DEEP LEARNING FOR PATTERN RECOGNITION OF FETAL GROWTH USNIG GSA AND FROST FILTER

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Abstract: *Antenatal analysis uses ultrasound to visualize the fetal growth. The accurate pattern recognition is difficult due to noises in the images. In order to improve the pattern recognition accuracy, deep learning for pattern recognition of fetal growth using GSA and frost filter technique is proposed. The DLPRGSFF technique takes the antenatal videos as input for pattern recognition. The antenatal videos are segmented into frames. The DLPRGSFF technique includes three major processes namely preprocessing, feature extraction and pattern recognition. The matching results provide the accurate pattern recognition. Experimental measurement is conducted for analyzing the performance of DLPRGSFF technique against the two state of-the-art methods with different metrics such as pattern recognition accuracy and computational time with respect to a diverse number of images. The results obtained with DLPRGSFF technique is encouraging than other approaches.*

Keywords:Antenatal videos, preprocessing, enhanced frost filtering,feature extraction, Gravitational search algorithm.

1. INTRODUCTION

Human beings are suffering from the dangerous diseasesanddetecting such kinds of diseases at earlystage is essential. Image is a critical part of medical diagnosis.Antenatalimpressions aretransferred into the images or video which is seen on the monitor. Thestructure of the patients mightdiffer based on their obstetric characteristics.Precision recognition plays a major role in clinical diagnosis and decision making. In this work, pattern recognition is done to identify anomalies of fetal growth with the help of optimized deep learning classification technique.

PV-LVNet was introduced in [1] using CNN and frame level feature extraction. However, the PV- LVNet failed to achieve higher accuracywith lesser complexity. Neuro-Fuzzy based on Genetic algorithm was drafted in [2] for anomalies of antenatal fetal growth measurement using ultrasounds images. But the algorithm was not considered the complexity terms of pattern recognition time.In [3] the Gaussian filtering technique was applied for the classification process to minimize the feature extraction time but

the computational complexity was not minimized. Convolutional networks werematured in [4] to boost the segmentation accuracy based on features. But it failed to achieving the higher accuracy.

In [5] multiscale information for escalating the segmentation accuracy to perform the quantitative analysis of the performance metrics but it failed. In [6] AI technology speckle noise removal was unperformed.A deep learning models were developed in [7] for classification of medical images to surge the accuracy and time complexity was failed.

A fetal ultrasound pictures is evolved in [8] here the framework absence was more challenging for researchers. In [9] the gestational age was monitored in a semi-automated system but its performance was low.A two-step transfer learning method was introduced in [10]using filtering technique with more images. The method failed to considermore training images.

A novel DLPRGSFF technique is imported to accomplish accurate pattern recognition which includes different processing steps namely preprocessing, feature extraction and classification.In feature selection and extraction, deeplearning gravitational search algorithm is employed to find the optimal feature. The pattern recognition is done with training feature vector with the help of Gaussian activation function. Based on the matching results, the patterns are correctly recognized with minimum time. Finally, experimental results are carried out with the various related algorithms to discover the attainment improvement of DLPRGSFFtechnique.

2.DEEP LEARNING FOR PATTERN RECOGNITION OF FETAL GROWTH USING GSA AND FROST FILTER

The proposed DLPRGSFFtechnique compose three major processes namely preprocessing, feature extraction and feature matching are implemented in deep learning concept for pattern recognition with higher accuracy and minimum time.

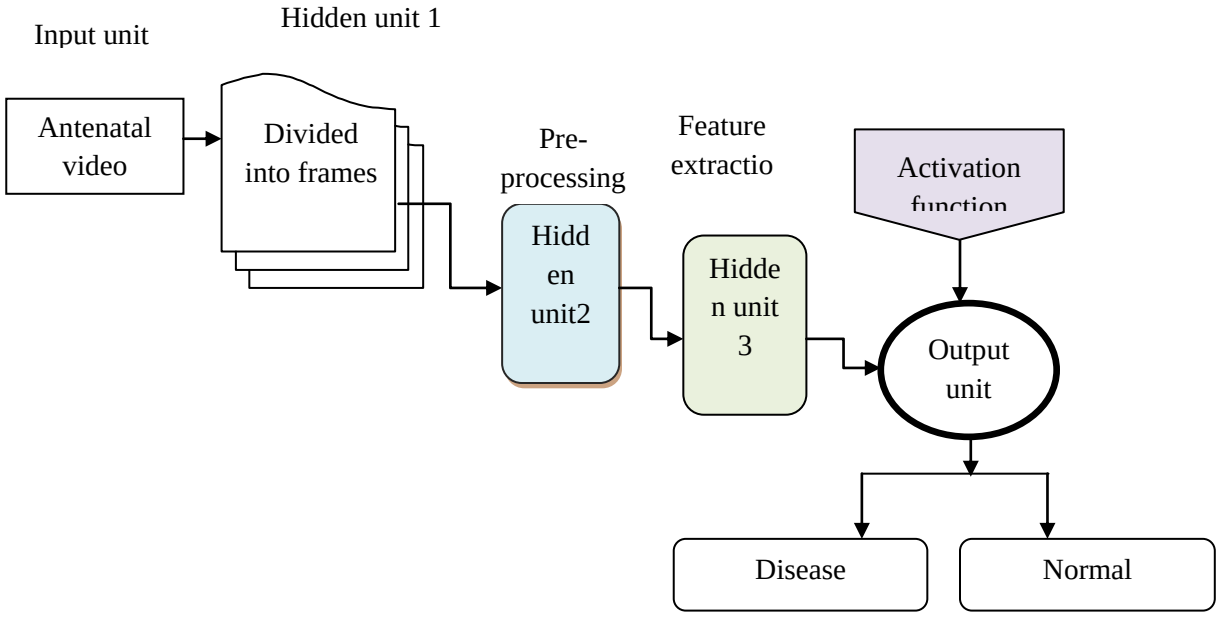

Figure 1construction of the deep learning

Algorithm 1: DEEP LEARNING FOR PATTERN RECOGNITION OF FETAL GROWTH USNIG GSA AND FROST FILTER

Input: Antenatal database, Fetal videos,
Output : Improve pattern recognition accuracy

begin
Given the Fetalvideos into **the** input unit
for each video
divide the frames $f_1, f_2, f_3, \dots f_n$
for each f_i
apply filtering technique D
remove the speckle noise
end for
end for
for each preprocessed f_i
find optimal combination of feature vector
initialize the population of the agents
for each agent 'i'
measure mass $M_i(t)$and fitness $fit_i(t)$
apply fuzzy membership
find best fit and worst fit
select best fit $\arg max\left(fit_j(t)\right)$
update the velocity $V_i^d(t+1)$ and position $P_i^d(t+1)$ of agent 'i' in 'd' dimension at time 't'
repeat process until convergence is met
end for
r**eturn** (optimal combination of feature)
end for
extract the features T, I, S, and C to create a feature vector $'F_v'$
if ($F_v = F_t$) **then**
δ_F returns '1'
learned features vector matched with the testing feature vector
else
δ_F returns '0'
learned features vector not matched with the testing feature vector
end if
calculate the error$R$
update the weights $\Delta\omega_1$, $\Delta\omega_2$, $\Delta\omega_3$
process is repeated until find minimum error
end

The above algorithmic process describes the pattern recognition with higher accuracy and minimum time. The deep structure learning comprises of neurons like nodes in one unit which are connected to another layer to form an entire network. The shift invariant deep structure learning framework includes the cascade of several processing units such as input, one or more hidden unit and output unit. Each successive unit receives the input from the previous unit. The input is transferred from input unit to output unit by the means of multiple hidden units.

3. EXPERIMENTAL SETTINGS AND RESULTS DISCUSSION

In order to estimate the performance of DLPRGSFF technique and the two existing classification methods namely PV-LVNet [1], Neuro-Fuzzy based on Genetic algorithm [2] are implemented in the MATLAB using Antenatal videos taken from the performance evaluation of the proposed system. The dataset of fetal ultrasound is available online on http://www3.medical.philips.com is considered as benchmark for public use for experimental study and research. Initially, the input images are divided into number of frames with various sizes for accurate pattern recognition.The description of the various parameters are listed below,

- Pattern recognition accuracy
- Computation time

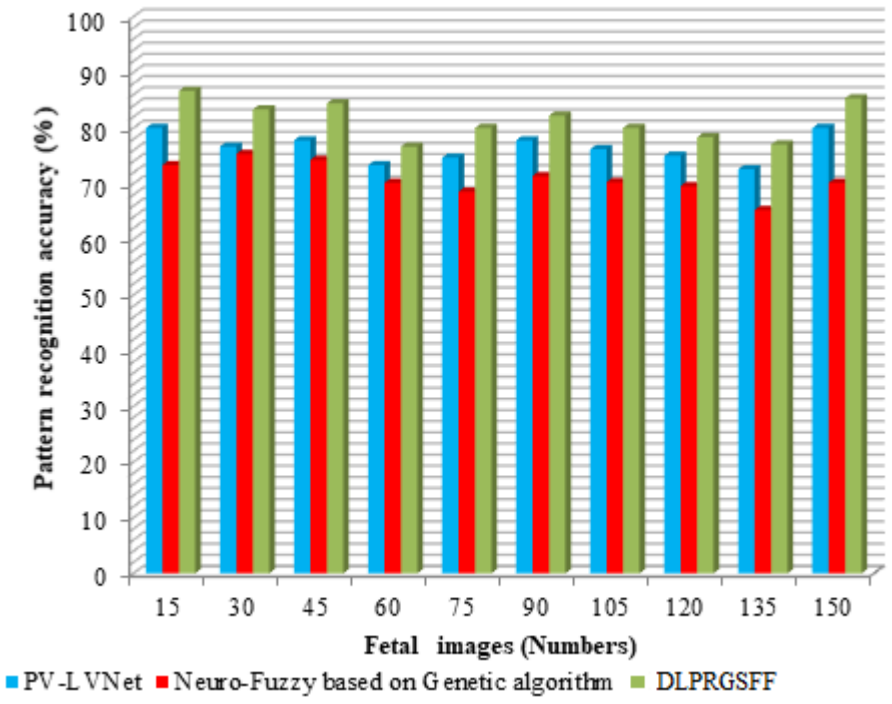

Figure 2 pattern recognition accuracy comparisons

Figure 2 demonstrates the pattern recognition accuracy comparison versus various input images.

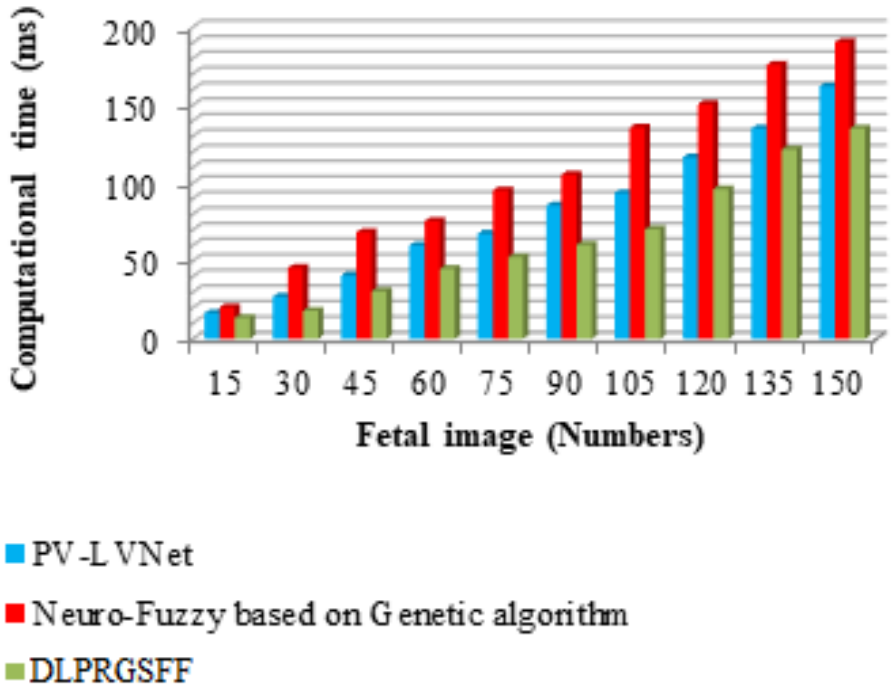

Figure 3 performance comparison of computational time

4. CONCLUSIONS

In this paper, a novel DLPRGSFF technique is introduced for providing accurate pattern recognition with lesser time using antenatal image.Experimental evaluation is conducted to estimate the performance of the proposed DLPRGSFF technique and two conventional approaches. The result reflects that the quantitative measure of DLPRGSFF technique outperforms better than state-of-the-art worksin terms of higher pattern recognition accuracy with lesser computational time.

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