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Abnormal Infant Movements Classification using Deep Learning

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Abstract: *With the help of instruments like the General Movements Assessment (GMA), researches have been actively pursuing the early detection of cerebral palsy and have been some extremely encouraging outcomes. For usage of transfer learning in new deep learning architectures, it will categorize the movements of infant intonormal and abnormal. We conduct comprehensive experiments on transfer learning in deep learning architectures to investigate the feasibility of leveraging the pose-based feature sets for automatic classification within a deep learning framework. The proposed system using one of the popular algorithms which is Visual Geometry Group (VGG16) a CNN architecture, and is easy to use with transfer learning for image classification.*

Keywords*:* CNN,VGG16

I. INTRODUCTION

For many years, there has been considerable study in the field of automated human action recognition. There are a variety of uses for the ability to automatically perceive, interpret, and reconstruct complex motion, such as human activity, including content-based video indexing, intelligent monitoring, virtual reality, surveillance, and human-computer interaction. We suggest that this technology be used in the healthcare industry, specifically in pediatrics, to help with the early detection of movement abnormalities such cerebral palsy, building on our early research.In this proposed system we evaluate the viability of analyzing the pose of infants as a mean of automatically diagnosing movement conditions. We suggest that the transfer learning a CNN architecture has many advantages, it is a machine learning technique that involves reusing a pre-trained model on one task improve the performance of a model on the different but related task.This approach is particularly useful when the new task has limited data or when the new data is significantly different from the original training data. By using transfer learning, it is possible to reduce the amount of training data needed to achieve good performance on the new task and to speed up the training process. Transfer learning has become increasingly popular in deep learning applications, where models with many parameters can be pre-trained on large datasets and fine-tuned on specific task

II. LITERATURE SURVEY

2.1) L. Adde, J. L. Helbostad, A. R. Jensenius, G. Taraldsen, K. H. Grunewaldt, and R. Støen, ‘‘Early prediction of cerebral palsy by computer-based video analysis of general movements: A feasibility study,’’ Develop. Med. Child Neurol., vol. 52, no. 8, pp. 773–778, 2010. The aim of this study was to investigate the predictive value of a computer-based video analysis of the development of cerebral palsy (CP) in young infants. A prospective study of general movements used recording from 30 high-risk infants (13 males,17 females; mean gestational age 31 wks, SD 6 wks; range 23-43 wks) between 10- and 15-weeks post term when fidgety movements should be present.Recording was analyzed using computer vision software. Movements variables, derived from differences between subsequent video frames, were used for quantitative analysis. The disadvantages are it done by manual, time consuming nature of assessment and it is highly susceptible to observe fatigue.

2.2) J. K. Aggarwal and L. Xia, ‘‘Human activity recognition from 3D data: A review,’’ Pattern Recognition. Lett., vol. 48, pp. 70–80, Oct. 2014.various approaches have been proposed with a great portion of them addressing these issues via conventional cameras. This project summarizes the major techniques in human activity recognition from 3D data with

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a focus on techniques that use depth data. Broad categories of algorithms are identified based upon the use of different features. The disadvantages are human action recognition is affected by several challenges due to view changes and variation in execution rate.

2.3) H. Akima, ''A new method of interpolation and smooth curve fitting based on local procedures,'' J. ACM, vol. 17, no. 4, pp. 589–602, Oct. 1970.A new mathematical method is developed for interpolation from a given set of data points in a plane and for fitting a smooth curve to the points. This methos is devised in such a way that the resultant curve will pass through the given points and will appear smooth and natural. It is based on a piecewise function composed of a set of polynomials, each of degree three, at most, and applicable to successive intervals of the given points. In this methos, the slope of the curve is determined at each given point locally, and each polynomial representing a portion of the curve between a pair of given point is determined by the coordinates of and the slopes at the points. Comparison indicates that the curve than those drawn by other mathematical methods. The disadvantages are Cannot estimate above maximum or below minimum values and not very good for peaks or mountainous area.

III. PROPOSED SYSTEM

By extracting the normalized pose-based feature sets for usage in VGG-16 in deep learning architectures, we expand on our earlier work in this publication. We conduct comprehensive experiments on transfer learning to investigate the feasibility of applying these pose-based features sets for automatic classification within a deep framework. Additionally, the suggested convolutional neural network architectures showed outstanding performance in processing features in higher dimensionality.

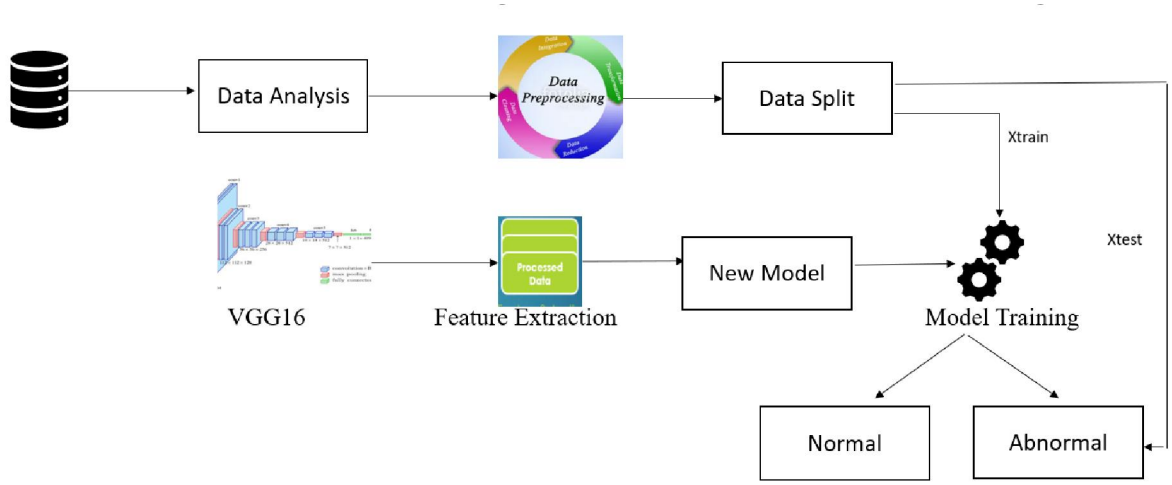

Figure 1. The pipeline of our proposed abnormal infant movements classification

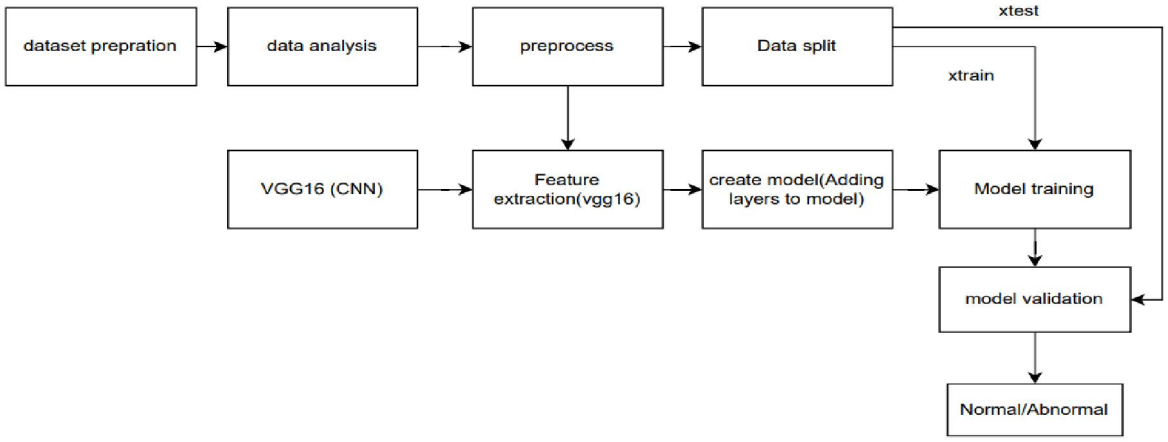

Figure 2. Work Flow

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IV. METHODOLOGY

In this paper, we presented a method for identifying abnormal infant movement that uses the deep learning technique. Here, the system is operated by transfer learning. Transfer learning is a machine learning technique that involves reusing a pre-trained model on one task improve the performance of a model on a different but related task. In transfer learning, the knowledge gained by a model from solving one task is transferred or shared to help the model perform better on another task. Transfer learning is the process of using machine learning model that has already been trained to solve a separate but related problem. Here we using VGG16, a convolutional neural network model for image recognition. It stands out because it uses only 16 layers with weights rather than a big number of hyper-parameters. It is regarded as one of the top architectures for vision model systems. This architecture is used for train a model and with this it classifies the images as normal or abnormal.

Dataset

A data set is an organized collection of data. They are generally associated with a unique body of work and typically cover one topic at a time. Information elements within a data set relate to another, and analysts often categorize types of data to create relevant data sets. The general objective is to make access easy, quick and inexpensive and flexible for the users. The frameworks for estimating human posture are, therefore, challenging to collect a dataset of photographs of infants for research purposes because they are almost solely trained and tested using images of adults. The Skinned Multi-Infant Linear (SMIL) model was used to create the Moving Infants in RGBD (MINI-RGBD) synthetic dataset, which was then made available to researchers working in this field.

Preprocessing

The purpose of the data preprocessing was to clean and crop the images. Because the data were collected from Internet resources by Piosenka, they had to be preprocessed before they could be used to train the deep learning model. In the data preprocessing to manipulate or dropping the data before it is used in order to ensure or enhance performance.

V. CONVOLUTIONAL NEURAL NETWORK

The goal of our job is to develop a convolutional neural network (CNN) that can recognize movements in photos. We will make use of the two datasets, which contain number of images of infants. So instead of creating and training a CNN from scratch, we'll employ a transfer learning model that has already been developed and trained. Transfer learning's fundamental tenet is straightforward, take a model that has been trained on a sizable dataset and apply its knowledge to a smaller dataset. With a CNN, we only train the final few layers that make predictions for recognition and freeze the network's early convolutional layers. The concept is that the convolutional layers extract universal, low-level features that apply to all images, it identifies particular features within an image. There are therefore common, low-level properties that are shared by all photos, allowing us to leverage a network that was trains on unrelated categories in a large dataset often ImageNet to solve our own issue.

VI. COMPARISON WITH PREVIOUS METHODS

In the earlier research, we looked into the viability of extracting pose-based features from video sequences in order to automatically categories new born body movement into two group, normal and abnormal. The distinction was made on upon the GMA, which an impartial professional reviewer performed on the video data. In this instance, we used convolutional neural network (CNN) architectures to show good performance in handling in higher dimensions.A range of lifelong neurological diseases, commonly brought on by a brain injury that occurs before, during, or soon after birth, are collectively referred to as cerebral palsy. For usage of transfer learning in new deep learning architectures, it will categorize the movements of infant into two normal and abnormal.

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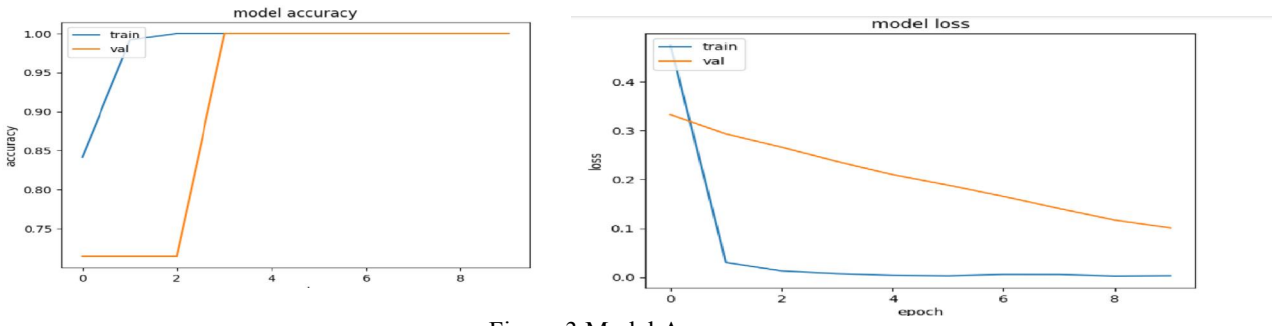

Figure 3 Model Accuracy

VII. CONCLUSION AND FUTURE SCOPE

In this study, we suggested deep learning-based framework for transfer learning to categorize newborn body movement using pose-base features. In this project the feature extraction and pre-processing are significantly expanded and improved. The suggested transfer learning worked consistently across several features sets, according to experimental findings. Additionally, the suggested VGG16 model in convolutional neural network architectures showed great performance in handling features in higher dimensions. The implementation of the deep learning frameworks and the annotated dataset will encourage in this fields. The appearance of the photos used as an input for the OpenPose framework differs slightly from that of real-world image data since the images utilized in this paper is synthetic. Additionally, because the MINI-RGBD dataset only contains a small number of images in video sequences, we plan to expand on this work by classifying a bigger video dataset.We build on this work by classifying a larger video dataset since the MINI-RGBD dataset only comprises a small number of images in the video sequences. Finally, comparing the suggested network designs with other cutting-edge pose-based features could be an intriguing future direction.

REFERENCES

[1]. KEVIN D. MCCAY1, EDMOND S. L. HO 1, HUBERT P. H. SHUM 1, (Senior Member, IEEE), GERHARD FEHRINGER1, CLAIRE MARCROFT2, AND NICHOLAS D. EMBLETON2.
[2]. L. Adde, J. L. Helbostad, A. R. Jensenius, G. Taraldsen, K. H. Grunewaldt, and R. Støen, ‘‘Early prediction of cerebral palsy by computer-based video analysis of general movements: A feasibility study,’’ Develop. Med. Child Neurol., vol. 52, no. 8, pp. 773–778, 2010
[3]. Kevin D. McCay1 , Edmond S. L. Ho1 , Dimitrios Sakkos1 , Wai Lok Woo1 , Claire Marcroft2 , Patricia Dulson2 , and Nicholas D. Embleton2 “Towards Explainable Abnormal Infant Movements Identification: A Body-part Based Prediction and Visualisation Framework”.
[4]. What is the General Movements Assessment? Cerebral Palsy Alliance, Allambie Heights, Australia. [Online]. Available: https://cerebralpalsy. org.au/our-research/about-cerebral-palsy/what-is-cerebral-palsy/signsand-symptoms-of-cp/general-movements-assessment/.
[5]. Wikipedia.
[6]. J. K. Aggarwal and L. Xia, ‘‘Human activity recognition from 3D data: A review,’’ Pattern Recognit. Lett., vol. 48, pp. 70–80, Oct. 2014. [3] H. Akima, ‘‘A new method of interpolation and smooth curve fitting based on local procedures,’’ J. ACM, vol. 17, no. 4, pp. 589–602, Oct. 1970.