Resemblance the Outcomes with Distinctive Algorithms for Ranking CSP

M.N.V Kiranbabu, K.V.V Satyanarayana

Abstract: ***The exhibition of different services in cloud computing SLA monitoring, selection of services and the negotiations with quality of service attributes which are claimed by the client from the provider. The work we presented in this paper in this paper with a Framework considering ranking of Cloud Service Provider mainly. Hear the character of cloud broker was taken into services to support for the client and SaaS provider in judging of potential service provider. We mainly concentrated different set of algorithms which are feasible for ranking purpose of the cloud provider. The different outputs parameters of these algorithms compared to the baseline research paper to increment the finer quality of ranking cloud Service Provider. This ranking work is initiated by the client to the cloud broker in judging of different quality of services provided by the service provider.***

Keywords: Cloud computing, Ranking of Service provider, Divergent algorithms, Cloud Broker, CSP (cloud service provider),Grey approach, Back propagation approach, Garrett method

I. INTRODUCTION

The cloud platform service models software as a service, platform as a service and infrastructure as a service have a prominent role in dispatching of services to the client in a form of pay as you use. Today many bundles of application are forwarded through the network of internet by basing cloud model utilizing the services of software as a service. The application software's may be related to accounting, GEO space, customer relationship management can human resource management shares the services of SaaS model to integrate with their clients. As the strategic demand for the saas model the need of utilization of services by client forwards the requests to the service provider to provide quality of services where, the quality of service attributes maybe functional and non-functional. In this research paper we are concentrating on non functional attributes of Reliability, response time, cost and availability.

Ranking of Cloud Service Provider was tagged with many attributes client needs, cloud broker availability, services related to the particular provider with the time bounds etc. The base script of our research interrogative many ideas of SLA management and its phases implementing, negotiation, execution and assessment. The document between client and service provider bonded with some rules which are mutually

concerned for agreeing is called SLA. SLA's are standardized by many forums by tuning of flexibility in its Phases. The Distinguished services from the service provider are selection of services, negotiating and monitoring of SLA's. The base script deploys the context of negotiation which the participation of stakeholders maybe one to one, many to one, one to many and many to many.

The authorization of negotiation constructed with three parts 1) objects for negotiation 2) rules or protocol of negotiation 3) finalizing of decision. The SLA document involved with participation parties, service level objectives, fine or penalty, time of activation, methods on SLO's and exceptions. An individual SLO state the services of the provider in the context of response time, availability, outage resolution service time and its reasons. Cloud service providers are affected with key performance indicators which are authorized by CSMIC (Cloud Service Measurement Initiative Consortium). Generally service providers SLA document involves with many attributes response time, download time, upload time, monthly rentals, client information etc. According to Burkon L SLA's projects the quality indicators for delivering of services they are throughput, reliability, scalability, security, interoperability, elasticity and testability etc,. The paper is organized with seven sections...the first section gives the introduction, second section explains the main objective of this research paper, the third section gives the picture of literature survey, the forth section pin points the problem formulation, the fifth section implements the problem, the sixth section projects the comparison of results and the final section ends with conclusion [4].

II. MAIN OBJECTIVE

The research Gaps we observed is that more concentration was placed on negotiation of SLA's. There is some ambiguity lies in monitoring network of SLA's which exhibits static and time consuming. Trust ability cannot be achieved to its Final mark in negotiation of SLA's and services as it is undertaken by cloud broker. Ranking of the cloud service provider showed as a part in the research result which is compared with the traditional TOPSIS method. We may not consider the result of rank individually of the cloud service provider where, the provider projects the combination different non functional attributes so, comparison of ranking more than one is always better. The variation's in the values of attributes and services offered by the cloud provider in a dynamic pattern which reflects decision mind of the client to choose economically. There is a chance of similar set of CSP's may enter to confuse the state of mind of the client. Specification of CSP with rank is not the issue, but we have to think about the other

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constraints of him with related to his previous history record for services utilization and its continuity within the promised time bounds in SLA's. The cloud service provider may not provide the same facilities of services constantly at all the time to the client.

The addressing main objective is that we want to achieve ranking of cloud service providers with the divergent algorithms and compare the results to the base research script in a lucid fashion. The below diagram clearly state the road map for this research script. From bottom to top the first segment gathering of CSP data take the data from different service providers with the service consistencies. The input CSP data was normalised with weights by the CSP broker and person to the second segment where the selection of algorithm is done. The third segment phase carries the implementation of selected algorithm where the forth segment outputs the comparison of results and final phase awarding of rank to CSP from the ideal solution.

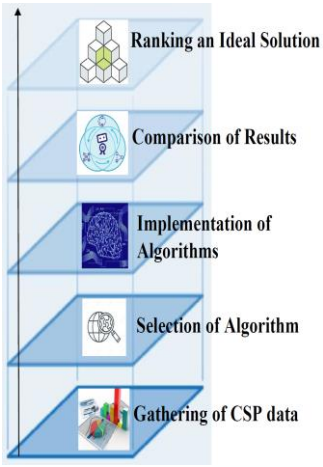


Fig: 1 Represent the roadmap of the Ranking CSP's Ideal Solution

III. LITERATURE SURVEY

A project can be evaluated by basing on many influencing factors which can be subjected for quality of service. Grey relational method can be used to integrate the influencing factors in finding the relational degree which can be useful for ranking of the cloud service provider. This system can also be used where there is an uncertainty in judging of statistical statements which are unsatisfied. The system can be undertaken as a our input training data is small. The many sequences involved in this grey can be classified as 1) generation he is based on the data with the transparent set of rules to calculate the core of each parameter. 2) In the process of modelling the equation of differentiation was posted for achieving of computational efficiency. 3) The method of prediction complemented with the time factor to acquire qualitative predictions. 4) The decision part process implemented on ambiguity situations where it consists of multiple attributes judging them with measurements which can transform to an ideal solution. 5) The process of relationality finding was carried buy the quantity where the similarities between different variables can be analysed with the relational degree. 6) The controlling process synchronise to the behaviour of rules applied for future prediction [1].

The importance of neural networks used for classification and prediction of huge unstructured parallel data. A network was constituted in the form of a brain used for learning and training of data to acquire the required desired output. We know that every neural network is constructed with three layers 1) input layer 2) output layer 3) hidden layer. Our study went down reading of back propagation algorithm in neural networks which helps in finding of error rate for the given training variables. The techniques involved in neural network are 1) the output of the system prediction is known call supervised 2) the output of the system prediction is not known called unsupervised. Threshold value dependent with two States study on neuron by McCullock and Pits which helps for today's interrogation in understanding of human brain judgements. Neural network consists of many neurons where they are interconnected passing of signals these neurons are connected by synapse. The attachable things in neuron are soma, axon, dendrite and synapse. Input layer of network take the input value pass on to the hidden layer with an adjusting of existing of weights output is carried to the output layer and an activation function is calculated on the output layer output result. The back propagation algorithm sliced into computation of feed forward state, output layer back propagation, hidden layer back propagation and updating of weights. For finding the local min of error propagation back propagation theorem is very much helpful in choosing the weights randomly [2].

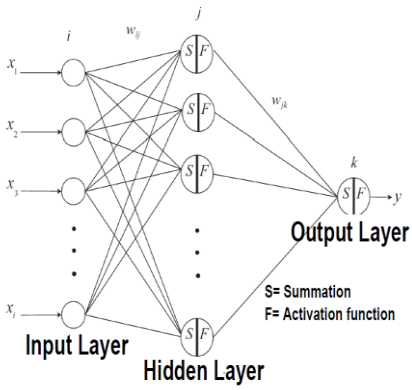


Fig: 2 Representation of Back propagation algorithm

Many critical constraints in medical field were drafted towards statistical measurements. The method of sample design is the main task in Garrett's ranking where it involves with sampling with convenience and sampling with non probability. Ranking was constituted with different interrelated items by exhibiting methods in search of best, least, partitioning and paired comparisons. The concept of finding the most influencing factors for the respondent attributes are taken into consideration in this Garrett's ranking. The percent position from the respondent attributes was calculated and transform to the Garrett rank finally. This priority Ranking method was proposed by Garrett and Woolworth (1969). This ranking was very flexible for the judgement of heterogeneous attribute where percentage positions were counted and their means scores are calculated [3].

IV. PROBLEM FORMULATION & RESULTS

Table: 1 List of Cloud Service providers

CSP-Id	Cost($)	Response Time(ms)	Reliability	Availability
ACSP001	17.1	7	0.9985	0.99888
BCSP002	39.1	3	0.99853	0.99868
CCSP003	9.4	4	0.99862	0.99835
DCSP004	41.2	4	0.99864	0.99888
ECSP005	13.6	5	0.99854	0.99859
FCSP006	23.2	7	0.99858	0.99863
GCSP007	34.2	8	0.99871	0.99839
HCSP008	26.3	3	0.99875	0.99818
ICSP009	31.8	8	0.9989	0.99895
JCSP010	25.2	4	0.99856	0.99858
KCSP011	23.8	8	0.99871	0.99845
LCSP012	7.7	8	0.99876	0.99881
MCSP013	16	4	0.99887	0.99811
NCSP014	12.7	6	0.99883	0.99824
OCSP015	25.8	6	0.9988	0.99812
PCSP016	23.7	4	0.99873	0.99848
QCSP017	32.9	6	0.99867	0.99852
RCSP018	24.9	3	0.99862	0.99899
SCSP019	34.7	4	0.99875	0.99844
TCSP020	21.7	6	0.99872	0.99843
UCSP021	20.6	6	0.99857	0.99887
VCSP022	28.2	3	0.99877	0.99859
WCSP023	21.4	5	0.99852	0.9987
XCSP024	26.4	6	0.99892	0.99899

For problem formulation segment we had considered the sample of 24 CSP's. As there are number of non functional attributes, we are confined to the four attributes to implement our main objective problem they are reliability, availability, cost and response time.

The cloud broker takes the role of this CSP ranking criteria and maintains the weights on these attributes which supports to the cloud client. The weights for the four attributes are availability (**0.303**), reliability (**0.269**), cost (**0.195**) and response time (**0.236**). The given CSP's are normalized with these weights to process the ideal solution finally. The weights are kept commonly for all the implementation algorithms to convey the consistency without any partiality.

V. IMPLEMENTATION METHODS

A) Grey Ranking Approach

Equation (1).....

$CSPZ_i^! (k) = Q_i (k) – \min Q_i (k)$

$\max Q_i (k) – \min Q_i (k)$

Where $CSPZ_i^! (k)$ is represented as service provider's cost offered

$\min Q_i (k)$ represents the minimum cost from the list of the service providers

$\max Q_i (k)$ represents the maximum cost from the list of the service providers

Deflect factor is formulated as

Equation (2).....

$CSPX_i^! (k) = \max P_i (k) - P_i (k)$

$\max P_i (k) – \min P_i (k)$

$CSPX_i^! (k)$ represents the service providers offered response time

$\max P_i (k)$ represents the maximum response time value from the service providers list

$\min P_i (k)$ represents the minimum response time value from the service provider list.

From the above equations 1 and 2 we can calculate the benefit and deflect factors, where the total is addressed in the column with **xi+yi** from the below table.

Table: 2 Represents Computed values of CSP's in Grey Approach

CSP-Id	Benefit Factor xi	Deflect Factor yi	Total xi+yi
ACSP001	0.055278	0.1848	0.240078
BCSP002	0.184651	0	0.184651
CCSP003	0.009997	0.0462	0.056197
DCSP004	0.197	0.0462	0.2432
ECSP005	0.034696	0.0924	0.127096
FCSP006	0.091149	0.1848	0.275949
GCSP007	0.155836	0.231	0.386836
HCSP008	0.109379	0	0.109379
ICSP009	0.141722	0.231	0.372722
JCSP010	0.10291	0.0462	0.14911
KCSP011	0.094678	0.231	0.325678
LCSP012	0	0.231	0.231
MCSP013	0.048809	0.0462	0.095009
NCSP014	0.029403	0.1386	0.168003
OCSP015	0.106439	0.1386	0.245039
PCSP016	0.09409	0.0462	0.14029
QCSP017	0.148191	0.1386	0.286791
RCSP018	0.101146	0	0.101146
SCSP019	0.158776	0.0462	0.204976
TCSP020	0.082328	0.1386	0.220928
UCSP021	0.07586	0.1386	0.21446
VCSP022	0.120552	0	0.120552
WCSP023	0.080564	0.0924	0.172964
XCSP024	0.109967	0.1386	0.248567

B) Back Propagation approach

Equation (1).....

$X_i = \sum^n_{i=1} w_i a_i$

w_i represents the weight of each offered attribute of CSB

a_i represents normalized attribute value.

A sigmoid function is calculated from the above formula and an error value if calculated with the following formulas

Equation (2).....

$Ei = ½ \sum (y_i – d_i)^2$

Where y_i is the actual output and d_i is the desired output. From the above a back propagation formula was represented as error rate E.

Equation (3).....

$Ei = ½ \sum (y_i – x_i)^2$

The above three equations are computed and the values of **yi-di and Ei** was shown in the below table.

Table: 3 Represents Computed values of CSP's in Back propagation Approach

CSP-Id	xi	yi	yi-di	Ei
ACSP001	0.773864	1.292217	-0.51835	-0.25918
BCSP002	0.768091	1.301929	-0.53384	-0.26692
CCSP003	0.674096	1.483468	-0.80937	-0.40469
DCSP004	0.799555	1.250695	-0.45114	-0.22557
ECSP005	0.713796	1.40096	-0.68716	-0.34358
FCSP006	0.797843	1.253379	-0.45554	-0.22777
GCSP007	0.864245	1.15708	-0.29284	-0.14642
HCSP008	0.717565	1.393602	-0.67604	-0.33802
ICSP009	0.85501	1.169577	-0.31457	-0.15728
JCSP010	0.736402	1.357953	-0.62155	-0.31078

KCSP011	0.823287	1.214644	-0.39136	-0.19568
LCSP012	0.759976	1.315831	-0.55586	-0.27793
MCSP013	0.700094	1.42838	-0.72829	-0.36414
NCSP014	0.733321	1.36366	-0.63034	-0.31517
OCSP015	0.78489	1.274064	-0.48917	-0.24459
PCSP016	0.730507	1.368912	-0.6384	-0.3192
QCSP017	0.812951	1.230086	-0.41713	-0.20857
RCSP018	0.712261	1.403979	-0.69172	-0.34586
SCSP019	0.77384	1.292256	-0.51842	-0.25921
TCSP020	0.768809	1.300713	-0.5319	-0.26595
UCSP021	0.76457	1.307926	-0.54336	-0.27168
VCSP022	0.725182	1.378965	-0.65378	-0.32689
WCSP023	0.744556	1.343082	-0.59853	-0.29926
XCSP024	0.787552	1.269758	-0.48221	-0.2411

C) Garrett's Ranking Approach

Here the CSB calculates the percent position of service provider which is cross examined with Garrett's table.100 or any value less than it (Ui) user integer value on utility driven attributes from the list.

The formula is CSB on SP = $\frac{Ui(Rij-0.5)}{N_j}$

Where R_{ij} is rank given for the ith variable of CSB's jth respondent

Where N_j is the n.o of CSB ranked variable to the jth respondent. This approach is customized in such a way the attributes of cost and response time are awarded with ranks.

The factor of cost is ranked in a manner where the CSP having highest cost given as highest value where for the response time it is taken as opposite. The below clearly show the customized ranking also and finally Ui value is calculated for synchronizing with Garrette's rank

Table: 4 Represents Computed values of CSP's in Garrett's Approach

CSP-Id	Cost Rank	Response Time Rank	N.o of Rank attributes	Ui
ACSP001	6	5	0.9185	91.84908
BCSP002	23	1	2.131	213.0979
CCSP003	2	2	0.178	17.79982
DCSP004	24	2	2.345	234.4977
ECSP005	4	3	0.4905	49.04951
FCSP006	10	5	1.3125	131.2487
GCSP007	21	6	2.5115	251.1475
HCSP008	16	1	1.4415	144.1486
ICSP009	19	6	2.3145	231.4477
JCSP010	14	2	1.36	135.9986
KCSP011	12	6	1.625	162.4984
LCSP012	1	6	0.5415	54.14946
MCSP013	5	2	0.4735	47.34953
NCSP014	3	4	0.5075	50.74949
OCSP015	15	4	1.6895	168.9483
PCSP016	11	2	1.0645	106.4489
QCSP017	20	4	2.182	218.1978
RCSP018	13	1	1.146	114.5989
SCSP019	22	2	2.148	214.7979
TCSP020	9	4	1.0985	109.8489
UCSP021	7	4	0.9015	90.1491
VCSP022	18	1	1.6385	163.8484
WCSP023	8	3	0.8845	88.44912
XCSP024	17	4	1.8865	188.6481

VI. COMPARISON OF RESULTS

The comparison of results segment give the clear picture ranking which was acquired from different algorithms. The Comparison of results is not static vision of tables where we can derive dynamically about the pros and cons of the implemented system.

The result's that are tabulated after computation exhibits the ideal solutions with nearer and approximation values. Most of the values in comparison produced by the implementation of algorithms show the identical equal solution for the same CSP in the provided list.

Table: 4 Represents Computed Ranks of CSP's in Implemented Algorithms

CSP-Id	Grey Rank	Back Propagation Rank	Garrett's Rank
ACSP001	9	9	17
BCSP002	14	12	6
CCSP003	24	24	24
DCSP004	8	5	2
ECSP005	19	21	22
FCSP006	5	6	13
GCSP007	1	1	1
HCSP008	21	20	11
ICSP009	2	2	3
JCSP010	17	16	12
KCSP011	3	3	10
LCSP012	10	14	20
MCSP013	23	23	23
NCSP014	16	17	21
OCSP015	7	8	8
PCSP016	18	18	16
QCSP017	4	4	4
RCSP018	22	22	14
SCSP019	13	10	5
TCSP020	11	11	15
UCSP021	12	13	18
VCSP022	20	19	9
WCSP023	15	15	19
XCSP024	6	7	7

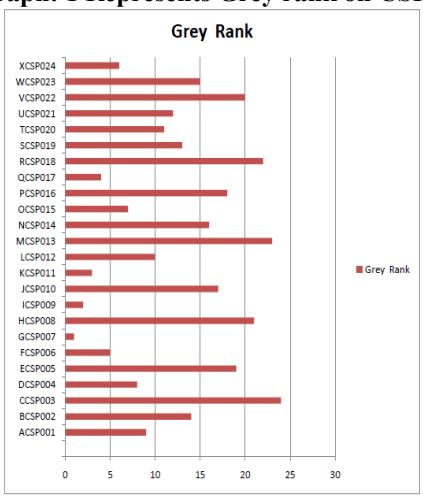
From the above table 2, table 3 and table 4 represents the computed values of divergent algorithms that we are opted for ranking are columned and ranks are calculated for every CSP. The ranks of each CSP with the usage of different algorithms was tabulated in table 5, as shown in the table 5 the group of CSP's are intersection with ranks of different opted algorithms. The results in the base research script got the first rank for XCSP024 CSP which was compared to that of topsis method was equal, remaining all CSP's exhibit dissimilitude to the topsis method. The Table 6 represents the first 10 ranks of different CSP with different methods of algorithms used which gives an option to the cloud client to keep CSP's as an alternative other than the first ranker. This involvement makes to convey good attachments to the other CSP's when a client or CSP in troublesome situation.

Table: 5 Represents Top 10 Ranks of CSP's in Implemented Algorithms

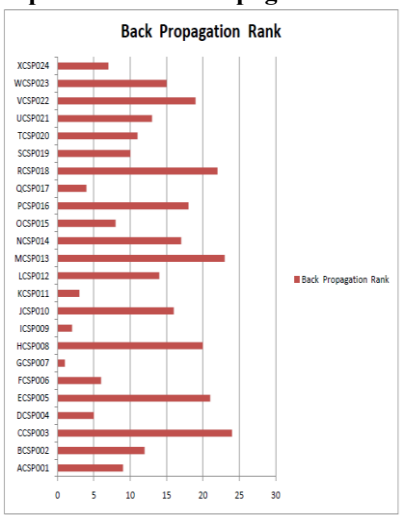
Rank In Order	Implementing of Algorithms on Cloud Service Providers For rank		
	GREY Approach	BACK PROPOGATION Approach	GARRETT'S Approach

1	GCSP007	GCSP007	GCSP007
2	ICSP009	ICSP009	DCSP004
3	KCSP011	KCSP011	ICSP009
4	QCSP017	QCSP017	QCSP017
5	FCSP006	DCSP004	SCSP019
6	XCSP024	FCSP006	BCSP002
7	OCSP015	XCSP024	XCSP024
8	DCSP004	OCSP015	OCSP015
9	ACSP001	ACSP001	VCSP022
10	LCSP012	SCSP019	WCSP023

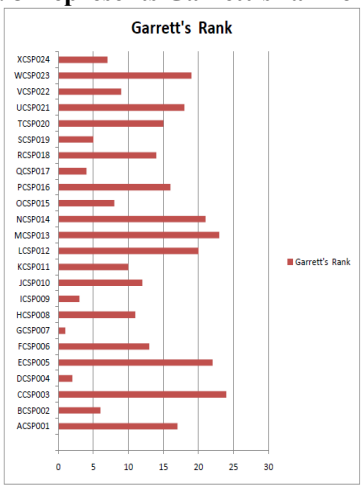
Graph: 1 Represents Grey rank on CSP's



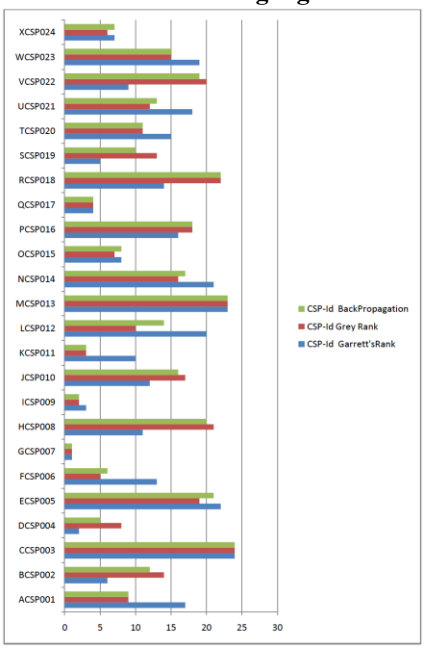
Graph: 2 Represents Back Propagation ranks on CSP's



Graph: 3 Represents Garrett's rank on CSP's



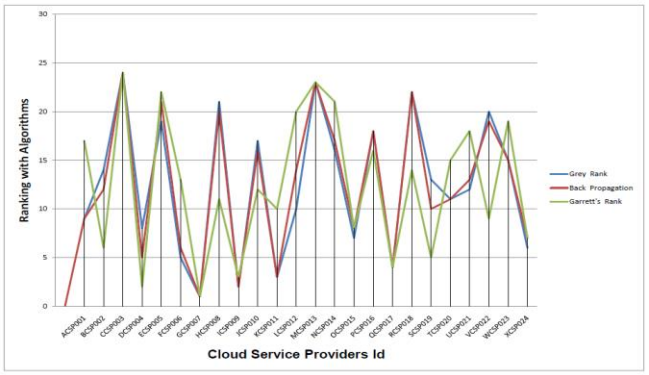
Graph: 4 Represents Combinational Comparison of ranks on CSP's using algorithms



Here Graph: 1 with horizontal bars represent the grey rank approach where the x axis was given to the list of service providers and y axis represent the rank from 0 to 30. Here Graph: 2 with horizontal bars represent the back propagation technique where the x-axis was given to the service providers and y axis for the representation of rank.

The same is followed to the Graph 3 which represents the Garrett's Rank. The combination Graph 1, Graph 2 and Graph 3 was shown in Graph 4 with horizontal bars of different colours indicates the ranking of each technique with reference to the y-axis. Similarly a combination Graph of Graph 1, Graph 2 and Graph 3 was shown in Graph 5 within a sine wave pattern, where taking ranking in x-axis and CSP's at y-axis differentiated with vertical bars for each CSP with different colours clearly. All this comparison of out frame work experiment was conducted using MS-Excel for computation of table, values and graphs which fits clearly rather than programming.

Graph: 5 Represents Combinational Comparison of ranks on CSP's using algorithms



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VII. CONCLUSION

A Transparent conclusion is achieved by implementing of these divergent algorithms where grey system approach can also be used for solving uncertainty where there are multiple attributes for taking decisions. The involvement of back propagation algorithm really exhibit, the human thinking and decision making of uncertainty problems. The Garrett approach was customised with manual ranking awesome attributes and fit to the percent position formula come back to the Garrette ranking scale. Though the algorithms are static it gives economically feasibility values to the client for judging of the correct CSP. This research script gives a new idea alternate CSP's in trouble some situations. We know that all the conditions of the client cannot be satisfied by the first rank of the CSP, where the client can also track previous history services of the CSP. The feature exposing of this work can be utilised more in neural networks and in meta heuristic algorithms. Based on this research paper we can clearly implement these divergent algorithms ranking of a cloud service provider without any hesitation moreover the values are very approximate to the real-time static conditions.

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