

# Classification of Skin Cancer Diagnosis Using Artificial Neural Network technique with Particle Swarm Optimisation

Gurinder Kaur Sodhi , Research Scholar , Desh Bhagat University , Mandi Gobindgarh,Punjab ,  
India

Dr S .Chatterji , Retired Professor and Head Electrical Engineering Department , NITTTR ,  
Chandigarh , India

Dr Nipun Sharma , Professor , Desh Bhagat University , Mandi Gobindgarh,Punjab , India

## Abstract

Skin cancer is one of the most dangerous type of cancers, and is more likely to spread to other parts of the body if not diagnosed and treated early. Detection of Melanoma in its early stages is extremely challenging to doctors. Today's technological advancements have made it possible for early detection of skin cancer. In the proposed work the Artificial Neural-Network with Particle Swarm Optimisation have been implemented for early detection of skin cancer and its classification. This paper discusses and explains in detail the Artificial Neural- network technique with Particle Swarm Optimisation that is used for classification of the image with and without Particle Swarm Optimisation using accuracy parameter. The results have been evaluated using the Artificial Neural- network technique with Particle Swarm Optimisation using accuracy parameter. Evaluated results has been compared with the Artificial Neural-network technique and Artificial Neural- network with Particle Swarm Optimisation technique using accuracy parameter.

Keywords : Artificial Neural- network with Particle Swarm Optimisation, Skin Cancer , accuracy parameter

## I Introduction

Skin is the outmost organ in human body and covers outer part of human peripheral boundary. Skin is a most delicate membrane consisting of various layers which pertains to osmosis and diffusion between subsequent layers. Due to more penetration towards cancerous elements; skin is also not out of reach and in fact more prone to outside elements and develop different types of cancers. Different types of skin diseases and cancers have developed the past few years. Due to various complexities; skin cancer is difficult to detect in its early stages and cancerous cells are found on proximity layer of the skin considering epidermis. These

epidermises are on the outer side of the body and occur normally due to penetration of UV rays. It is somehow believed that exposure to sun creates malignant cells but the only reason behind this is the exposure to ultraviolet rays which give rise to development of cancerous cells. Cancerous cells are those which don't have a normal life span and the rate of developing and dying is abnormal. It has been found that cancerous cells are still alive even after the death of the host. Skin cancer also follows the same terminology having change in functionality, and changes in colour, odor even though; these changes can also occur due to change in temperature. It has been observed that

Skin cancer belongs to undying cells and uncontrolled growth of cells, leading to abnormal behaviour and outer layer of skin, known a melanoma get burnt and show sunburn appearance.

## II Artificial Neural Network

Artificial neural- network is similar to human brain and comprises same elements of human brain and nervous system like dendrites, axon and synapses and different neural elements in storing information. Neural systems are not different in their characteristics but limited to training sets as they learn from their convergence and differentiate between real and complex problems and evolve with different problems. The main advantage of these systems is their ability to modify and search different attributes to solve a specific problem. It can't be tested with the help of predefined steps and processes but acts as biological framework with unlimited constraints applied to various fields of different structure and different types of learning mechanisms. Every problem has a specific attribute with specific goals and different subsets, therefore, these systems behave differently and are trained in a manner comprising input, output and hidden layers where all trained parameters are subjected to hidden layer constraints. Likewise, in Image processing, every image is different and their segregation mechanism depends upon their application thus, these systems are best suited for such applications and keep evolving with

trained mechanisms maintaining flexibility in their characteristics.

The purpose of an artificial neural-network like that of a biological neural-network is to map an input into a desired output. The iteration level and processing power of ANN can be increased exponentially with collection of neurons, a basic element of human brain for storing information and used in medicines as applications of neural-networks like ANN.

## III Proposed work

The proposed work is to analyze the Artificial Neural- network technique with Particle Swarm Optimisation that is used for classification of the image with and without Particle Swarm Optimisation using accuracy parameter There are various steps involved in evaluation of accuracy parameter for classification of skin cancer diagnosis. The steps involved for diagnosis process is as shown in figure 1 :

- (a) Preprocessing
- (b) Segmentation
- (c) Feature extraction
- (d) Classification

Fig.1 shows the basic steps of skin cancer diagnosis

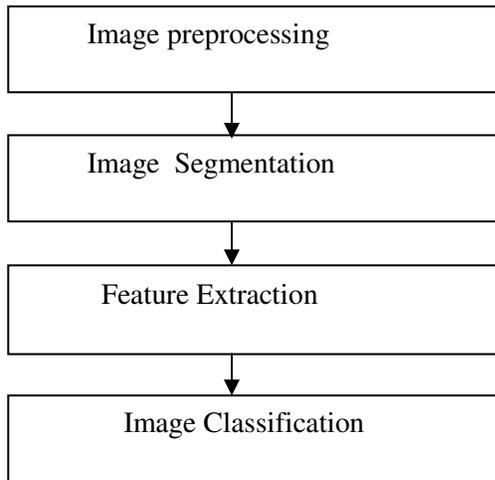


Fig. 1 Basic Steps of Skin Cancer Diagnosis

#### IV Particle Swarm Optimisation

It is an Evolutionary Computation (EC) technique that reproduces the social lead of the swarm in nature. More especially, PSO is an iterative estimation that relies upon finding the space and choosing the perfect plan of a goal work or objective (fitness function). A concept for the optimization of non-linear functions using particle swarm methodology along with relationship between artificial life and genetic algorithms is most highlighted in various research studies. This kind of optimization is used to find an iterative solution after annealed analysis find an optimum solution or modified solution with respect of its accuracy and precision. It has been observed from various research studies that population size and type of function, whether linear or non-linear doesn't act as a catalyst or hindrance in solving a defined problem. Particle Swarm optimization is

a kind of swarm technique which deals with defined and pre-defined parameters which converges to an optimal solution where other methods fail to converge or do not produce required results in terms of deviation and parameterization

#### V Results

Fig.2 (a) , (b) , (c) , ( d ) shows the ME<sub>0</sub>C, ANN, ANN -PSO with accuracy parameter of 1<sup>st</sup> image count , 2<sup>nd</sup> image count , 3<sup>rd</sup> image count , 4<sup>th</sup> image count ,

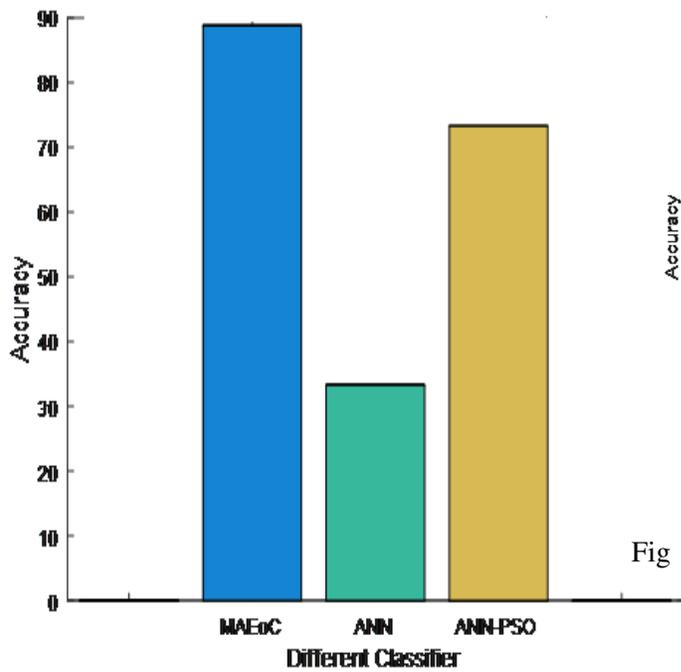


Fig 2. (a) ME<sub>o</sub>C, ANN, ANN -PSO with accuracy parameter of 1<sup>st</sup> image count

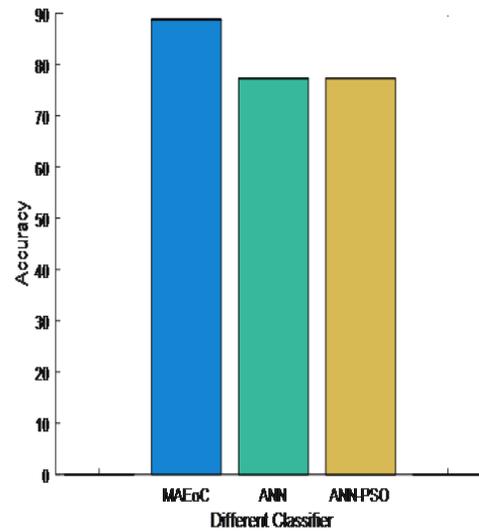


Fig 2. (c) ME<sub>o</sub>C, ANN, ANN -PSO with accuracy parameter of 3<sup>rd</sup> image count

**Table 1 Evaluated Results regarding of Ostu and Ostu – BAT Thresholding With various parameters**

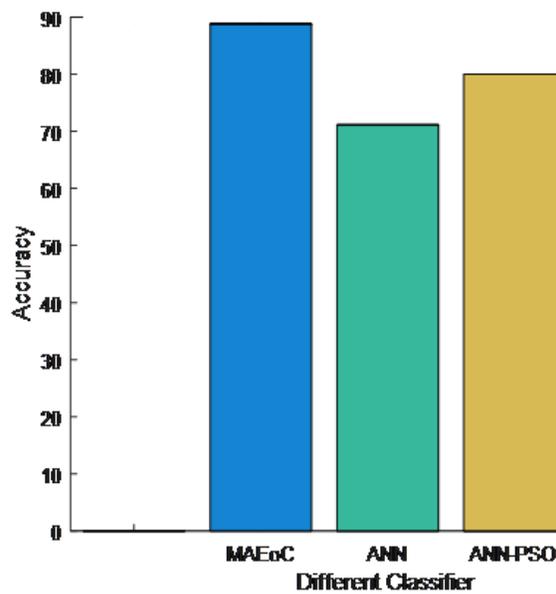


Fig 2 (b) ME<sub>o</sub>C, ANN, ANN -PSO with accuracy parameter of 2<sup>nd</sup> image count

Parameter	Image 1		Image 2		Image 3		Image 4	
	A	ANN-PSO	ANN	ANN-PSO	ANN	ANN-PSO	A	ANN-PSO
Accuracy	33	73.3	68.57	76	73.42	80	76.84	87.06

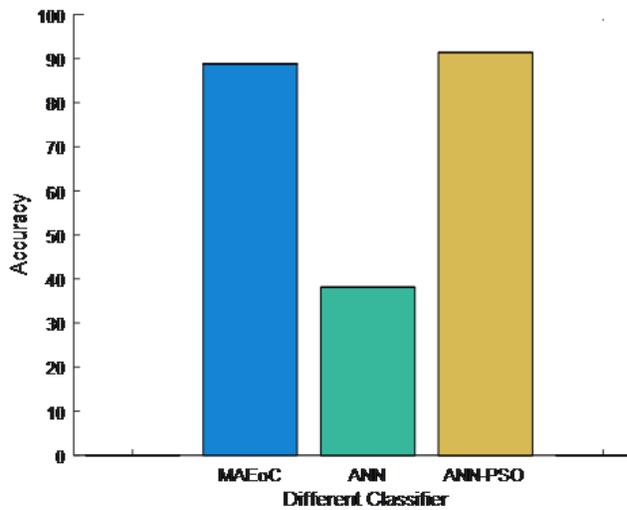


Fig 2. (d) ME<sub>o</sub>C, ANN, ANN -PSO with accuracy parameter of 4<sup>th</sup> image count

## 5 CONCLUSION

By evaluating the results with Artificial Neural- network technique with and without Particle Swarm Optimisation using accuracy parameter it is concluded that accuracy for ANN-PSO is more than ANN . From the evaluated results it is concluded that ANN-PSO has good accuracy as compared to ANN which helps more in classification of diagnosis of skin cancer.

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