

Finding Optimized Frequent Pattern using Genetic Algorithm

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Abstract: Data mining plays an important role for framing association rules between the huge sets of gathered data. Association between sets of items or entities in transaction, relational database and other data warehouse as well as their frequent patterns can be discovered by using association rules. However, the limitations in using association rules are that it takes too much time to figure out all the frequent itemsets. It is therefore, weblog mining techniques with Genetic Algorithms (GA) are used to find information patterns from the web data with much lesser time in comparison to association rules. By the using GA the outcome of association rule mining and behaviour analysis is improved. GA are powerful and extensively related to stochastic search and optimization technique created on the model of universal selection and evaluation. The aim of this paper is to observe all the frequent itemsets, patterns and produce the association rules from the huge datasets by use of proposed evolutionary algorithm.

Keywords: Frequent Patterns, Databases, Behaviour Analysis, Patterns, Genetic

I. INTRODUCTION

With the introduction of World Wide Web, lots of information are being exchanged amongst different users for different purposes. Yet, the challenge lies to provide the exact data to the correct searcher. At times, the data retrieved proves moderate or ineffective. However, the accessing desired data over internet might depend on the web clientele accessing abilities also. Extracting the data available on the internet for meaningful purposes is known as data mining. In other words, it can be defined as processing of data to cull out desirable information. Data mining can also be referred as, Knowledge Discovery in Databases or KDD. Data processing task can be divided into two classes: descriptive and predictive. Describing the common assets of the facts in a record is known as descriptive mining whereas performing inferences on the recent data in order to make predictions is known as predictive mining. Weblog mining is a mining technique to mine and find out information from web record and facility by using Apriori algorithm or genetic algorithms to identify the techniques for association rule mining and patterns. In this manuscript ARM algorithm with genetic algorithms has been analyzed through dynamically.

1.1 Association Rule Mining

Association rule mining is used to discover exciting patterns in a dataset. In this relations surrounded by pages accessed by clients in single client sessions are used for analysis. They are of the frame $A \rightarrow B$, which implies there is a solid connection amongst A and B.

An itemset can be defined as a gathering of at least one thing. For example a gathering of k things is called, a K-itemset. To discover the degree to which A and B are connected different intriguing quality measures are utilized. In this article, the accompanying two intriguing quality measures are examined.

Support: Support (Eq. (1)) uncovers the quantities of exchanges containing both A and B and its esteem lie in the range [0, 1].

$$\text{Supp}(A \rightarrow B) = P(A \cup B) \quad [1]$$

Certainty: Confidence (Eq. (2)) gives a small amount of the aggregate number of exchanges that contain B, given that the exchange incorporates A. Its esteem lies in the range [0, 1].

$$\text{Conf}(A \rightarrow B) = P(B|A) = \frac{P(A \cup B)}{P(A)} \quad [2]$$

1.2 Frequent Itemset Mining

An evidence of substance to make possible occur in lots of baskets it is supposed to be “frequent”. To be formal, we suppose there is a number’s, known as support threshold. If I may be set of things, the support for I is the figure of baskets for which I is a subset. We say I is common if its support is s or new.

II. RELATED WORK

Devyani and Pragya proposed [1] for improving the rules generated using traditional association rule mining

techniques. They used two popular association rule mining technique namely Apriori and FP-tree to optimize the association rule both these algorithms were utilized with the similar datasets and compared the obtained results. Vivek et.al., proposed [2] a genetic algorithm based model for profit pattern mining. They applied the idea of benefit design mining with hereditary calculation to produce benefit situated example which assist in future business extension and satisfy the business objectives. Dharmendra Singh *et.al.*, proposed [3] discussed the suitability of genetic algorithm for web document data. Performance studies were conducted to show the execution efficiency and scalability. The proposed procedures resulted in excellent performance. Umesh Kumar Pate *et.al.*, designed a method for generation of strong rule by combining Apriori algorithm with FP growth algorithm. By using the Genetic algorithm the rules were optimized. Yang Xu *et.al.*, proposed the hereditary calculations in light of the tree encoding diagram that extraordinarily decreases the affiliation control seek space. The proposed technique is particularly useful in mining staggered affiliation leads in huge information related applications. Prince Mary and Babura [6] did exploration survey on weblog to find out successive examples of web documents by applying genetic technique. This strategy can be connected to break down the ongoing guest's pattern and prompt the formation of rehashed and most visited pages. The reason for utilizing a hereditary calculation is to influence development to approach for learning extraction and it is additionally more straightforward to execute. It very well may be actualized in a few ongoing applications.

Ghosh *et.al.*, [7] proposed methods to discover visit itemsets utilizing hereditary calculation. The affiliation governs mining calculation like apriori, partition, fp-tree, and so forth produce the continuous itemsets. The basic purpose is to acquaint hereditary calculations to minimize the processing time. Hereditary calculation performs worldwide inquiry to produce the regular itemsets. The time multifaceted nature and memory utilization is less when contrasted with the affiliation control mining calculation in light of the fact that the hereditary calculation is built by the ravenous guess.

Dou W, Hu J, et al., [8] “*Quick Response Data Mining Model Using Genetic Algorithm*”. In this paper, check the database for the genuine help and certainty and show them to clients. Along these lines, our technique can not just spare ordinarily filtering the database and make snappy reaction to clients, however give a well disposed interface that let clients select his fascinating tenets to mine.

Wakabi-Waiswa, P.P., et al., proposed [9] “*Generalized Association Rule Mining Using Genetic Algorithms*”. In this paper, Association manage digging is intended for joining the Genetic Algorithms and Apriori calculation. It yields quick outcomes. It summed up a substantial database

of exchanges, where every exchange contains an arrangement of things, and a grouping on the things, and afterward the relationship between things at any level of the order have been found. It enhances the execution of least help number of things and number of exchanges.

Emine Tug, Merve S, Akirog Lu, Ahmet Arslan., At El Proposed [10] “*Automatic discovery of the sequential accesses from weblog data files via a genetic algorithm*”. This paper is worried about finding consecutive gets to from weblog documents, utilizing 'Genetic Algorithm' (GA). GA is utilized for preparing the information between HTML labels which are put at customer PC. Be that as it may, ALMG extricates data from information which is put at server. It is thought to utilize log records is favourable position for our motivation. Since, we discover the character of solicitations which is made to the server than identify a solitary individual's conduct. We built up an application with this reason. Right off the bat, the application is examined weblog records, than discovered successive got to page bunches naturally.

Ms.Karuna Nidhi Pandagre, Dr S.Veenadhari [11] “*Data Mining Techniques With Weblog: A Review*”. In this paper a comprehensive review of different web mining techniques is being presented with their limitations.

Ms.Karuna Nidhi Pandagre, Dr S.Veenadhari [12] “*Efficient Approach for Finding Strong Patterns from Weblog using Web Usage Mining*”. In this research paper, we proposed an approach for extracting strong patterns from weblog. In this paper, we have proposed an algorithm named SPMW (Strong Patterns Mining from Weblog) algorithm and framework from mining strong patterns from weblog.

III. WEBLOG MINING

Web mining is usually different as discover outing and reading of supportive data beginning the WWW. Web mining fragment into three parts: Web Usage Mining, Web structure mining and Web Contents Mining. Web Contents Mining serves as Identify information within given web pages and distinguishes personal home pages from other web pages. Web structure mining where user interconnection between web pages to give weight to the pages. Web Usage Mining can be as the understand access patterns and the trends to improve structure. The result of the WUM is utilized in web personalization, recovering performance of system, site alteration, usage description etc. Web log file could be a server log file that could be an elementary knowledge sources in Web usage mining, in which it include -access logs of the network server. The significant step in the WUM is Data Preprocessing segment. It includes of data cleaning, session identification, user identification, path completion.

Information pre-processing is important walks to

decipher natural system server sign into arranges client sessions once expelling deficient, uproarious information and break the log document into client sessions. Web server log report could have missing information, URLs that have picture, sound or video expansions; records with exclusion status code are evacuated amid information cleaning to produce clean information. The web server log passages are assembled into client sessions, where every session alludes to the unit of collaboration between a web client and a web server.

3.1. Formation of weblogs

Characteristic composition (ASCII) records are web server records and are open from the server. About we find an amount of contrasts in server virtual products, yet frequently there are four sorts of server logs:

- Transfer (get to) log
- Error log
- Referrer log
- Agent log

Here initial two documents are standard. The referrer and operator log happen or not occur is "turned on" at the server or could be added to the exchange log document to assemble an "expanded" log record organize.

All HTTP convention activity, it might be finished up or not, it is kept up in the logs, and various associations are kept up in extra than one log. For instance, principally HTTP blunders are kept up in transmit log and the mistake log. This kind of succession created in a 'broadened design' transmit log document is analyzed.

Regular log record in an individual column is exhibited in Figure 2 and its allegories are uncovered in Table 1. This normally shows as one long queue of ASCII content, isolated by tabs and spaces (helpful for bringing in it into a spreadsheet program).

```
192.168.1.73- - [17/Apr/2018:15:25:40 +0500] "GET/index.html
http/1.0" 404 304
"http://www.careercollegeindia.com""Chrome/6.6.346 (compatible;
MSIE 5.0; Windows 2007; DigExt)"
```

Figure 1. Common log file in an individual row.

IV. GENETIC ALGORITHM

This idea seems first in 1967 in J. D. Bagley's thesis "The manners of robust systems that use Genetic and Correlative Algorithms. The speculation and relevance was then powerfully influenced by J. H. Holland, who is thought of

because the establisher of genetic algorithms. Since then, this field has witnessed an amazing development. The aim of this lecture is to provide a comprehensive summary of this category of different ways and their applications in optimization, program induction, and machine learning. John Holland and his students and colleagues at the University of Michigan developed GA in 1970, where David E. Goldberg has since been tried on various optimization issues with a high degree of success.

Genetic Algorithm is regularly used to discover optimal or near-optimal solutions to hard effort which otherwise would take a lifetime to explain. It is a search-based optimization method based on the principles of Genetics and Natural Selection. It is regularly used to solve optimization trouble, in research, and in machine learning.

In the year 1992, John Koza used Genetic Algorithm to develop programs for perform various jobs and this defined as Genetic programming and it is also an element of evolutionary computing. "Survival of the Fittest" inspired by theory of Darwin's it is main objective of genetic algorithm.

Genetic algorithm operators are as follows:

Selection: Darwin's evolution theory concept, the chromosomes which have high strength ratings are particular from the community to be the parents to crossover that should stay alive and produce fresh offspring.

Crossover: Chromosomal crossover (or crossing over) is the swap of genetic objects among homologous chromosomes that results in recombinant chromosomes during sexual reproduction.

Mutation: When crossover is over, mutation takes place. It is a random change in a point. It prevents the algorithm from capability. The process changes a 1 to a 0, or 0 to a 1.

- Stage 1: Select the primary population of individuals.
 Stage 2: Create the fitness of all individual in those inhabitants.
 Stage 3: Rebuild on this production in anticipation of the end-point: (time limit, sufficient fitness achieved, etc.)
- a) Pick the most excellent fit individuals for reproduction.
 - b) Reproduce fresh those from beginning to end crossover and mutation operations.
 - c) Calculate the creature fitness of new individuals.
 - d) Swap least-fit population with new entity.

4.1 Proposed Work

In this paper we work on (DARMGA-Dynamic Association Rule Mining through Genetic Algorithm) where mined has been performed on weblog generated files through genetic algorithm. At that where as we find literature of web mining, as it is shown that, GA is to create natural selection pattern

for information pull out and it is easy to manage. On the other side, DARMGA is to read about web usage mining. Here GA has been apply for manage the records among HTML data which are located at PC Client and it may be on user site .Other than DARMGA take out intelligence from record which will locate in server or Admin site. This method is use log files for as an benefit for that and reason is that individually discover the nature of requirements which is make for server than find behaviour of on its own or number of persons. Here establish an algorithm among this reason. Firstly the algorithm is analysed files of weblog and then finds sequential web page access automatically.

Genetic operators is combination of selection, crossover and mutation produce fresh young from the fittest persons. The making of follower in a GA is concluded by those operators a well known change and transform particular portion of the modern people. And so on communicate to perfect variation of genetic operations initiate in biologic progress. For that very important operators are crossover and mutation. The crossover operator delivers two fresh young as of two parents by lifting certain genes from every parent. Whereas mutation operator create tiny casual changes to the DNA by choosing a particular bit at chance, then altering

Table 1 A particular row from log server with its detail illustration

Similar piece of a line as of record file	Its description
192.168.1.73	IP Address
-	RFC931 host
-	UserName
[17/Apr/2018:15:25:40+0500]	TimeStamp
'GET/index.html	Http request
http/1.0'	
404	Not found
304	Not Modified
'http://www.careercollegeindia.com/'	Referrer URL
'chrome/6.6.346 (compatible; MSIE 5.0;	User agent
Windows 2007; DigExt)'	

its assessment. Mutation is frequently completed later crossover will applied. Here genetic algorithm used for this effort is shown in Figure 3. The next part discusses various outlook of the planned algorithm where as construction of DNA and healthy role.

4.2 Structure of chromosome

Chromosome creation is approachable earlier to performance of GA apply on this work. All pages, has a specified page_id, to keep record of the file at the action of pre-processing work. For creating chromosomes used these page_id values. Chromosome length put as a number of pages occurred they are required to sequentially access. When all trio page groups are searched sequentially then chromosome's figure have to build as seen in Figure 4.

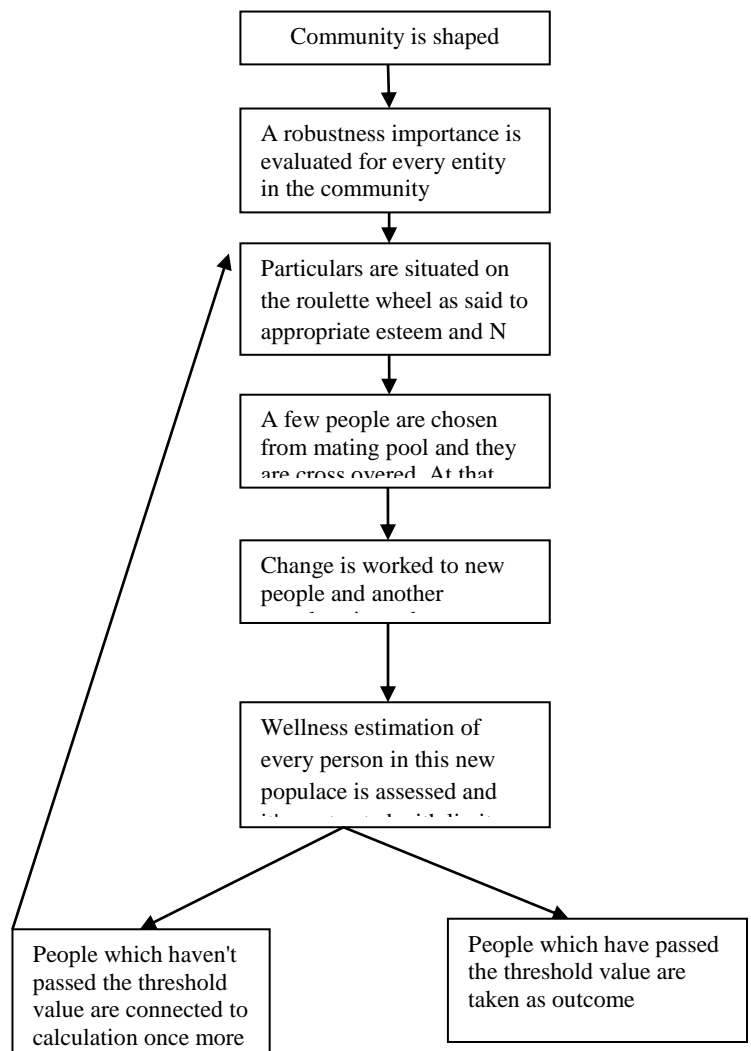


Figure. 2. Flow chart for genetic algorithm

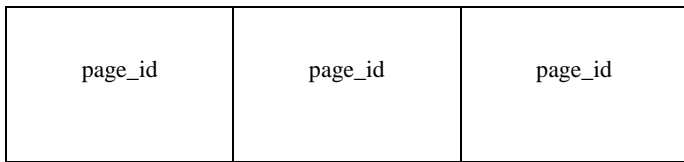


Figure3. Arrangement of Chromosome

4.2 Genetic operators

Genetic algorithm utilizes genetic operators to create young ones of the present community. This segment consists of trio operators of genetic algorithms are described: selection, crossover, mutation, and these entire three operators necessarily modified issues.

4.2.1 Selection

Here selection operator selects a single from the actual group in line with strength task and make number of copies beside modification into the fresh group. Here apply roulette wheel for action stage, at that point single ones chosen randomly from actual group. Fitness function is judged by the select of group.

4.2.2 Crossover

Crossover operator creates two fresh chromosomes from two chosen chromosomes by interchange part of genes and put in a community. At that time single -point crossover

Figure 4. Graphical depiction of crossover and mutation operators.

Operation where probability of crossover 30% has been utilize for this task and the single-point crossover operation randomly chosen through crossover point and nurture chromosomes are interchange to crossover point and two child chromosomes can be produce.

4.2.3 Mutation

Mutation operator is in use for continuing diversification. At the time the mutation phase, suitable for mutation probability amount of all gene in each chosen chromosome is exchanged with create an unselected amount. Here 30% probability of mutation appears for this activity.

4.3 Fitness function

Here fitness function is explained. We assign the purpose, three new values are initiate: session, support and similarity rate.

4.3.1 Session

Session is delineated that every one of guests' solicitations make to the server in a piece of time. A similar path from delineation of information in Figure 2 the essential log gathering show stream of inquiry by IP address and demand time. Most importantly, an individual session ought to have been characterized. Remarkable IP address and a one of a kind demand time are known as session. Time Stamp is noted when an IP address is crossed. Beginning of a session at that point time is acknowledged. Here time space is laid out as a session period. In our errand this case perceived 15 min for all session.

In the event that a solitary demonstration much than a fourth part hour then her/his session is finished and another session is made. Later producing the sessions, they are dispersed to subsets. For instance, expect that we searching for serial three pages bunches are finding, so three subsets need to make from sessions.

4.3.2 Support

Likelihood of the individual is being available in all sessions is known as Support. It is the aggregate of the quality figure coordinated with the greater part of the session subset of a solitary; isolate the whole figure of the session subsets.

4.3.3. Similarity rate

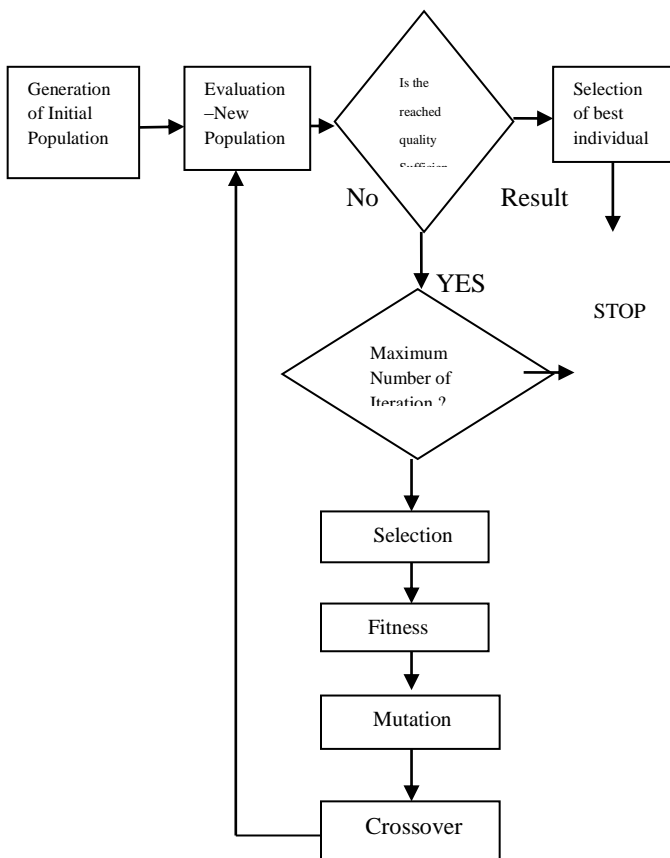
The gene pace is fine fitted with session subsets of a substance. This statement is formal as below.

Finally, fitness function is formalized in Table 2.

Table 2

Numerical Description of DARMGA factor

SupportZprobability (S {number is matched with session subsets}/S {session subsets})



mZSum of the Session number
 Similarity Rate:
 P_2 z
 nZ

Zk3 compatible gene number with $n!2^n =$ subset number in session =100
 Fitness (an individual) ZSupport! Similarity Rate

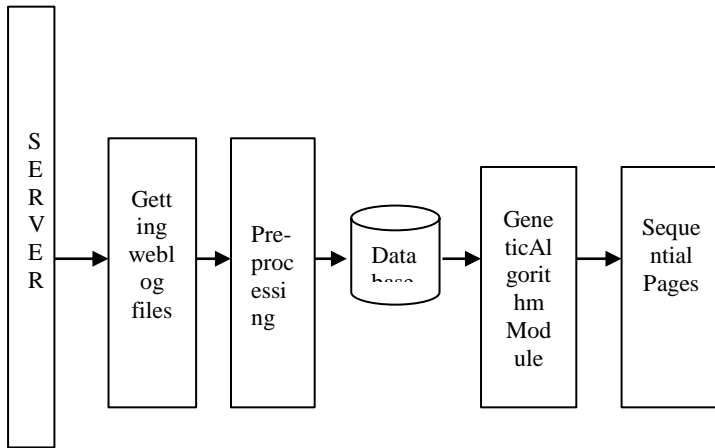


Figure 5. Framework of DARMGA

According to this value 0.08 threshold value is chosen and gauges.

V. INTER RELATED TASK AND DATABASES

The intention of DARMGA is discovery site pages which are visited one by one on the site. GA is utilized for this which is upheld on common choice technique for insight drawing and could have recuperated best outcome for the trouble. System of DARMGA is exhibited in Fig 6.

Our application is getting weblog records from server it is the primary stage as appeared in Figure. 6. Casing work of basic log document in an individual line appeared in Section 2.2. Like previous information mining technique, web use mining incorporates pointless or random information, which must be disengaged from the information cause. In this, our information source is these weblog records. Expel loud documents and orchestrate the weblog records with methods of pre-handling are a move of information revelation. As found in Figure. 2, which utilization information is natural information. At first, superfluous information are wiped and after that diverse record sent to envelope. System of the database is found in Figure 7. Where, the log whose extension is .swf, .gif, .jpeg or and so on is common as a commotion information. Later this move, prepared information will be investigated and deciphered. Next time of the DARMGA is GA. The hereditary figuring is associated with data for securing the trio page get-

together, here. This count proposed for our work involves the going with progresses:
 Stage 1: Firstly we select 100 people randomly from the record and these individuals make up the people.

Stage 2: In the people each and all ones fitness is evaluated. For that a suitability utility is used. The utility is described in part 3.3.

Stage 3 (Selection): Individuals are put on the roulette wheel as per wellness esteem and N individuals are arbitrarily chosen. One of the four steps comprises them.

Stage4 (Crossover): Individuals are chosen from mating pool (one of the four steps) as indicated by crossover possibility. Crossover possibility is chosen 30% for this approach. Later double people are chosen from mating pool and crossover with them. One point crossover utilized for this task.

Stage 5 (Mutation): Individuals are chosen from new populace as indicated by transformation. Crossover possibility is chosen 30% for this purpose. After that double individuals are chosen from one of the four steps and crossover with them. One point crossover utilized for this task.

Step 6 (Evaluation): In this fresh community fitness value of every individual is evaluated and it is differentiating to threshold value. The threshold values which had not cleared by fittest individual are run by algorithm additionally and the others, who have passed the threshold value, are taken as outcome.

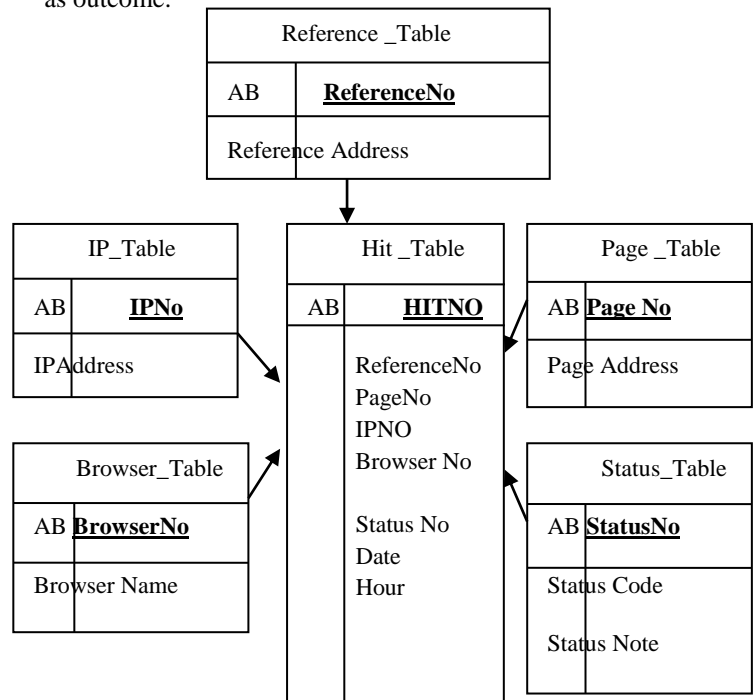


Figure 6. formation of the record

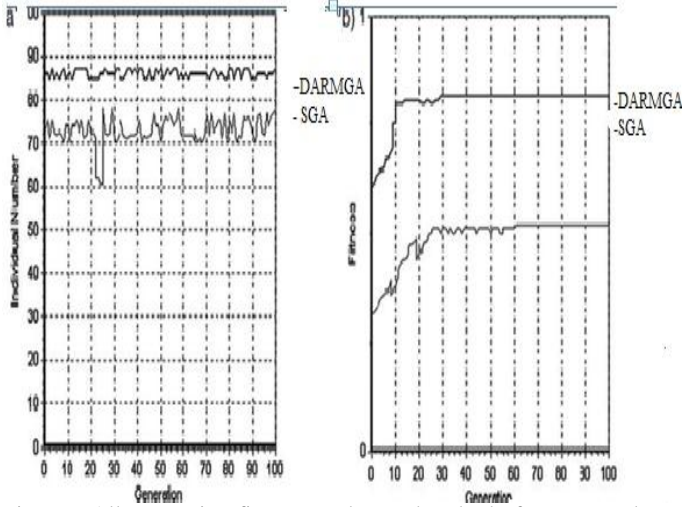


Figure 7. All generation fittest one, later a hundred of age group be prepared in line with 50% threshold value in (a). Every generation of fittest digit, later a hundred of age group be prepared in line with 50% threshold value in (b).

VI. RESULTS OF EXPERIMENTS

Within this part, we used Career College, Bhopal website data of three day’s for testing. Overall capacity of data is 1 GB. Here we developed a function for this effort to use on genetic algorithm. Here used two dissimilar fitness functions. In the end first function discuss over and second one utilize the support assistance which is known from data mining.

Both two functions output are differentiating with each other. Efficiency differentiation of these functions for discovery of trio page groups by (a) All generation had individual gene (b) Suitable single of generation, later positive quantity of generations is processed.

Differentiation of DARMGA and SGA can be done evaluate by graphs. It clarifies the trio page bunches which is found from 100 times running consequences of DARMGA and SGA as per half edge an incentive on informational index which is appeared in Fig. 8(a). Every one of running procedure speaks to an age and furthermore every one of trio page bunches speaks to a person of genetic calculation. As observed from the diagram, DARMGA has discovered same around number and comparable page bunches as indicated by elective SGA technique. This circumstance is demonstrated that DARMGA’s execution is superior to other.

Figure 8(b) demonstrates the fittest individual of every age. A sweep be seen from the chart, DARMGA wellness quickly increments

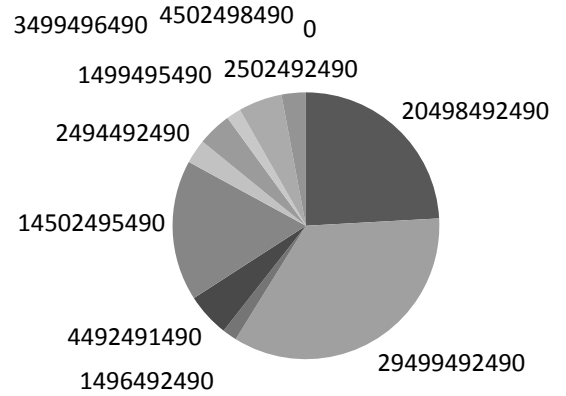


Figure 8. Threesome page gatherings, after a 100 times running consequences of DARMGA as indicated by 50% threshold value Before the tenth generation in spite of the fact that SGA wellness increments until about the 25th generation. In this way, DARMGA is passed the steady state before SGA.

Figure 9 demonstrates that, trio page gatherings, is obtained after 100 times running and the recurrence of this page bunches in the populace.

This outcome set speaks to the fittest person that is created after the DARMGA is passed to the steady state. Table 2 demonstrates depiction of these page gatherings. The page bunches which have a wide cut on the chart, are visited every now and again more than alternate pages. Notwithstanding, the pages that are not visited regularly but rather have high visiting rate along alternate pages, are set on the chart. These gatherings have less part than the others on the chart.

VII. CONCLUSIONS

By use of genetic algorithm (DARMGA) created in this task, the data disclosure was made on weblog informational collections. Next to this, there was demonstrated an examination of genetic calculation with the elective one. Here genetic algorithm, used as a differentiation algorithm, uses commonbear value known from data mining. Aftereffects of work and examination of execution are appeared with diagrams in Section 5. The most sound and solid outcomes were gotten with the DARMGA.

The informational indexes utilized in this work are the weblog documents of the copy information from various website. The application executed in this work can be huge particularly for page utilized in electronic commerce. The ads are put on the pages where clients are investing the greater part of their energy. Or then again looking at

consecutive page from the client side, extraordinary unique pages can do accommodated client want shopping. Deciding by which client which items were purchased, unique genius movements could be sorted out. Setting new techniques like this can be utilized for choice help.

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