding which majorly helps in medication, management, learning patterns and many situations of video retrievals. The Human Activity Recognition Systems (HAR) is capable of recognizing physical activities like walking, standing, sitting. The detection of the physical activities by different such sensors and recognition process is a key topic of research in wireless, smartphones and mobile computing. Human activity recognition systems is in a position to perform different tasks and recognize the humans which may be either simple activities like standing, walking, sleeping or the complex activities like running, eating etc.

For the purpose of activity recognition of human's different actions, multiple types of sensors and devices are required like video sensors, environmental activities sensors, body inertia sensors and many other sensors like these which record or sense the human actions. There are many other sensors used by the HAR systems but with the limited availability of use due to the effect of outdoor environments and activities on them like GPS receiver which is limited to outdoor environments. The non-residual networks or simply the neural networks which are not ResNet behaves like plain networks when compared to the other residual neural networks. The main usage of the skipping of levels within the residual networks either HighWayNets or DenseNets is to resolve the difficulty of vanishing gradient via the answer of reusing previous layer activations until the upcoming or adjacent layers are capable of learning their weights.

In most of the cases it is a really explicit practical applicability: act recognition is an integrate a neighborhood of human behavior-based system. Nowadays, smart home technologies are getting plenty of attention thanks to better care of the residents which is extremely important for elderly, children or disabled people. Now-a-days, the primitive act partition to the static postures and dynamic motions isn't sufficient. one of the key features of smart system technologies' task for act recognition is enabling to identify this activity considering to the big choice of provided indoor activities. Fully-autonomous and barely noticeable assisting systems are becoming more appropriate for daily use than equipment supported wearable sensors or appliances. machine learning technologies are applied for image recognition tasks. Therefore, the most challenge in act recognition is to gauge the reliability of selected technologies. Considering this fact, it is necessary to match the experimental results obtained using different machine learning approaches.

2. Literature Survey

In paper [3] focuses on the uses of activity recognition frameworks and reviews their best in class. We divide such applications into dynamic and helped living frameworks for keen homes, human services observing applications, checking and observation frameworks for outside and indoor exercises, and tele-drenching applications. Inside these classifications, the applications are arranged by the philosophy utilized for perceiving human conduct, especially, in light of visual, non-

*Corresponding author: kharvipuneeth123@gmail.com

visual, and multimodal sensor innovation. We give a summary of those applications and mention the points of interest and confinements of every approach. Furthermore, we represent open informational collections that are intended for the assessment of such activity recognition frameworks. The article closes with a correlation of the present strategies which, when applied to true situations, permit to work examine inquiries for upcoming methodologies. The issue of programmed recognizable proof of physical activity performed by person subjects is alluded to as activity Recognition (HAR). There exist a couple of methods to measure movement attributes during these physical exercises, for instance, Inertial Measurement Units (IMUs). IMUs have a foundation position during this specific situation, and are described by utilization adaptability, minimal effort, and decreased protection sway.

3. Methodology

The Proposed System contains four main modules called Pre-processing, model creation, system training and classification. Pre-processing module is used to pre-process the dataset images by resizing them to required dimension. Model Creation module is used to construct a machine language model using desired number of layers. System training phase is used to train the system with dataset images and store the model weight. Classification module is used to classify the input test image to determine the human activity.

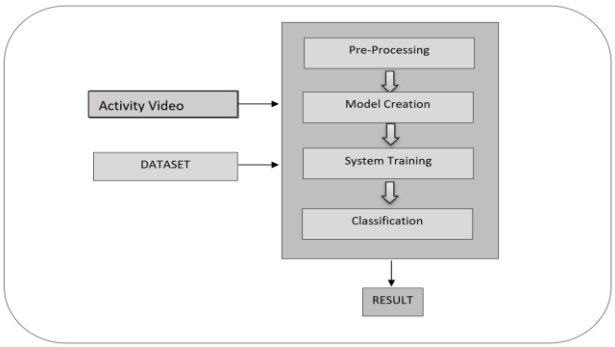

Fig. 1. HAR system architecture

Convolutional neural network is a popular representative algorithm in deep learning. It is essentially a multi-layer perceptron that simulates local perception to realize an input-to-output mapping. It extracts the characteristics of the info at different scales through multiple convolutions and pooling. What is unique within the CNN network is that the way utilized in local connections and shared weights. On the one hand, it reduces the amount of weights which makes the network easy to optimize, and on the opposite hand, it reduces the danger of overfitting. CNNs are generally composed of three mutually supported levels, that is convolutional layer, pooling layer, fully connected and Softmax layer. In the convolution process, we get local features. Since one of the convolution layers consists of multiple convolution units, within the calculation process, so on extract more features about the input parameters, it's needed to urge more complex feature correlation values from low-level convolutional layers through multi-level cascading.

4. Result

The Video of different activities is fed to system; classified result is given in figures. Human Activities like walking, standing, sitting is recognized.

Fig. 2. Sitting activity is captured

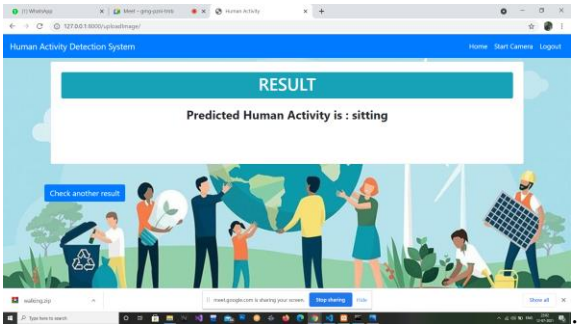

Fig. 3. Sitting activity is recognized

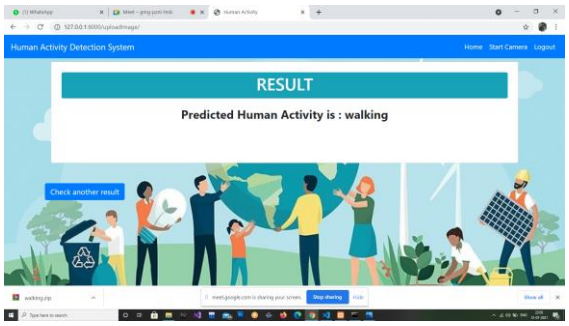

Fig. 4. Walking activity is recognized

5. Conclusion

In this proposed system Human Activity Recognition System, we presented a model trained using Convolutional neural network (CNN) with data set to recognize almost three human activities with satisfactory accuracy level. The designed system is often improved to automatically categorizing a dataset of videos on disk, training and monitoring a replacement employee to properly perform a task, verify food worker services, monitoring bar/restaurants patrons and ensuring they are well served. For future work, we can use a dataset covering more than 400 activities to make the system more versatile. It is also observed that increasing the number of samples for an activity in the dataset improves the performance of the system significantly.

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