



Elderly Care Monitoring using IOT and Deep Learning

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Abstract

As of late, the strategies of Web of Things (IoT) and versatile interchanges have been created to assemble human and climate data information for different clever administrations and applications. Remote observing of old and crippled individuals residing in shrewd homes is profoundly difficult because of likely mishaps which could happen because of everyday exercises like falls. For older individuals, fall is considered as a significant justification behind death of post-horrible intricacy. In this way, early recognizable proof of old individuals falls in shrewd homes is expected to build the endurance pace of the individual or deal needed help. As of late, the approach of computerized reasoning (man-made intelligence), IoT, wearables, cell phones, and so on makes it practical to configuration fall location frameworks for shrewd homecare. In this view, this paper presents an IoT empowered older fall discovery model utilizing ideal profound convolutional brain organization (IMEFD-ODCNN) for brilliant homecare. The objective of the IMEFD-ODCNN model is to empower cell phones and wise profound learning (DL) calculations to distinguish the event of falls in the shrewd home. Principally, the info video caught by the IoT gadgets is pre-handled in various ways like resizing, expansion, and min-max based standardization. Moreover, Crush Net model is utilized as an element extraction procedure to infer proper component vectors for fall discovery. What's more, the hyperparameter tuning of the SqueezeNet model happens utilizing the salp swarm improvement (SSO) calculation. At last, sparrow inquiry improvement calculation (SSOA) with variational autoencoder (VAE), called SSOA-VAE based classifier is utilized for the arrangement of fall and non-fall occasions. At long last, if there should be an occurrence of fall occasion identified, the cell phone sends an alarm to the overseers and medical clinic the executives. The presentation approval of the IMEFD-ODCNN model happens on UR fall discovery dataset and numerous cameras fall dataset. The exploratory results featured the promising execution of the IMEFD-ODCNN model over the new techniques with the most extreme precision of 99.76% and 99.57% on the numerous cameras fall and UR fall identification dataset.

108



INDEX TERMS:Hyperparameter, Tuning,Smart homecare, Smartphone, Fall Detection, Artificial intelligence, Elderly people, Deep learning, Parameter tuning.

DOI Number: 10.14704/NQ.2022.20.15.NQ88010

NeuroQuantology2022;20(15):108-113

INTRODUCTION

As of late, the Web of Things (IoT) and portable correspondence track down helpful in medical services area. With an improved medical services framework in a few nations, normal life expectancy has grown impressively. Additionally lower normal

increments bring about an older populace that would require suitable consideration and more interest. Be that as it may, everyday crisis episodes will likewise keep on happening because of seniors' human instinct. Falling is the most widely recognized issue experienced by senior people groups.

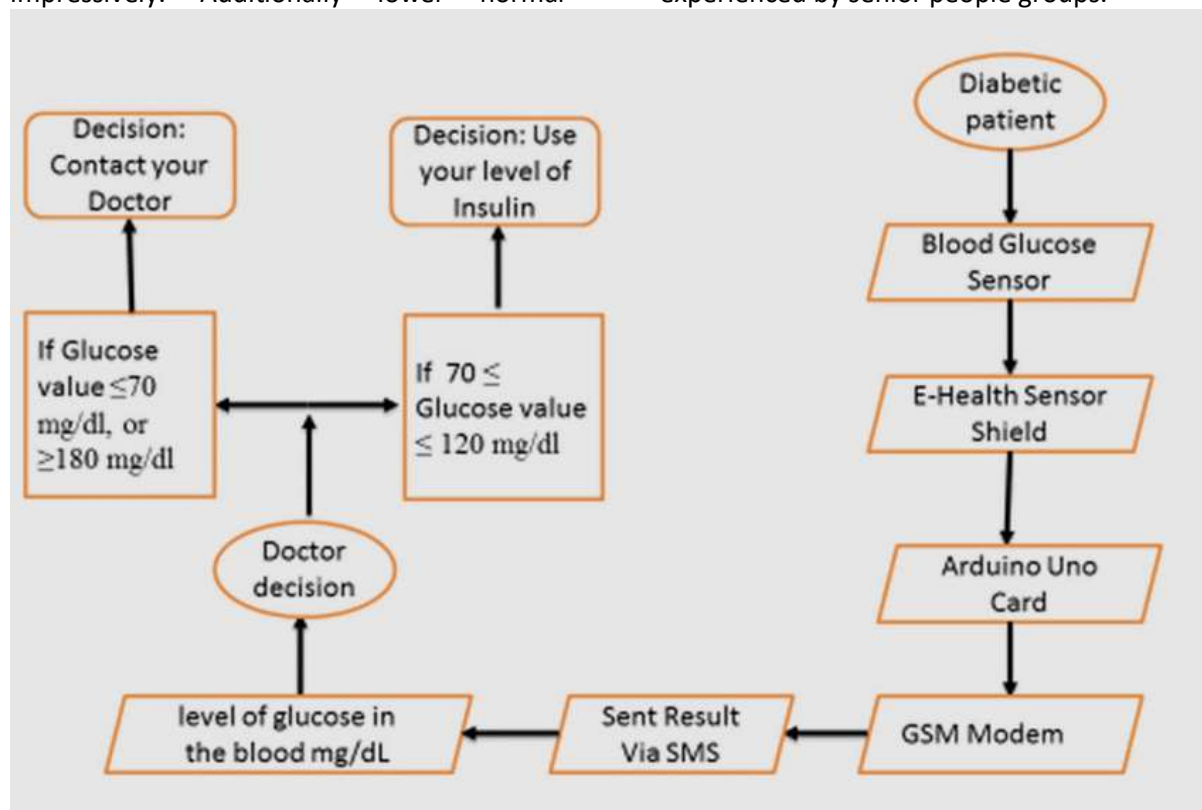


Fig.1: Elderly Care Monitoring using IOT and Deep Learning Flow Chat.

For senior grown-ups, a fall could be profoundly dangerous and could cause serious medical problems. Furthermore, absence of equilibrium and fall may be side effects of a perilous sickness. By and by of the reason for a fall, it very well may be basic in the event that it works out, the harmed individuals should get fast assistance. As often as possible, the individual probably won't have the option to ascend with no help and could require quick clinical thought.

Unreported cases bring about the fall of injury that might include prior medicines. Feeling of

dread toward falling expands the pessimistic post fall impacts and may diminish patient certainty [4]. Thus, it restricts the patient's exercises, diminishes social communication, lastly causes sadness [5, 6]. Individually, it helps to diminish treatment expenses and raise the chance of recuperation.

Paper Contributions

This paper presents a shrewd IoT empowered old fall location model utilizing ideal profound convolutional brain organization (IMEFD-ODCNN) for brilliant homecare. At the underlying stage, the info video caught by the



IoT gadgets is pre-handled in various ways like resizing, expansion, and min-max based standardization. Besides, SqueezeNet model is utilized as an element extractor and its hyperparameters are tuned by the utilization of SSO calculation. Besides, sparrow inquiry advancement calculation (SSOA) with variational autoencoder (VAE), called SSOA-VAE based classifier is utilized.

The SSO calculation is best attributable to its high proficiency, heartiness, precision, and union rate. The VAE is picked on account of the capacity of learning smooth inert state portrayals of the information. Ultimately, if there should be an occurrence of fall occasion distinguished, the cell phone sends a caution to the guardians and medical clinic the board. A broad arrangement of recreations is done on UR fall location dataset and numerous cameras fall dataset.

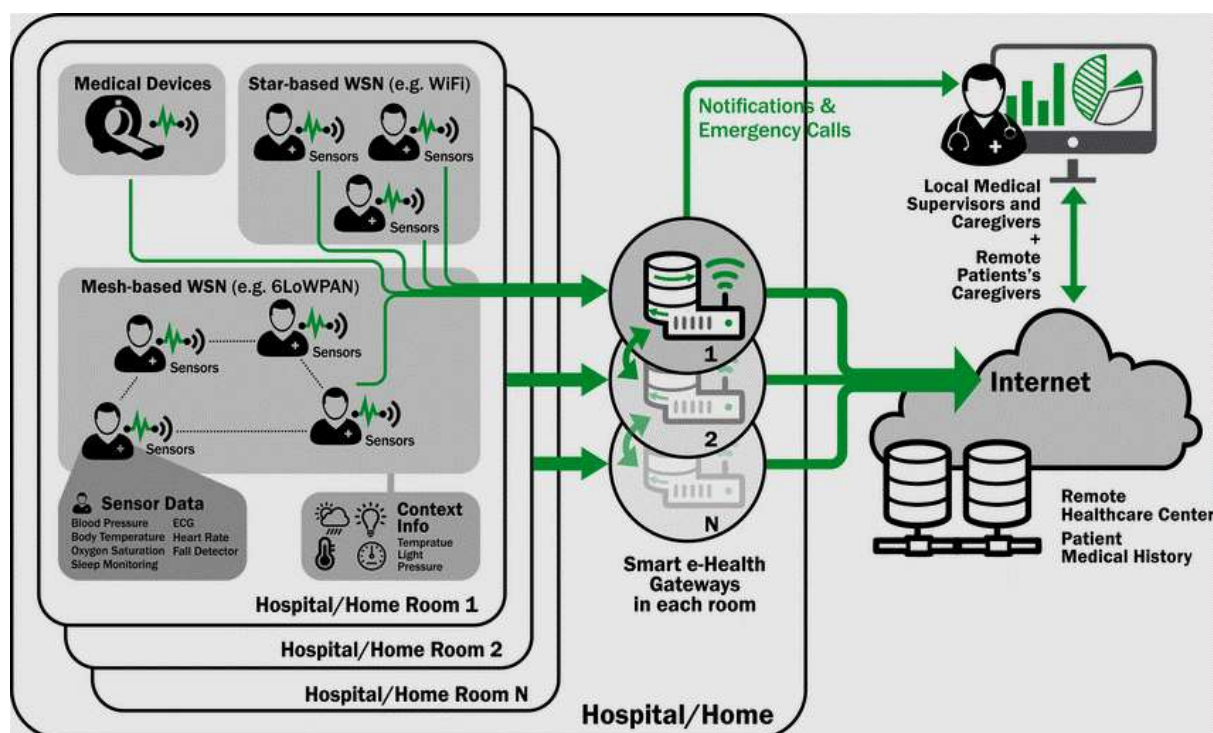


Fig.2: Elderly Care Monitoring using IOT and Deep Learning Process.

SYSTEM ARCHITECTURE

The general framework engineering of the proposed model is portrayed in Fig. 1. The proposed fall discovery model purposes a cell phone for handling. The IMEFD-ODCNN model permits cell phones and shrewd DL calculations to recognize the event of falls in the brilliant home. The proposed IMEFDODCNN model includes unmistakable phases of tasks like information securing, pre-handling, SqueezeNet based highlight extraction, SSO based boundary tuning, and SSOA-VAE based order.

Essentially, the information recordings are caught and are shipped off the cloud server

for extra handling where the proposed model gets executed. The pooling layer, supposed subsampling layer, is slow the convolutional layer. It executes down testing process, with a specific worth as result in unambiguous districts. With the expulsion of inconsequential case focuses from the component map, the size of info include guide of the accompanying layer is diminished, and the calculation intricacy is likewise decreased.

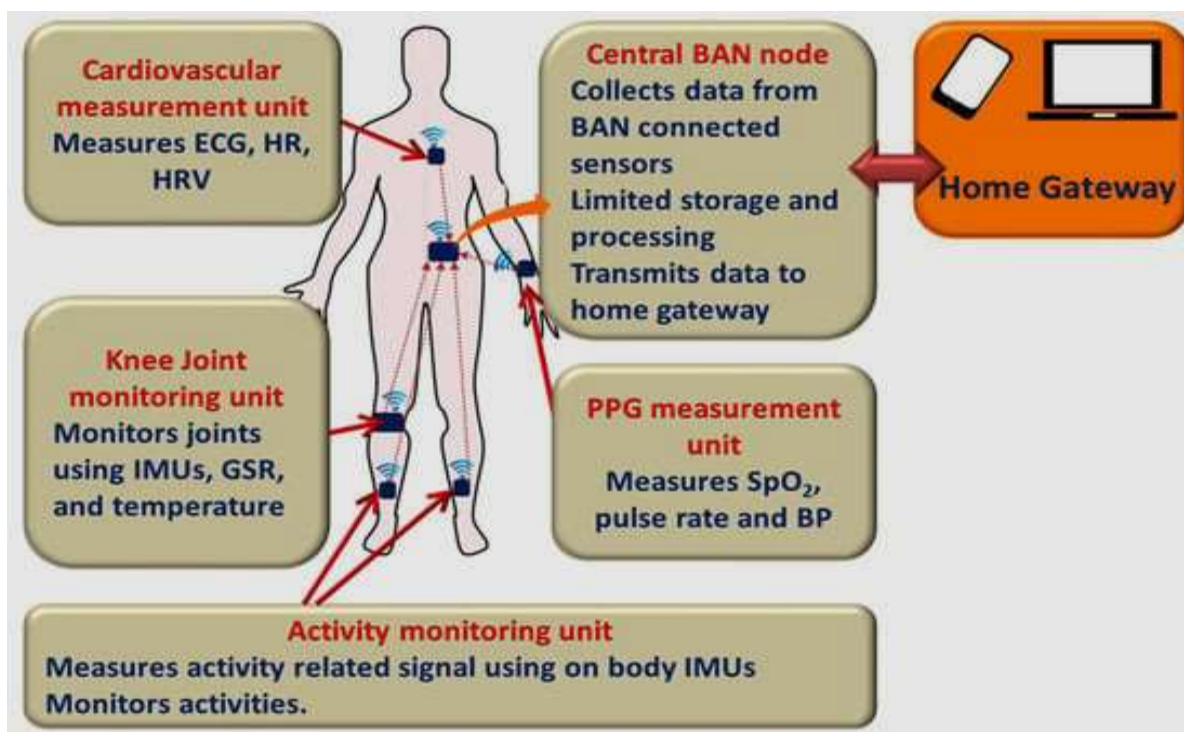
All the while, the adaptability of the organization to the adjustments of picture pivot and interpretation was additionally raised [2][1]. The general pooling activity contains normal and maximal pooling. The



structure is stripping after pooling and convolutional layers could improve the strength of the organization module. The CNN could grow by multi-facet convolutions. By measure of expanding layers, the elements accomplished through learning becomes worldwide. At last, the worldwide component map learned is switched over completely to a vector for interfacing full association layer. All factors in the organization module are in the full association layer.

In the early phase, the edges were pre-handled for working on the qualities of a picture, expulsion the commotion relics, and work on unambiguous gatherings of elements. Right now, the edges were handling from 3 significant levels in particular resizing, expansion and standardization. To diminish the computation cost, the resizing of edges happen from 150×150 . Simultaneously, the edges are increased where the casings are changed at all preparing ages. For enlarging the casings, different models like zooming, even flipping, pivot, width, and level moving. Finally, standardization strategy was executed to improved speculation of the model.

Information Pre-handling



111

Fig.3: Elderly Care Monitoring using IOT and Deep Learning

Squeeze Net Based Feature Extraction

The CNN by and large contains full association layer, convolutional layer, and pooling layer. At first, the element is separated with more than one pooling and convolution layer. Afterward, whole element mappings from the last convolution layer are changed over completely to 1D vectors for full association. Ultimately, the result layer sorts the information pictures. The organization adjusts the weight factors utilizing BP and limits the

square change among the arrangement results and unsurprising result. The neurons in each layer are requested in 3D: profundity, width, and level, where level and width is the size of neuron, and profundity means channel measure of the info picture/how much information highlight mappings. The convolutional layer has numerous convolution channels, remove unmistakable elements from the picture utilizing convolution process.



SSO Algorithm

For tuning the hyperparameters of the SqueezeNet model, the SSO calculation is applied to ideally change the hyperparameters engaged with it. The salps incorporated the arrangement of Salpidae that includes a noticeable barrel molded body. The tissues are indistinguishable from jellyfishes. Too, the movement is indistinguishable from jellyfish, when the water is propelled by a body as drive and heads down the forward path. A numerical portrayal of amassing ways of behaving and populace of not entirely settled. Moreover, no numerical strategy for salp swarm is used for settling improvement issues were multitudes of fishes, honey bees, and insects are generally applied and named to tackle the upgraded issue. For demonstrating the salp chain numerically, the populace is ordered by two classes like Adherent and Pioneer. Right off the bat, pioneer is viewed as salp at the front period of a chain, while the lingering salp is purported supporter. As indicated by the names, the salps addresses pioneer guide the multitude where the devotee follows one another.

PERFORMANCE VALIDATION

The proposed model is approved utilizing Different cameras fall dataset [2][5] and UR Fall Location (URFD) dataset [2][6]. The first dataset includes 192 recordings where 96 recordings go under fall occasions and 96 recordings go under non-fall occasions. The second dataset has front facing arrangement of 314 edges, where 74 casings come into fall occasion and 240 casings go under non-fall occasion. The boundary setting of the proposed model is given as follows: smaller than usual clump size: 200, dropout: 0.5, number of stowed away layers:3, and number of stowed away unit A short examination investigation of the IMEFD-ODCNN model with other existing strategies on numerous cameras fall dataset happen.

RESULT

From the figure, it is exhibited that the 1D Conv NN and 2D Conv NN models have shown

unfortunate outcomes with the exactness of 94.3% and 95.5% separately. In accordance with that, the ResNet-50 and ResNet-101 models have achieved respectably nearer results with the exactness of 96.1% and 96.5% separately. Close to that, the Profundity wise, VGG-16, and VGG-19 models have achieved reasonably nearer results with the precision of 97.8%, 98%, and 98% decently. At last, the proposed IMEFD-ODCNN model has displayed unrivaled outcomes with an exactness of 99.76%.

CONCLUSION

This paper has planned another IMEFD-ODCNN model to distinguish fall occasions in shrewd homecare of older individuals. The IMEFD-ODCNN model permits IoT gadgets and wise DL calculations to recognize the event of falls in the shrewd home. The proposed IMEFD-ODCNN model includes various phases of tasks like information procurement, preprocessing, SqueezeNet based highlight extraction, SSO based boundary tuning, and SSOA-VAE based arrangement. When the fall is recognized, a quick alarm is shipped off the guardians and medical clinic the board.

The use of SSO calculation to choose the hyperparameters of the SqueezeNet model and SSOA calculation for boundary changes of the VAE model serves to further develop the general fall discovery execution significantly. A broad arrangement of reenactments is completed on UR fall identification dataset and various cameras fall dataset. The exploratory outcomes featured the promising execution of the IMEFD-ODCNN model over the new condition of workmanship techniques. In future, the fall discovery execution of the IMEFD-ODCNN model can be worked on by the utilization of cutting edge DL models for characterization process. In addition, versatile and strong renditions of the IMEFD-ODCNN model can be created to help ongoing fall discovery occasions from bad quality recordings.

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