

REVIEW PROCESS ON DETECTION OF MOVEMENT COMPENSATION IN POST STROKE PATIENTS

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ABSTRACT

After a stroke, one needs to go through the recovery process because it helps them to recover in order to perform their performance in upcoming reiteration. Standard clinical rating conducted by human observation is the victorious way today to monitor motor recovery of the patient. Patients have no proper idea whether they are performing a movement properly or not as they have to check while exercising. Hence the exercise regime helps the rehabilitation process more effective and a system which is able to give the performance feedback of the patients. For this purpose, we built a machine learning based automated model which provides exact information on the reimbursement gestures that they make. To construct this model, we noticed the gestures and taken information from stroke patients, who each performed 18 gestures, which helps to identify the presence of six types of reimbursement gestures in stroke patients. The algorithm we used for training this multi- label classification model is Random-Forest algorithm. The average precision percentage across the six movements compensation is 85%. This model can further be modified for the use in clinic and at home exercise methods for patients after stroke.

Keywords: Rehabilitation, Post-Stroke Patients, Random Forest Algorithm, Multi-Label Classification, Machine Learning.

I. INTRODUCTION

Now a days most of the stroke patients were get effected with stroke. Here, up to 80% of patients are participated in upper limb deterioration. This will reduce the patient quality life. While performing exercises themselves will give the successful and well organised performance in the recovery process. Here, reach to grasp procedure is the major functional goal in the recovery process after stroke. The gestures are distinguished by the drowsiness, disconnection and joint synergy. As compared to the normal participants the stroke patients perform the gestures with less exactness and less productive. In order to increase their upcoming reiteration the patient should know that how well they perform their exercises after they discharge from the hospital. For, the stroke patients exercising themselves is very important due to this self-exercising will prevent a recurrent stroke. Due to this self-exercising will improve the patient health day by day and also overexercising will push the patient life into the risk.

II. LITERATURE SURVEY

1] The fugl meyer assessment (FMA) was a quite exact with active patients but less accuracy with post stroke patients. This is because they are considered the active patients training information instead of stroke patients information. So, the otten was implemented a upper-limb motor assessment that uses low cost of sensors to accumulate gesture information. The sensor information is then fining through a machine learning algorithm to specifying a score for a patient upper limb performance. This experiment provides FMA scores to clinician scores and reduces the time spent evaluating each patient data by 82%[1].

2] While performing the exercise, these glove sensors more heavy for the stroke patients to carry for a long time and it also need vast attempt to collect reference data to expand accuracy. To identity these subjects three tests of FMA method was firmly related the issues were selected. Kinematic v2 and force sensors can provide hand related information, those tasks were implemented without glove sensors. Fuzzy-logic classification table

is based on traditional FMA guidelines were implemented without machine learning. Practical it shows more convenient automated assessment of upper limb motor function impairment[2].

3] The 3D kinematic analysis provides detailed and objective information about upper limb movement performance and movement quality everyday activity such as reaching and drinking from a glass after stroke. The main aim of this study is to quantify longitudinal changes and residual deficits in movement performance and quality after stroke using kinematic analysis of drinking task a total number of participants with first ever stroke causing upper extremity impairment were extracted from non-selected stroke unit coherent participants need to able to perform the drinking task with more affected arm. A movement time, number of movements units peak angular velocity of the elbow, peak hand velocity and trunk displacement improved significantly. The find in demonstrate that kinematic analysis might be useful for those with limited functioning in order to get a better understanding of the specific movement impairment in daily tasks.[3]

4] Now a days mobile users are increasing commonly enormously. In these generation the smart phone involves phone based accelerometers for detecting the physical activities. To propose our system we collected 29 users data such as their daily activities walking, jogging, sitting and collecting all these information samples into examples that sum up user activity recognition. This proposed system efficiency work for recognition the activities of more people by carrying their phones and it introduce a daily activities profile to predict. The user is performing good exercise.[4]

5] The ensemble method shown effectual results for solving multi-label classification tasks instead of using random k label sets. In RAKEL using a single label classifier is trained according to each combination of elements in the subset. So, instead of selecting K label randomly we select the minimum required subsets of K labels that cover that cover all labels and encounter extra requires such as coverage of inter-label correlations. To construct the cover that attain by preparing the subset selection as a minimum set covering problem(SCP) and solving by using approximate algorithms. The cover is prepared it well approved to any of the multi-label data set classification whose properties conform with those of the covers. By using or implementing SCP selection for processing label covers while allowing user to incorporate cover construction requires. We show the effectiveness of this selection by introducing two construction requirements. First one is whose implementation produces covers that improve performance of random selection Second one is we provide theoretical bounds that specify the prospects random selection to produce covers that meet the proposed construction criteria. So these ensemble method improves the multi label classification accuracy and stability compared with RAKEL algorithm.[5]

6] In the label power set classifiers have the disadvantage of having different possible label sets. So, to avoid these problem we use the ensemble method for multi-label classification is called RAKEL. RAKEL is used for multiple learning classifiers to approach better prognostic performance and gives more accuracy results when compared to power set label. In RAKEL the M and K values are high, better the performance and also increases the complexity of the RAKEL exponentially with the size of the label set K.

III. METHODOLOGY

a] The process of generating these model, we first collected the movement data from post stroke patients. For this model, we are considered 30 stroke patients movement data from the rehabilitation center.

b] After the data collection process, we were analyzed the collected data in the feature generation phase. The feature generation phase is consisting of two methods.(i)Handcrafted feature which is based on the motor control literatures that is used to analyze the reach-grasp-lift movement by calculating the segments of each movement and then a while variety of biomechanical a handcrafted metrics a such as velocity, jerk, angle of joints etc (with matlabR2017b).(ii) Automated extraction which is based on the dedicated software using scalable hypothesis test implemented by using the python 3.6 Tsfresh package to generate 3000 time series features automatically

c] The next step is feature selection process which is used to avoid overfitting problems due to large number of features compared to the number training instance and also used to identify the most meaningful features for a learner and more efficient model. Feature selection was necessary to us to reduce the feature space , remove redundances, irrelevance and noisy features .

d] The next process is classification algorithm, we use RAKEL algorithm which is a popular ensemble method for multi label classification algorithms which is used to get the accurate predicted results

e] Final step is evaluation , we use the leave -one -out cross validation(LOOCV) for avoiding the statistical problems of overfitting in the built model and finally tested the performance of the model we built.

IV. CONCLUSION

This was our project of system designed about detection of movement compensation in post stroke patients developed in python programming language. The development of this system takes a lot of effort from us. We think these system gave a lot of satisfaction to all of us. Though every task is never said to be perfect in this development field even more improvement may possible in this application. We learned so many things and gained a lot of knowledge about development field. We hope this will prove fruitful to us.

ACKNOWLEDGEMENT

We are pleased to present “Detection of movement compensations in post stroke patients” project and take this opportunity to express our profound gratitude to all those people who helped us in competition of these project. We thank our college for providing us with excellent facilities that helped us to complete and present this paper. We would like to thank the staff members and lab assistants of permitting us to use computers in the lab as and when required we express deep set gratitude towards our project guide for valuable and timely advise during the various faces in our project. We would also like to thank for providing us with all proper facilities and support as the project co-coordinator. We like to thank for support, Patience and faith in our capabilities and for giving us flexibility in terms of working on reporting schedules.

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