Inquisition the Prospect of Ranking Cloud Service Provider using Distinctive Algorithms

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

Abstract: ***Selecting services in cloud computing platform varies in several ways, where in fact the service quality is assessed by the cloud customer part and the negotiation issues was forwarded by CSB to avail the utmost throughput. The initiation to start CSB pivot role shows that CSB was characterized as the intermediation of services between CC and CSP. This research work incorporates with three participants CC, CSP, CSB, presents the scenario of supporting ranking viewpoint of CSP by CSB as the CC was associated with his regular attached work. The successful implementations of three algorithms are being used for ranking are grey method implementing strategy, back propagation methodology and pivot attribute selection with selective user condition methodology. We derive above three algorithms on rank of CSP with an execution and result focused procedure. Many rank methods was produced from statistical methodologies but almost all of them are impractical and novelty. Our effect oriented procedure display in striking the goals of calculating CSP ranking in cloud computing platform***

Keywords: Cloud Computing, CSB prioritization, Service distribution, Ranking algorithms, Grey ranking and back propagation approach.

I. INTRODUCTION

The computing system invokes in the analysis of several service delivery models, which effects in the incrimination of cloud computing architectures. Many acceptances by the cloud consumer gets the services from the CSP side are created with many baseline concepts as elasticity of services, coordinal relationship with the management and customer and resource of information planning.

The service level commitments between consumer and CSP was determined and tagged with SLA's to triumph over the miss conceptions of services. A recognized more demands from client were forwarded to the provider by making use of resource and decision making CSB. The SLA life pattern was incorporated to create an objective management for the prediction of services support towards the client. The constraints require in ranking of CSP continues to be unjustifiable to hundred percent because of the dynamic variation in the cloud market.

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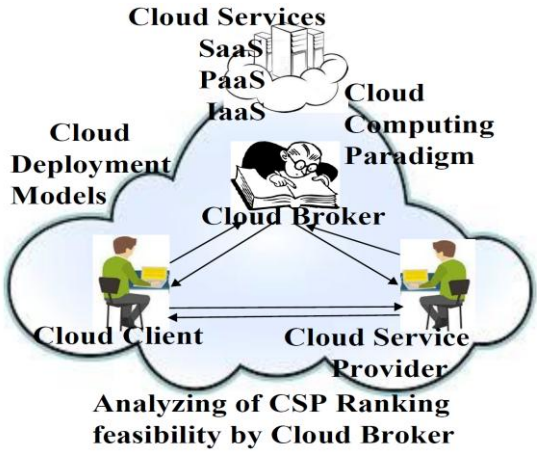
M.N.V Kiranbabu, Research Scholar Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, Andhra Pradesh, India,

K.V.V Satyanarayana, Professor in CSE Dept, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, Andhra Pradesh, India,

The research proceeded to go deeply in the framework of positioning and synchronized to different ranking literatures that have parametric information in monitoring of CSP services of availability conditions.

The awakening idea of research in this paper highlights the ranking of potential service provider, which explains the clear services, where in fact the cloud customer was regularly burdened and will take the support of CSB. The CSB judges, in the analysis of right service provider impartially by basing of numerical and mathematical approaches.



II. LITERATURE SURVEY CONCLUSION

The doubt in the information collection causes many troubles in figuring out corrective decision making. The applicability of grey analysis emphasizes the product quality and performance methodology in the service sector, where in fact the doubt can be sliced up somewhat. The need for grey system was possible and effective weighed against the traditional ways of ranking. A relational level was determined for the given group of attributes of CSP's gives the dissimilarities between traits and their affects. This statistical method can closely used for ranking of CSP for our problem. [1]

Many uncertain problems can be fixed by neural networks for decision making. The initialization of these methodologies was successful in classification and mining of data in several layers involved with neural networks. A supervised learning strategy in neural systems was embossed with back propagation algorithm for the analysis of uncertain conditions in results display.

The structure of neural systems was biologically framed with soma, axon, synapse, and dendrite. These elements have functionalities in having of signals with related to the human mind activities.

The technique of back propagation algorithm constituted with at the least three layers input layer, hidden layer, and output layer. The problem size is explored by basing on different nodes used for learning. The idea of arranging weights in neural network, supervised learning deploys the required end result from the determined output. An activation function was computed in the hidden layer to keep the non linearity where in fact the weights are changed to acquire the targeted required output. [2]

Pivot attribute computation ranking be a new strategy that was based on basic line beliefs of Garrett's rank procedure. The Garrett rating technique establishes the influencing factor and these influencing factors are percent and modulated with results. The most important pivot attribute in distinguishing of responded CSP was examined with Garrett rank with the formulation by position the respondent service provider attributes and the number of attributes raked. Garrett ranking strategy was generally used at medical stream for locating the abnormalities within an unstable ambiguity situation. [3]

III. PROBLEM FORMULATION

From the above literature ranking of CSP is a targeted problem and this targeted problem was aimed with list of service providers and each of them distribute their service offerings are availability, reliability, cost and response time. These are the preliminary service offering attributes of CSP to discuss about the quality of service in cloud computing platform by cloud client. The pivot role of CSB is that to intermediate the services between cloud client and service provider which enhances the service utilization and cost benefit approach towards client and provider. To get an optimal solution, the CSB assign weights for the CSP offered attributes are availability (**0.306)**, reliability (**0.26**), cost (**0.197**) and response time (**0.231**). I had choose c language compiler for calculation in support of inquisition the prospect of ranking Cloud Service Provider using distinctive algorithms. At the positive side C is a compiler oriented language having variety of data types, operators and functions, which necessarily supports to this framework. As the programming code is too longer, we supposed to show the screenshots for the source code output.

Screenshot. 1 (Frame work developed in C language)

```
Inquisition the prospect of Ranking
   Cloud Service Provider (CSP)

Enter Options 1, 2 or 3: 1

1.   Input (CSP) data

2.   Implement (CSP) data with
     algorithms

3.   EXIT
```

The first screenshot exhibit with three options 1) taking the input of cloud service provider's data 2) implementing cloud service providers data with provided distinctive algorithms and the option 3) exit from our framework system. When the option in the first screenshot was given as 1, it opens module 1 (screenshot 2) is enabled for taking input text of Cloud Service Provider data with five attributes entering CSP ID, response time, cost, availability and reliability. Here there is a specific option entering the data or exit

Screenshot. 2 (Module 1 Entering of data)

```
Inquisition the prospect of Ranking
   Cloud Service Provider (CSP)

Module 1: Input (CSP) data

Enter CSP-Id: DCSP004
Enter Response Time: 3
Enter Cost: 40.2
Enter Availability: 0.99964
Enter Reliability: 0.99988

Do you want to enter (Y/N): Y
(Y-enter data, N-Exit)
```

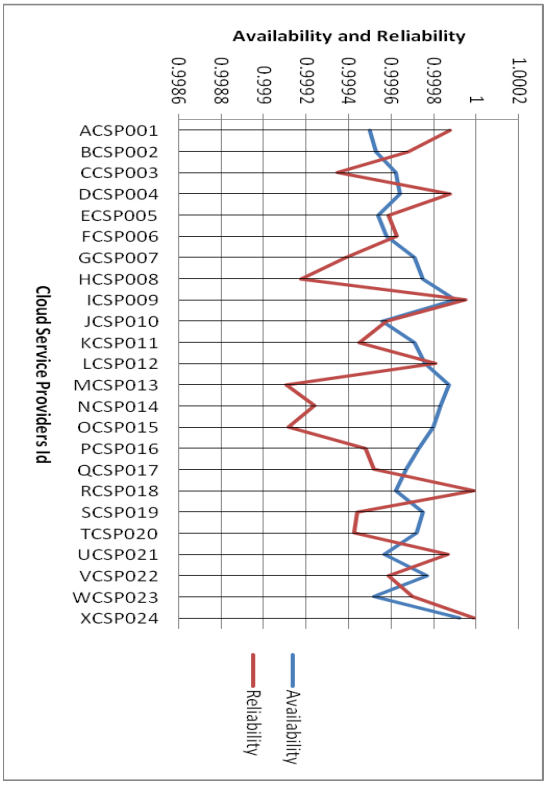
The screenshot 3 exhibits the list of potential Service Provider which was input in the Screenshot 2. The list of Service Providers is stored in text file as inp.txt.

Screenshot. 3 (List of Service Providers)

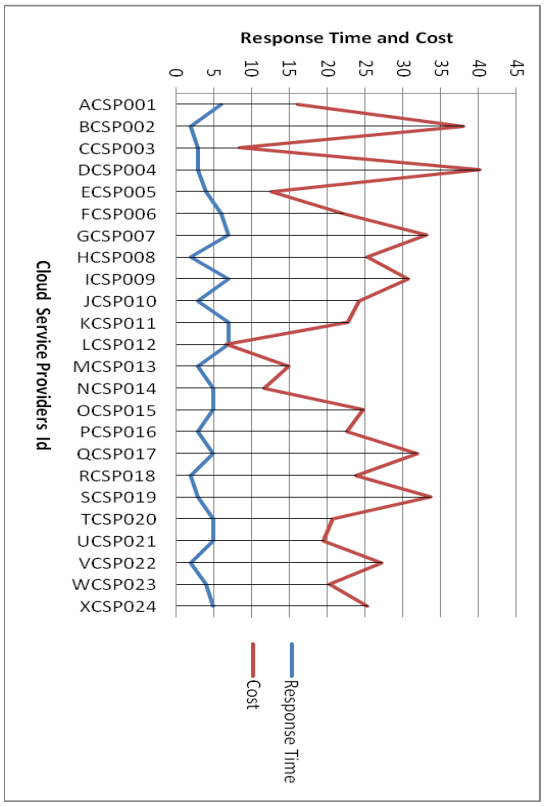
CSP-Id	Cost($)	Response Time(ms)	Reliability	Availability
ACSP001	17.1	7	0.9985	0.99888
BCSP002	39.1	3	0.99853	0.99868
CCSP003	9.4	4	0.99862	0.99835
DCSP004	41.2	4	0.99864	0.99888
ECSP005	13.6	5	0.99854	0.99859
FCSP006	23.2	7	0.99858	0.99863
GCSP007	34.2	8	0.99871	0.99839
HCSP008	26.3	3	0.99875	0.99818
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

Before introspecting with proposed listing to algorithms, I planned to depict a pictograph basing on the input of list of cloud service providers.

Graph. 1 Depicts the variations of Availability and Reliability from CSP's



Graph. 2 Depicts the variations of Response Time and Cost from CSP's



The graph one clearly shows the variation of availability and reliability for the list of cloud service providers. The highest reliability factor is provided by the RCSP018, and the lowest reliability was provided by MCSP013 CSP. The reliability was shown with red line. The highest availability factor is provided by the XCSP023 and the lowest availability was provided by ACSP001 CSP.

In the same way the graph 2 shows the variation between response time and cost. The highest response time provider is ACSP001 and the lowest response time provider is BCSP001 among different CSP's. The highest cost exhibitor is DCSP004 and the lowest is LCSP012.

IV. IMPLEMENTATION OF THE PROBLEM FORMULATION

The implementation of our problem formulation was enabled by our C program which supports for this framework seen in Screenshot 4 as module 2. This frame consists of options which we may choose the application of the following algorithms. The implementation of these algorithms takes the input file inp.txt.

Screenshot. 4 (Module 2 choice of algorithms)

```
Inquisition the prospect of Ranking
   Cloud Service Provider (CSP)

Module 2: Implement (CSP) data with
          algorithms


1.  Grey approach
2.  Back propagation Technique
3.  Garrett method
4.  Exit
Enter the Option for Implement (1, 2, 3, and 4)
3
```

Grey Approach: This approach analyse the influence factors of attributes which are offered by CSB. The involvement of the Grey system undertake many process as generation, modelling, predicting, decision making and analysing the relational variability. The system was formulated with two factors benefit and deflect factor. Where the benefit factor is formulated as

$$X_i^{!}(k) = \frac{X_i(k) - \min X_i(k)}{\max X_i(k) - \min X_i(k)}$$

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

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

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

deflect factor is formulated as

$$X_i^{!}(k) = \frac{\max X_i(k) - X_i(k)}{\max X_i(k) - \min X_i(k)}$$

$X_i^!$ (k) represents the service providers offered response time
max X_i (k) represents the maximum response time value from the service providers list
min X_i (k) represents the minimum response time value from the service provider list.

The below Screenshot5 exhibits the calculation of Grey approach with benefit factor, deflect factor and the total of both

Screenshot. 5 (Grey approach results)

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

Back Propagation approach: The utility of neural networks solves many problems in decision making. The list of service providers are supervised with back propagation algorithm, where the service providers are tuned with CSB weights which is pass on to the network for calculated output and back propagated to get the desired output with the following formulas

$X_{i=} \sum^{n}_{i=1} w_i a_i$

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

$E = ½ \sum (y_i - d_i)^2$

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.

$E = ½ \sum (y_i - x_i)^2$

The below Screenshot 6 exhibits the calculation of Back Propagation approach, by choosing the actual output, desired output and error occurrence rate.

Screen shot. 6 (Back Propagation results)

CSP-Id	xi	yi	yi-di	E
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

The advantage of this algorithm shows the accurate values in negative side, where as this algorithm is a time consuming process as the rearranging of weights to the network for the desired output is a hurdle some. This algorithm cannot go for non-linearity approach whereas, we can also refine the result of E to further more process with mathematical formulas

Garrett's Approach: This approach initiates the priority given by the CSB and converted into the formula for the elevation of ranking to service providers. The base line of this formula was acquired from Garrett's ranking and utilized in ranking of service provider.

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 = $\underline{Ui(R_{ij}\text{-}0.5)}$

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

The formula was oriented on the list of service providers, where the maximum value is taken as 99.9 and ranked as one, as it is in the Garrett's table. The second highest value of calculated table was taken and compare to the Garrett's table and assign the rank as two and so on for the whole service provider list. The prioritization of attribute ranking which is a base line from Garrett techniques, where the results are obtained as shown in the screen shot below. The pivot role of CSB is that where the CSP offered Cost driven attributes are ranked ie., Cost and Response time as in screen shot below. The cost and response time attributes are tuned with the formula to obtain the final output Ui. The highest value of Ui is ranked as one and so on.

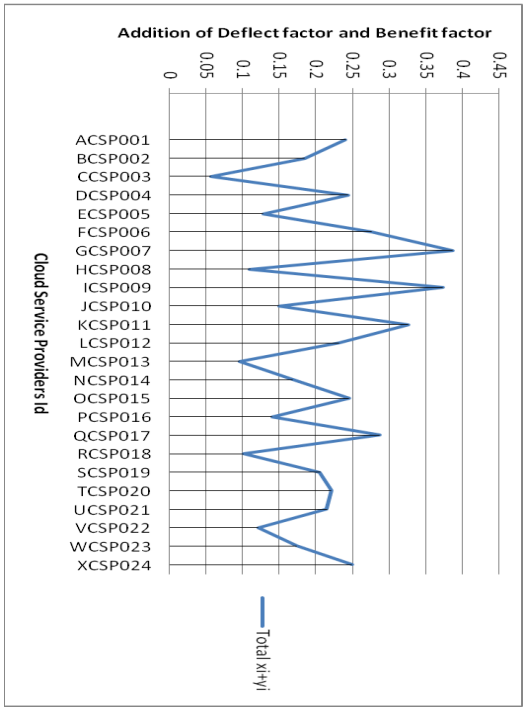
The below Screenshot exhibit the idea on calculation, here the highest cost Cloud Service Provider exhibitor was incorporated with highest value and the lowest response time was prioritized with the lowest value. Finally Ui value was calculated by basing on the formula

Screen Shot. 7 (Garrett approach results)

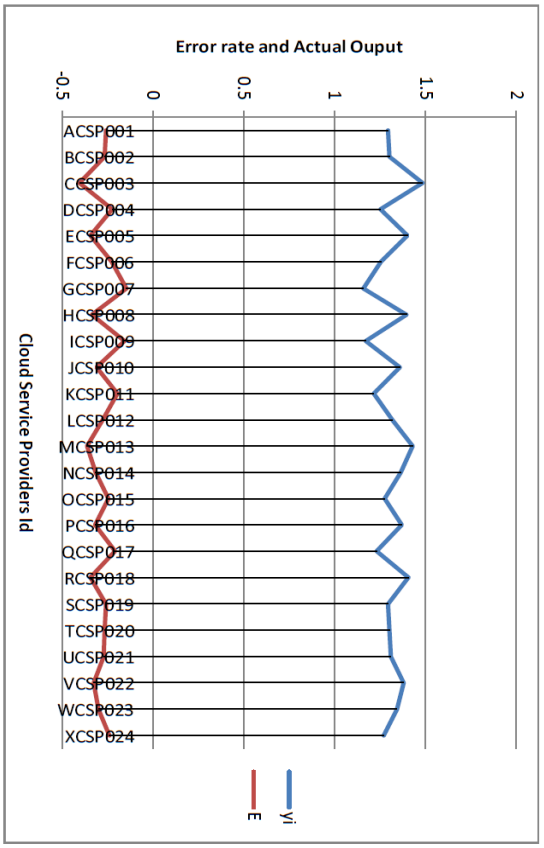
CSP-Id	Cost Rank	Response Time Rank	N.o of Rank attributes	Ui
ACSP001	6	5	0.9185	91.84908
BCSP002	23	1	2.131	213.0979
CCSP003	2	2	0.178	17.79982
DCSP004	24	2	2.345	234.4977
ECSP005	4	3	0.4905	49.04951
FCSP006	10	5	1.3125	131.2487
GCSP007	21	6	2.5115	251.1475
HCSP008	16	1	1.4415	144.1486
ICSP009	19	6	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

V. DEPICTION OF ABOVE ALGORITHMS RESULTS IN GRAPHS

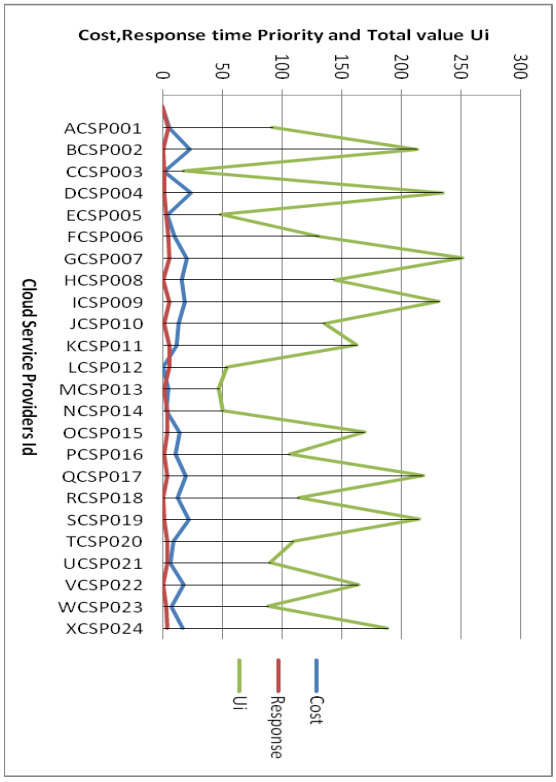
Graph. 3 Depicts the Grey Approach



Graph. 4 Depicts the Back Propogation Technique



Graph. 5 Depicts the Garrett's method



Our Framework is very much supported for acquiring results by basing on proposed algorithms. Each algorithm output values are picture in graph for clear and standing to justify the title of the paper. The graph 3 represent grey approach, where the list of cloud service providers are toss with deflect factor and Benefit factor on the provided input attributes. The total value is showing least to the CCSP003 and highest to the GCSP007. The graph 4 represents back propagation approach, where the list of service providers are attached to the network for learning for finding the actual output and error rate of it. The Redline shows the error rate and the blue line shows the actual output. The Graph 5 represents Garrett method where fully concentrated on the specific attributes which gives more variations are cost and response time. The final value of euro is calculated where GCSP007 has the highest value and ACSP001 considering as the lowest.

VI. CONCLUSION

The situation of uncertainty lies in justification of service providers was really a daunting problem. A quantitative analysis with grey approach, supervised learning with back propagation approach and prioritizing attributes with cross reference to the Garrett's table was deployed in our paper. The above implementation method provides accurate and subjective data for solving this kind of specific problem in discrete situation at cloud computing platform. The above methods are implemented with mathematical formulas and values are tabulated. Based on this research paper the future scope ranking of CSB can also be carried by using meta-heuristic algorithms or by non linear equation using game theory. In the next coming article i want to take a research base paper on ranking of the CSP's and implement with these and some other algorithms in comparative way.

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