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Evaluating The Clinical Domain With Data Mining Using Classification And Regression Tree (Cart) & Particle Swarm Optimization (Pso) Method

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Abstract:

Disease management programs, which use no advanced information and computer technology, are as effective as telemedicine but more efficient because less costly. We proposed a platform to enhance effectiveness and efficiency of home monitoring using data mining for early detection of any worsening in patient's condition. These worsening could require more complex and expensive care if not recognized. The paper is to describe the remote health monitoring platform which is designed and realized that supports heart failure severity assessment offering functions of data mining based on CART and PSO method. In this paper, existing method (CART) is applied to detect heart failure which takes more time and more memory to produce the result. Proposed PSO method takes less time and less memory compare to CART. Thus PSO is best suitable to detect heart failure.

Key words:*Particle swarm optimization (PSO), Classification and Regression Tree (CART), data mining (DM), heart failure (HF), heart rate variability (HRV), home monitoring (HM).*

1.Introduction

Swarm intelligence is the emergent collective intelligence of groups of simple agents. Each agent can interact with its local environment and other agents, but acts independently from all other agents. In swarm intelligence two families of algorithms clearly stand out in terms of the amount of work published, degree of current activity, and the overall impact on industry. One such family is inspired directly by the pheromone-trail following behaviour of ant species, and this field is known as Ant Colony Optimization (ACO). The other such family is inspired by flocking and swarming behaviour, and the main exemplar algorithm family is known as Particle Swarm Optimization (PSO).

2.Existing Methodology

Classification And Regression Trees (Cart) are binary decision trees, which split a single variable at each node. The CART algorithm recursively goes though an exhaustive search of all variables and split values to find the optimal splitting rule for each node. The classification tree construction by CART is based on binary splitting of the attributes. It uses gini index splitting measure in selecting the splitting attribute. Pruning is done in CART by using a portion of the training data set. CART uses both numeric and categorical attributes for building the decision tree and has in-built features that deal with missing attributes. CART algorithm is applied to detect heart failure which takes more time to produce the result.

3.Proposed Methodology

PSO is a computational method that optimizes a problem by iteratively trying to improve a candidate solution with regard to a given measure of quality. A swarm of particles moves through the problem space, with the moving velocity of each particle represented by a velocity vector. At each step, a function representing a quality measure is calculated by using as input. Each particle keeps track of its own best position, which is associated with the best fitness it has achieved so far in a vector. The best position among all the particles obtained so far in the population is kept track as output. In addition to this global version, another local version of PSO keeps track of the best position among all the topological neighbors of a particle.

3.1.PSO Algorithm

1. [x*] = PSO()
2. P = Particle_Initialization();
3. For i=1 to it_max
4. For each particle p in P
5. fp = f(p);
6. If fp is better than f(pBest)
7. pBest = p;
8. end
9. end
10. gBest = best p in P;
11. For each particle p in P do
12. v = v + c1*rand*(pBest – p) + c2*rand*(gBest – p);
13. p = p + v;
14. end
15. end

PSO applied to detect heart failure, which takes less time to produce the result.

4.Result And Discussion

In this thesis, status of heart problem is detected using CART and PSO algorithm.

SNO	DATASET NAME	AVERAGE TIME (Milli Secs)		MEMORY USAGE (KB)	
		CART	PSO	CART	PSO
1	Dataset1	292.44	187.44	30.231	16.507
2	Dataset2	324.12	199.28	25.103	14.310
3	Dataset3	305.5	190.48	31.234	16.705
4	Dataset4	284.5	177.04	27.342	15.543

Table 1 : Average time and Memory usage of CART and PSO

The comparison chart of performance analysis for CART and PSO Algorithms

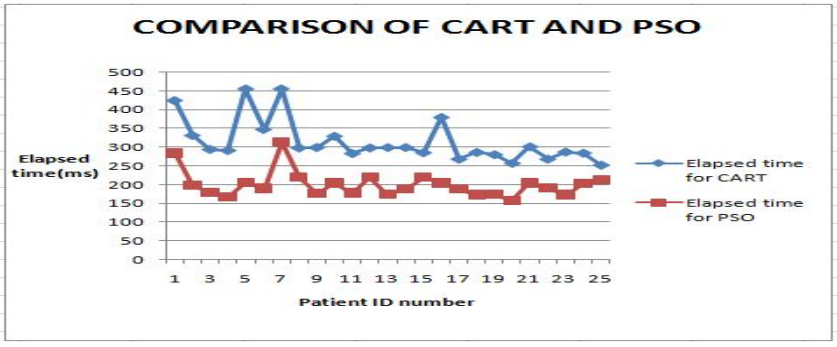

Figure 1: COMPARISON OF CART AND PSO(Time)

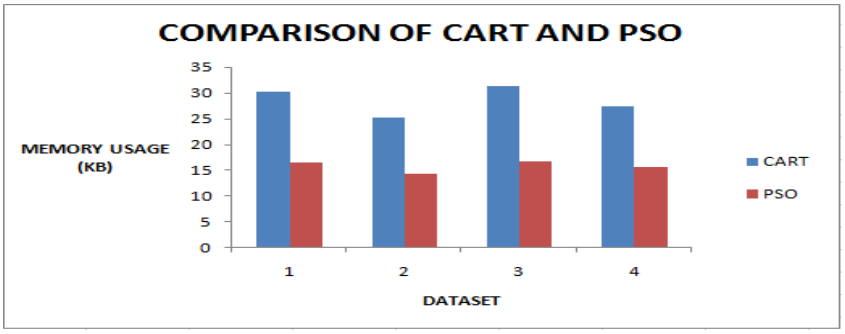

Figure 2: COMPARISON OF CART AND PSO(Memory Usage)

In this thesis, existing method (CART) is applied to detect heart failure which takes more time and more memory to produce the result. Proposed PSO method takes less time and less memory compare to CART. Thus PSO is best suitable to detect heart failure.

5.Conclusion

Health monitoring is to detect heart failure earlier of healthcare services. Disease management programs, which use no advanced information and computer technology, are as effective as telemedicine but more efficient because less costly.

In this thesis use two types of algorithms CART and PSO. Classification And Regression Trees (CART) is binary decision trees, which split a single variable at each node. CART algorithm takes more time and more memory to produce the result. By comparing the performance between CART and PSO, PSO algorithm produces the best result in less time and which occupies less amount of memory. Thus PSO is best suitable for medical domain applications.

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