

An efficient Association based Optimization technique for Web pages

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Abstract

The websites popularity is increasing in all areas. Because of ease in use, data gathering, sharing, business everything is possible through World Wide Web (WWW). So the website ranking and optimization determines that which website is open first and shown in the Google search. The traffic determination and their optimization is a challenging issue. So in this paper we have applied association rule mining algorithm has been applied to find the ranking. The ranking has two bases one is for individual and another is for the associated mining. Then we apply ACO and Random weight PSO algorithm for the comparison. By this method we will be able to find the optimized values and the associated values both.

Keywords

Domain, WWW, Data Mining Techniques, Optimization

1. Introduction

The World Wide Web has grown in the past couple of years from a gathering to the best and most conspicuous system for correspondence and information dissipating. Reliably, the WWW gets to be by around a million electronic pages, adding to the numerous millions starting now on-line [1]. WWW serves as a stage for exchanging diverse sorts of information, reaching out from investigation papers, and enlightening substance, to intuitive media substance and programming [2]. The relentless advancement in the size and the usage of the WWW compels new procedures for changing these huge measures of data [3]. Because of its quick and cluttered improvement, the resulting arrangement of information nonattendances of affiliation and structure [4]. Furthermore, the substance is appropriated in distinctive varying plans.

Due to this, customers are feeling here and there puzzled, lost in that information over-weight that returns to augment. Issues that must be overseen of relevant information, including the looking for and indexing of the Web content, the arrangement of some meta learning out of the information which is available on the Web, and the having a tendency to of the individual customers' prerequisites and redirections, by modifying the gave information and administrations[5]. There are a few methods are utilized as a part of the heading of page positioning. K-means grouping, fluffy C-means and enhancement strategies are utilized as a part of a few examination work like [6][7][8][9][10]. This additionally incorporates the utilization of affiliation principle mining as the significant information ought to be separated [11][12][13][14][15]. The same strategy with diverse method for improvement is proposed in [21]. As the mining concentrate the learning from the colossal database and it is additionally helpful in gathering taking into account closeness name's and class which can be a superior apparatus for understanding and portraying the information from the wellspring of activity. This phenomena is likewise proposed in [15] [16] [17] [18] [19] [20] [22][23][24][25]. Our principle inspiration of this exploration work is to apply enhancement methods with information mining system to attain to aggregate streamlined rank.

2. ACO and PSO

The Ant Colony Optimization (ACO) [26][27] algorithm is a meta-heuristic which is a grouping of distributed environment, positive feedback system, and systematic greedy approach to find an optimal solution for combinatorial optimization problems. This algorithm tries to mimic the ant's behavior in the real world. The Ant Colony Optimization algorithm is mainly inspired by the experiments run by Goss et al. [34] which using a grouping of real ants in the real environment. They study and observe the behavior of those real ants and suggest that the real ants were able to select the shortest path between their nest and food resource, in the existence of

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alternate paths between the two. The above searching for food resource is possible through an indirect communication known as stigmergy amongst the ants. When ants are travelling for the food resources, ants deposit a chemical substance, called pheromone, on the ground. When they arrive at a destination point, ants make a probability based choice, biased by the intensity of pheromone they smell. This behavior has an autocatalytic effect because of the very fact that an ant choosing a path will increase the probability that the corresponding path will be chosen again by other ants in the next move. After finishing the search ants return back, the probability of choosing the same path is higher because of increasing pheromone quantity. So by the pheromone will be released on the chosen path, it provides the path for the ants. In short we can say that, all ants will select the shortest path. If we analyses the case then we observed that because of the same pheromone laying the shortest path will be chosen. It will be starts with first ants which arrive at the food source are those that took the two shortest branches. After approaching the food destination these ants start their return trip, more pheromone is present on the short branch is the possibility for choosing the shortest one than the one on the Long Branch. This ant behavior was first formulated and arranged as Ant System (AS) by Dorigo et al. [34]. Based on the AS algorithm, the Ant Colony Optimization (ACO) algorithm was proposed [35]. In ACO algorithm, the optimization problem is formulated as a graph $G = (C; L)$, where C is the set of components of the problem, and L is the set of possible connections or transitions among the elements of C . The proposed solution is represented in terms of feasible paths on the graph G , with respect to a set of given constraints and predicate. The population of ants that is also called agents collectively solves the problem under consideration using the graph representation. We assume that the ants are probably very poor of finding a solution, good quality solutions can emerge as a result of collective interaction amongst ants. Pheromone trails encode a long-term memory about the whole ant search process from the starting to the food resource destination. The value depends on the problem formulation, representation and the optimization objective which is different in case to case.

The algorithm presented by Dorigo et al. [28] was given below:

Algorithm ACO metaheuristic ();
while (termination criterion not satisfied)

ant generation and activity();
pheromone evaporation();
daemon actions();
“optional”
end while
end Algorithm

Particle Swarm Optimization (PSO) [28][29] gained from the situation and utilized it to take care of the improvement issues. In PSO, each one single arrangement is a "fledgling" in the hunt space. We call it "particle". All of particles have wellness values which are assessed by the wellness capacity to be upgraded, and have speeds which administer the flying of the particles. The particles fly through the issue space by emulating the current ideal particles. PSO is introduced with a gathering of arbitrary particles (arrangements) and afterward hunt down optima by redesigning eras. In every cycle, every particle is overhauled by taking after two "best" values. The first is the best arrangement (wellness) it has accomplished as such. (The wellness quality is likewise put away.) This worth is called pbest. An alternate "best" esteem that is followed by the particle swarm analyzer is the best esteem, acquired so far by any particle in the populace. This best esteem is a worldwide best and called gbest. At the point when a particle partakes of the populace as its topological neighbors, the best esteem is a neighborhood best and is called lbest. In the wake of discovering the two best values, the particle upgrades its speed and positions with taking after comparison (a) and (b).

$$v[] = v[] + c1 * rand() * (pbest[] - present[]) + c2 * rand() * (gbest[] - present[])$$

$$present[] = present[] + v[]$$

 (b)

$$v[]$$
 is the particle velocity, $present[]$ is the current particle (solution). $pbest[]$ and $gbest[]$ are defined as stated before. $rand()$ is a random number between (0,1). $c1$, $c2$ are learning factors. usually $c1 = c2 = 2$. The pseudo code of the procedure is as follows

For each particle
Initialize particle
END
Do
 For each particle
 Calculate fitness value
 If the fitness value is better than the best fitness value (pBest) in history
 set current value as the new pBest
 End
 Choose the particle with the best fitness value of all the particles as the gBest

For each particle

Calculate particle velocity according equation (a)

Update particle position according equation (b)

End

While maximum iterations or minimum error criteria is not attained Particles velocities on each dimension are clamped to a maximum velocity Vmax. If the sum of accelerations would cause the velocity on that dimension to exceed Vmax, which is a parameter specified by the user. Then the velocity on that dimension is limited to Vmax.

3. Implementation

The data has been gathered from google trends. This data is first extracted from google trends. This data is then converted into rows and columns. Then association rule mining algorithm has been applied to find the ranking. The ranking has two base one is for individula and another is for the associated mining. The principle purpose of web utilization mining is to watch the behavioral examples of clients interrelating with a site. The found examples are by and large described as a gathering of pages, articles or assets which are consistently gotten to by gatherings of clients with normal diversions. So the investment areas have been found by Apriori calculation. Then we apply ACO and Random weight PSO algorithm. Each ants and particle knows its best value so far (pbest) and its position in case of Iteartive PSO. Here the ants and the particles are assumed to as the item set values. This data is similarity of individual encounters of every molecule. Also, every molecule knows the best esteem so far in the gathering (gbest) among pbests. This data is relationship of information of how alternate particles around them have performed. Every molecule tries to adjust its position in light of current positions, current speeds, remove between the current position and pbest and separate between the current position and gbest. The primary target of this research paper is to discover the upgraded patterns in a year which can help to anticipate alternate pages on the same website in this admiration through the month. For this first apriori calculation is connected. By apriori calculation continuous examples are discover so that in light of an obliged least bolster esteem a set can be qualified. Then we apply aco and pso for checking the optimized value up to the 11 month specified. The algorithm is shown below. The termenology used are PS for particleset, PS1, PS2 is for particleset1, particleset2 etc. GS for groupset, GS1,GS2 for the

group set values. RV is used for result values. S_{AC} is for the self accuracy.

ACO [33]

Input:

- PS(ps1,ps2....psn)
- GS(Gs1,Gs2....Gsn)

Output:

- RV1.....RVn

Step 1: Input Set

Step 2: Initialize pheromone as the trends obtained month wise

Step 3: Check the PS pheromone set for the relevancy

For 1 to 5

$$T_v = (PS_1 + PS_2 + PS_3 + \dots + PS_n) / n$$

$$P_t = T_v - E_p$$

$$E_p = \{0.2, 0.4, 0.6, 0.8\}$$

If ($P_{t1} > P_{tm-1}$)

$$P_{t1} = P_{tm-1}$$

Step 4: Final set

For 1 to 5

$$T_v = (T_1 + T_2 + T_3 + \dots + T_n) / n$$

$$P_t = T_v - E_p$$

$$E_p = \{0.2, 0.4, 0.6, 0.8\}$$

If ($P_{t1} > P_{tm-1}$)

$$P_{t1} = P_{tm-1}$$

Step 5: Overall Accuracy

$$S_{AC} = \sum P_{t1} / n$$

Step 6: Finish

Then we apply particle swarm optimization for the comparison. The algorithm is shown below:

Random PSO [21]

Input:

- PS(ps1,ps2....psn)
- OS(Or1,Or2....Orn)

Output:

- ET1.....ETn

Ps → Particles

OS → Optimal Set

ET → Efficient Trails

V → Velocity

RV → Random Velocity

RV_p → Previous Random Velocity

Step 1: Google Trends Values

Step 2: Initialize particle

Step 3: Random Velocity Calculation

for i=0 ;i<=5;i++

RV_i = Math.random();

Step 4: Distribute PS for the below Iteration
do

$$E_v = (PS_1 * RV_1 + PS_2 * RV_2 + PS_3 * RV_3 + \dots + PS_n * RV_n) / n$$

If ($V_{t1} > V_{tn-1}$)
 $V_{t1} = V_{tn-1}$
 $RV_p = RV_i$
 while;
 For 2 to 5
 $T_v = (PS_1 * RV_1 + PS_2 * RV_2 + PS_3 * RV_3 + \dots + PS_n * RV_n) / n - \text{value}(RV_p)$
 $V_{t1} = V_{tn-1}$
 If ($V_{t1} > V_{tn-1}$)
 $V_{t1} = V_{tn-1}$
 Step 5: Overall Accuracy
 $O_{AC} = \sum PS_i / n$
 Step 6: Finish

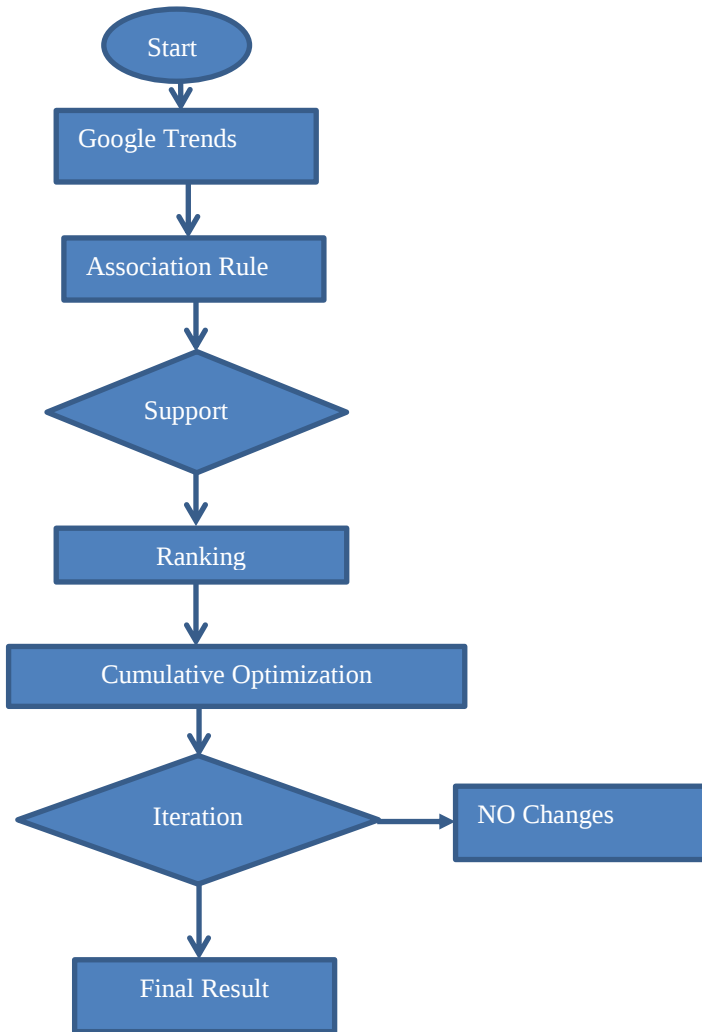


Figure 1: Flowchart

4. Result

The optimized iteration values after ACO and Random weight PSO are shown below.



Figure 2: Associated Rank

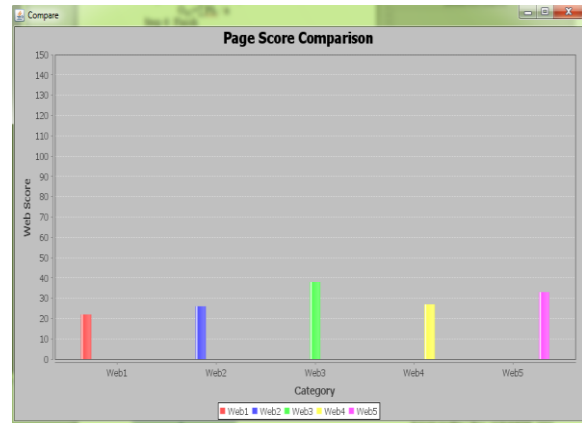


Figure 3: Without Optimization

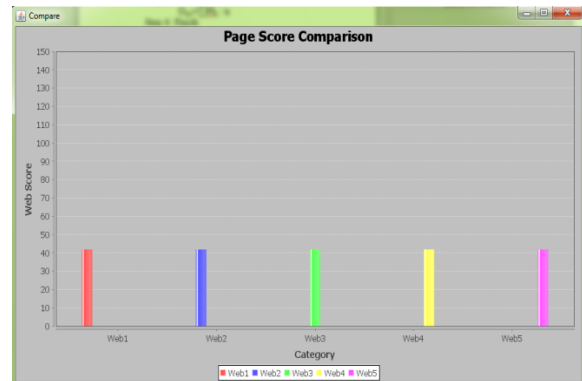


Figure 4: With ACO Optimization

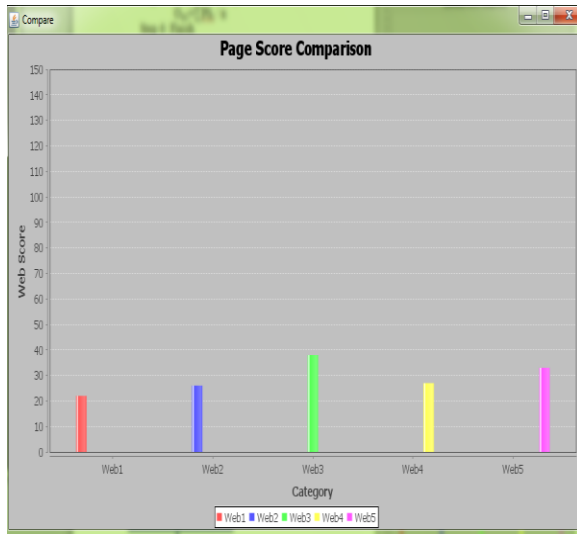


Figure 5: Without Optimization

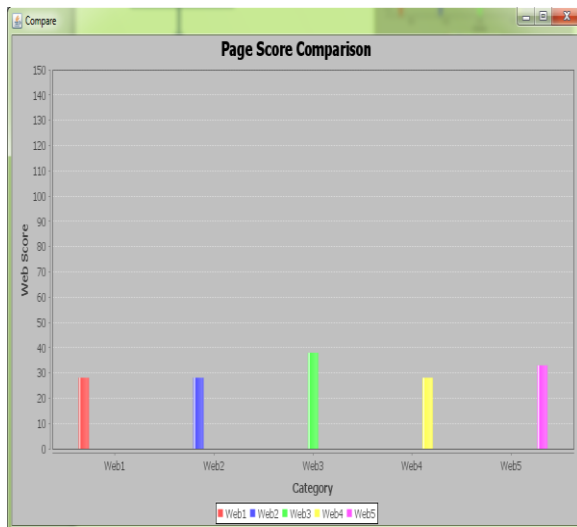


Figure 6: With Random weight PSO Optimization

5. Conclusion

This research paper provides a direction of web mining and web traffic optimization so that the impact have been discussed and analyzed. This research emphasize the focus on the data that can be seen to enhance the optimize value in all respect. The parametric and probabilistic changes has been notices and discussed. We have applied ACO and Random weight PSO to analyzed the web data and find the overall optimized ranking. The result suggests the

chances of optimized ranking are equal with ACO and Random weight PSO.

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