Cognizance and Ameliorate of Quality of Service using Aggregated Intutionistic Fuzzy C-Means Algorithm, Abettor-based model, Corroboration method and Pandect method in Cloud Computing

Abstract—**To solve heterogeneity and gauge problems cloud computing proffer abundance of services to users. Users without percipient how transcendent the service and without any cognizance of Quality of Service (QOS) of services in cloud computing, users use the services and feel perturb, unsatisfied. To avoid user ennui, dissatisfaction, soreness and annoy by using a service it is very important to induce and elucidate awareness of Quality of Service (QOS) of services to users before using the services in cloud. For any cloud service provider to accumulate profit, to cope with other service providers and to perpetuate in the business field successfully it is very much imperative to emolument customer satisfaction, so cloud service provider should ameliorate QOS of service to augment customer satisfaction. How cognizance of QOS of services is useful for users who use services in forthcoming and how improving QOS of service is useful for service providers in cloud is inaugurated and designed in this paper. Knowing about QOS for one service from one user feedback is agile but it is very striving and time conceiving to get awareness of QOS of all services in cloud computing by collecting feedback of users who already used the service, so in order to surmount this predicament clustering technique is used . One of the important task in data mining is clustering which is propitious for profuse users so by using clustering concept users who want to use service in future will dexterously and agilely can get awareness of QOS of services in cloud through Intutionistic Fuzzy C-means clustering algorithm. Multiple Abettors are used to comply and dispose this process so multi Abettor system is inaugurated to transact the work. K-means, Hard C-means and Fuzzy C-means clustering algorithms are not much efficacious, proficient, and conducive for clustering QOS values of services so in this paper for giving awareness of QOS of services in cloud Intutionistic Fuzzy C-means algorithm is used for clustering. As Intutionistic Fuzzy C-means algorithm clustering algorithm abides of both membership function and hesitation function the feedback of QOS of services not given by users who used services is also handled. In the inaugurated process while collecting QOS feedback of services in cloud from future users, security contention from extrinsic people may occur and this predicament is solved by corroboration method in this paper. By the concept prefaced in this paper users can analyze agilely which service is best to use among available services in cloud and feel happy, satisfied by using the best service. By analyzing the output obtained from clustering, service providers can improve their QOS of services by using Pandect technique as customer satisfaction is the primary thing for any service provider to sustain in business, to gain clover and lucre. In this paper the unexpurgated process Awareness of Quality of Service and Convalescent Quality of service of services in cloud is elucidated with help of architecture.**

Keywords: Cloud computing, Quality of service, Aggregated Intutionistic Fuzzy C-means algorithm, Service users, Service providers, QOS feedback, Awareness of QOS, Improving QOS.

I. INTRODUCTION

The desideratum of the paper is cognizance of Quality of Service of services in cloud computing to forthcoming users and Ameliorating of Quality of Service to cloud service providers and this is ordain and procured in cloud computing by usher in and inducing Aggregated Intutionistic Fuzzy C-means Algorithm, Abettor-based model, Corroboration method and Pandect method in the methodology of this paper.

Cloud computing is a serviceability, on-pursuit model for network access, wherein costs are extremely reduced, storage whack increases, high computerization eliminates worries about preserving applications up to date and there is hefty flexibility and regimentation of data. Apart from this there is higher fidelity, up time and maneuverability is increased, conceding organizations to ingress information anytime, anywhere.

A viable model is cloud computing with copious precocious technologies integrated. Web services, speculation applications with SLA management, virtualization etc are advent grade technologies subsumed in cloud computing. For pervasive network access to a configurable mutual pool of dope out resources endow the exemplar used is cloud computing.

Users and enterprises are vouchsafed to stockpile and process data with incommensurable adequacy in third-party data centres by storage solutions and cloud computing. Agnate like adequacy cloud computing to enact economies of scale and adherence allows resources to go Dutch by everyone. Dispensing services and focalize infrastructure are the patron conception of cloud computing. 'The cloud' or cloud computing will be predominantly cynosure for augmenting the potency by utilizing shared resources. Strenuous distributing of cloud resources per demand is transacted by cloud computing along with acquiesces

978-1-4673-8286-1/16 $31.00 © 2016 IEEE
DOI 10.1109/IACC.2016.26

sharing of services and resources by assorted and multitudinous users. This can accomplish users to be admeasured with resources vehemently. This accession or process should depreciate devastation of environment, aerate the dope out power convection as well should take meagre power, receptacle space, air toughen up etc functions of many variety are indispensable.

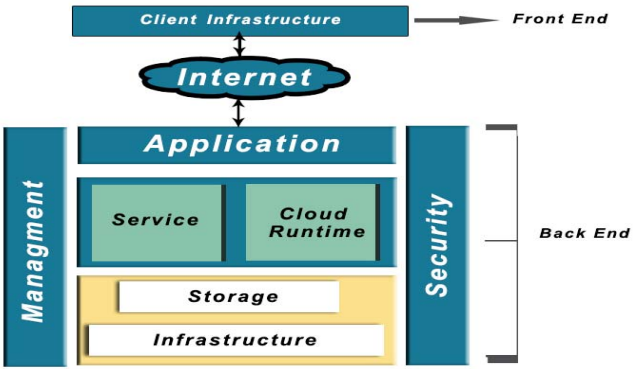

Figure 1.1 Basic Cloud

Cloud computing in the mold of service and as a tool makes computing from hallucination to tangibility. Cloud with its benediction and great potential has refined a neurotic system in the world of computing.

Quality has been spaded as: "The completeness of lineaments and peculiar characteristics of a commodity or service that convey on its dexterity to conciliate declared or adumbrated needs.

By this rendition, security is an intrinsic of quality.

Quality can also be spaded as follows: ·

- Quality is not a catalogue; it is an accession to business.
- Quality is an agglomeration of omnipotent tools and perceptions that is affirmed to work.
- Quality appliance and methods are pertinent in every demeanour of the business.
- Quality augments customer indemnification, abate costs and cycle time, and annihilate rework and lapse.

Quality affirmation and quality administration interpolates strategic outlining and disposal of quality stratagems in a constitution or organization. This should hook in security tenet in abutment of the security crew. QA can campaign that security is an intrinsic articulation of the business gimmick at the preeminent level of the institution or organization. So in this paper security issue is also solved by using corroboration technique while getting awareness of quality of services in cloud computing.

Quality of service plays major role in gaining user satisfaction. In various organizations due to progress and popularity of cloud Quality of Service is of special importance. Awareness of quality of service helps users or customers in making right decisions and service providers for improving the service quality. Customer satisfaction is needed for service providers to improve their service usage so it is very important for a service provider to improve service quality for the services they offered.

This paper induces how service providers will improve service quality for achieving user's satisfaction and how forthcoming users can easily gain knowledge about each service quality like particular service quality is best or good or worst etc. Wastage of money and time is avoided as user can use service with best quality that he desires among available services in cloud with the inaugurated Fuzzy C-means algorithm and multi-Abettor model approach. User feels happy, satisfied by using services in cloud as Quality of Service is improved by service provider and by awareness of quality of service user or customer can use particular service with quality that he desires in the approach inaugurated in this paper.

The customers or users who already used the service in cloud computing will give feedback about QOS of each service they used. Abettors are used to collect the feedback of each user immediately after a user using a service for the services available in cloud computing. The feedback back information about QOS of all services is stored in a server of a cloud with help of Abettors. From the server the feedback information is taken and by using data mining technique clustering is performed. Based on feedback (QOS attributes of services) given by each users for each service they used Abettors can cluster the services like best, better, good, satisfactory, bad, worst etc. Abettors again keep this clustered QOS services information into server of cloud so that everyone can access this information with the help of Abettors. The users who use the service in future called futures users can access the clustered information of QOS of services with the help of abettors and get aware of how good or bad a service is of services in cloud. As the future users get awareness QOS of services in cloud by clustering concept and Abettor-based system or model they analyze and decide to use the best and desired service among available services. In this way data clustering and multi-Abettor model can be used for future users to use services in cloud comfortably and with satisfaction.

Quality of Service (QOS) enacts a discerning role in the esteem possession of resources within indulgence oriented distributed system and has been extensively investigated in the wrapped tight established archetype of Grid Computing. The emanation of a new exemplar, Cloud Computing, loiter the natural progression of Distributed Systems pander to the modifications in application province and system exaction. Virtualization of wherewithal, decisive automation nitty-gritty Cloud Computing, inveterate forth neoteric challenges to be scrutinize within QOS and instants befall to exploit the cognition and lessons apprentice from Grid Computing.

Cloud computing provides platform for keeping our resources or services in cloud. As cloud provides many

services, many users from different places can access cloud and use the services in cloud. As cloud consist of many services, users without any knowledge about how good a service is simply use services in cloud. For suppose user used the service available in cloud with any knowledge about how good quality that service provides and if the quality of service of service used by user is not good then user feel unhappy and dissatisfied. User feels it is just waste time and money to use cloud service and feel vapid to use cloud services if the quality of service is not good. They are clouds which provide service sample first, if the user is happy and satisfied with the service used amount can be paid for using the service and if user is not happy with the quality of service no need to pay amount for sample service used. But this wastes users or customer's time by using service which is not good of quality and later quitting using another service. Because of all this problems it is very important for a customer or user to know about quality of service of services available in cloud and use the best among available services. So in this paper how users who use services in future are getting aware of quality of service of services available in cloud is inaugurated. As many services are available it is very difficult task for users know about quality of services of services available in cloud. So this paper induces awareness about quality of services to forthcoming users through soft computing concept Intutionistic Fuzzy C-means algorithm and multi-Abettor model.

Cloud service providers provide services to gain some profit but profit can be obtained to service providers only if the customers or users or clients use services offered by them more or frequently. Customers or users or clients use the services of cloud frequently only if there are satisfied with the service they use in the past. So for using services in cloud by more customers and frequently customer satisfaction is more important. Customers will be satisfied based on QOS of services in cloud so it is very important for cloud service provider to provide service with good quality to gain profit, to improve his service usage and to sustain in the business world. As there are many services in cloud computing service providers compete among them to gain profit and to increase their business. Cloud service providers should give best QOS of service or should improve quality of service as to sustain in business world or to gain profit or to improve business. To provide good QOS Service providers not only should get aware of the QOS service they provide but also they should get aware of QOS of services offered by other services of cloud. Therefore it is very important for a cloud service provider to get aware or cognizance of QOS of all services in cloud for improving QOS of service they provide, to gain profit, to improve business etc. In this paper we introduce that how by using clustering technique cloud service provider get aware of QOS of services in cloud and if a particular service QOS is not good than by using Pandect method cloud service provider improves the service quality.

II. LITERATURE SURVEY

Cloud computing with its ongoing technology which is internet based has brought power of processing, capability, and flexibility. IT industry moved one step forward by the capabilities of cloud. Famous and large enterprise shifted to cloud computing and have transferred their storage and processing to cloud. As there is vast usage of cloud now days it is very important to provide services with customer satisfied quality services.

A network of virtual services is distributed by cloud computing so that from the world at competitive cost on payment customers are able to access services from anywhere. Cloud computing is able to flock internationally dispersed thousands of customers for accessing and using services at any given time. Diverse types of services are accessed and used by customers. Based on type of customer resources involved diverse types of services are available in cloud. Quality of service performance evaluation is an important thing of cloud customers and cloud providers crucial interest. In the cloud service provisioning relies on a in endorsed between the service producer and customer which also include quality of service. The contract or agreement between the service producer and customer is called service level agreement that defines the level of service formally.

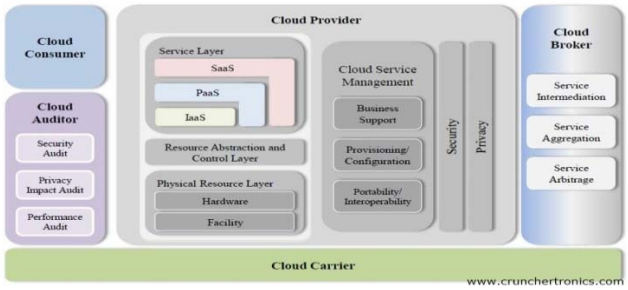

Figure 2.1 Cloud Computing Structure

Cloud computing for end users and business promises and gives several benefits attractively. End users almost for all and any kind of workload can spin up functioning resources. Cloud services are able to scale down when demand for services decreases and scale up when demand for services increases. Cloud customers should only pay for the services or resources they accessed and used i.e at granular level measuring of computing resources is performed. The services provided by cloud computing can be private, public or hybrid. |Delivery of private cloud services is done from data centre of business to internal users. This model preserves management security and control and it offers convenience, versatility. For using services by internal customers sometimes they are billed and sometimes they don't. Delivery of cloud services is done by provider of third party over the internet in the public cloud. Typically by an hour or by the minute services are sold in public cloud on demand. Cloud customers in public cloud can only pay for

bandwidth, storage and cpu cycles they consume. Google compute engine. Most famous and leading are Amazon web services, IBM/soft layer, Microsoft azure and Google compute engine.

Customer satisfaction:

Customers or users of cloud are people who use the services of cloud. A customer in the business field is a stakeholder who pays in exchange for the services provided by cloud with the aim of maximizing customers or user's satisfaction and fulfilling customers or user's need. The term consumer and customer may be confusing sometimes. A consumer necessarily may not be a customer but a customer needs to be consumer. The person who consumes service ultimately is a consumer and the person who will pay for the service used is called customer.. The term satisfaction comes when customer and consumer is contended with the service. Customer's outcome with his expectations disappointed that results from comparing services used or customers feeling of pleasure. The pleasure obtained by customer from the usage of services in cloud offered by cloud service provider is customer satisfaction. Customer satisfaction can be measured by using dimensions like quality of service, speed of service, pricing, problems or complaints, trust in service providers, closeness or relationship or behavior of cloud service provider with customers etc.,. Customer satisfaction always encourages or motivates cloud service provider.

Service Quality:

In order for business or cloud computing there is a requirement for service to reach customers .Based on the type of product service dependent and it is different from cloud to cloud. Service can be defined any intangible work or function that one troop offering by money exchange for pleasure and doesn't result anything in ownership. When service is offered to customer quality is the primary thing that customers look for. The totality of characteristic and features of services that able to offer satisfactory needs by capability of cloud is defined as quality. In which way the customers are served in cloud is intended as service quality which can be good or poor. Customer satisfaction is the main aim of providing services with good quality. The better way to known whether users are satisfied with service or whether the services are bad or good in measuring service quality. Quality of services depends on physical facilities, processes and judgment on the service provider by customers.

Service quality can be measured by using dimensions like availability, tangibles, responsiveness, competence, courtesy, credibility, access, communication, understandability, security etc.,

There are much quality of service parameters, some quality of service parameters are listed below.

Tangibles: Appearance of service, infrastructure, physical facilities of service etc.

Responsiveness: In an effective and pleasant way the readiness of service providers to help and serve the customers.

Availability: Availability of services easily and effectively to customers.

Competence: Service provider's capability to execute the service.

Courtesy: The service provider which are available or contact to customers directly or indirectly must be thoughtful, polite and respectable.

Creditability: Service provider's honesty and trustworthiness.

Security: Customer should be provided service with absence of provider.

Communication: Use of language must be understandable doubt, physical danger and economic risk.

Access: Accessibility of service and service by customer i.e. there should be proper communication between customer and service provider.

Understanding: Service provider should effort to understand and know the customers need.

Agility: Reprovisioning of resources inexpensively and rapidly to end users.

API: Providing way for accessing cloud services and interaction between end users services.

Cost: Dramatically cost should be low and resources consumption and cost should be based on user needs.

Device and location independence: Customer should be able to access services anywhere and from everywhere regardless of service locations through internet.

Multi-tenancy: Sharing of resources among customers should provide centralization, improve efficiency, utilization and must increase peak-load capacity.

Scalability: Services should be dynamically delivered to customers.

Maintenance: Services should be easily managed and maintained.

Accountability: The service should be auditable, compliance, sustainable and should provide ethicality.

Performance: Services provided to customers must be highly functional, should give good service response time and must be accurate.

Assurance: The likelihood of a service provider performing the service to customer as promised or expected in SLA(Service level agreement).

Adaptability: Adjustment of the service provider based on the requirements of request customer.

Elasticity: During peak time cloud service should be scaled i.e. service need to change the service capacity dynamically according to number of customer requests and in peak times maximum service quality should be high.

Usability: cloud service ease of usage is usability cloud service should be operable, learnable, installable and understandable.

To focus on the information in large database which is very important data mining is a new technology that extracts

productive hidden information using data warehouse. Data helps companies with great potential. Tools of data mining predict behavior, future trends and allows business to take knowledge driven decisions and become proactive in data mining. The prospective automated analyses offered beyond the past events analyses by data mining with the help of tools retrospective. Business questions which take so much time for resolving are answered by data mining contraptions. Data mining contraptions furbish databases finding predictive information hidden patterns that lie outside of expert's expectation.

Product development and long process of research result data mining techniques. When first data was stored on computers evolution of data mining began continued to improve data access and recently with real time make user to navigate their data with generated technology. Beyond navigation and retrospective data access to proactive and prospective information delivery process evolution is taken in data mining. In the business community for application development is always ready because of three technologies support which is matured sufficiently. The three technologies help in data mining are power multiprocessor computers, massive data collection, data mining algorithms. Commercial databases at unprecedented rates are growing vastly. Computers with parallel multiprocessing technology the accompanying need in a cost-effective manner now can be meeting for computational engines that are improved. For at least for last 10 years data mining algorithms techniques has been implementation consistently as reliable, mature tools that outperform methods which are statistical.

Data mining functions or parameters or techniques include following:

Association: patterns are found where one activity or event is connected to another activity or event.
Clustering: Grouping of facts or clustering and visually documenting clusters which are not known previously.
Classification: Finding new patterns which change the result of data organized way.
Forecasting: From data finding patterns from which predictions that are reasonable about future can be made.

Data mining techniques or functions or parameters can be used in many research areas including cybernetics mathematics marketing and genetics. In this paper we are using data mining techniques in cloud computing for getting awareness of QOS of services in deployed in cloud. This awareness of QOS of services cloud is helpful for cloud users and cloud service provider.

In this paper data mining technique functionality used in getting awareness of QOS of services in clustering. Clustering technique induced in this paper useful for cloud users to find out and use the best service among the services available and cloud users to improve the service quality if there service quality is not good.

The task of clustering or cluster analysis is set of objects grouping. So that objects will have similar characteristics into similar group the groups which consist of same type of objects are called clusters.

Data clustering or cluster analysis is the major functionality of exploratory data mining used in many fields like pattern recognition, information retrieval machine learning, pattern, bioinformatics and recognition. Set of objects grouping which are of similar type is clustering which is not algorithm of specific type. By using various algorithms clustering can efficiently be achieved that significantly differ in their notion.

Groups having smaller distances among cluster among cluster members, data space in the dense area statistical distributions intervals are the same notations that are popular. Cluster analysis is multi-objective interactive optimization which involves failure and trail, knowledge discovery interactive process but not a task which is automatic.

Clustering term has terms with similar meaning which are numerical taxonomy, typological analysis, botryology, classification etc. In anthropology cluster analysis was originated in 1932 by Driver and Krober in psychology is introduced in 1938 by zubin. For trait theory classification is used in 1943 by cattell. Vladmir Estivill Castro gave that we cannot precisely define the notation of cluster. Clustering can be performed by using many algorithms and concepts. Intutionistic Fuzzy set concept is used for performing clustering. Many valued logic is one way of Fuzzy logic which consist of truth values of variables and the truth values of variables between 1 and 0 i.e. any real number lies between 0 and 1. In hard-k means clustering algorithm the truth value of variables can only be 1 or 0 and Fuzzy logic is used to handle and extend the partial truth concept i.e. in Fuzzy logic the range is between completely false and completely true for Fuzzy logic.

By Lotfi A zadeh Fuzzy set theory was proposed in year 1965. In many fields Fuzzy logic can be applied from fields like control theory to fields like artificial intelligence. As infinite value logic had been studied by Tarski and Zukasiewicz in the year 1920. In sendai Fuzzy Logic is applied first on the train with high speed notably and had able to improve precision economy and comfort of the ride. Fuzzy logic has applied in many applications like hand written symbols like recognition in sony pocket computers, to improve driving comfort in subway system controlling, in helicopters' for flight and halting in precision, in automobiles for improving feel consumption in vacuum cleaner, degree of soiling and recognition of surface condition as automatic motor control, for recognition of earth quake used early as prediction system through seismology Bureau of metrology, precision of power economy and halting.

III. PROPOSED WORK

The approach induced in this paper is useful for two different types of people; one is for users who use services of cloud in future and the second one for the cloud service providers. The first premeditation of the methodology is forthcoming users or clients of cloud to get aware of QOS of services and to use desired or imitable or smitten service among the available services. The second premeditation of the methodology is cloud service providers improving QOS of service to gain accrual, success and to survive in business field. Both the first and second Mecca able to procured with the benevolence of data mining technique clustering. So the methodology is divided into two modules.

Module 1: Awareness of QOS of Service to forthcoming users by using clustering and Abettor-Based Model.

Module 2: Improving QOS of service by cloud service providers by using Pandect method.

Awareness of QOS of Service to forthcoming users by using clustering, Abettor-Based Model and improving QOS of service is performed by cloud service providers by using clustering, Pandect method.

3.1 Module 1:

The whole process getting awareness of quality of service of services in cloud computing is divided into stages and all stages are performed with help of Abettors available at different places in the cloud. The following are stages for users getting cognizance of quality of service of services in cloud.

(1.) Procuring feedback about QOS of services in cloud from users who former used services.

(2.) Cumulating the collected feedback of QOS of services in a server from different services available in cloud with the help of Abettors.

(3.) Clustering the accumulated feedback information by using intutionistic Fuzzy C-means algorithm.

(4.) Accrue the clustered QOS of services data in servers so that clustered data is useful for everyone who are using services of cloud computing.

(5.) Bequeath the clustered information about QOS of services to users who are going to use services of cloud in future for analysis and decision making.

Stage 1: Procuring feedback about QOS of services

Service is afforded in cloud by Abettors to hoard the feedback from users who heretofore used services available in cloud computing. After each user using a service will give feedback about service with attributes or parameters like tangibles, availability, competence, courtesy, credibility, security, access, communication, understanding, agility, API, cost, device and location importance multi-tenancy, scalability, accountability, assurance, adaptability, elasticity, usability, performance, synchronization, level of service, cost of service, management of service etc., Abettors procurable in cloud will scare up the feedback values for the QOS parameters of services given by user after using service. For each service if any user feel diacritic or vapid in giving feedback and doesn't give feedback for QOS parameters of services in cloud that information is also flock together by the Abettors in the system and urged ,handled by using intutionistic Fuzzy concept.

While performing this process there may be fluky of deception activity i.e. there may be chance of extortion that any extraneous person or Abettors or cloud service providers itself can give their endemic QOS feedback values of cloud services according to their own benevolent services. This predicament can be solved by replenishing security while flocking QOS feedback for cloud services from users who previously used the services of cloud. Security is rendered while hoarding QOS feedback for cloud services from only users who used the services by Abettors is as follows:

Pristine users will access cloud and ask solicit for using cloud services. Before any user using the service of cloud are adjured to authenticate by cataloguing with userid and password to use service in cloud. These userid and password is used primo genial for the user for using the service of cloud. After a particular user using a service, feedback should be dole out by user about quality of service for the service they used in cloud. Anon userid and password should be consigned by users for bequeathing QOS feedback for the service they used. Tracery is made in such a way that only if same userid and password of user used in anticipation for using service should be given again for giving QOS feedback from users who used the service. So if any extrinsic person from outside or Abettors or cloud service providers endeavors to give their endemic QOS deception feedback values are not conceded because userid and password are needed for giving QOS feedback which is only sworn to users who used the service of cloud. Hence by corroboration technique fraud activity can be avoided for collecting QOS feedback from only users who used the services of cloud. Any other security method can also be used in lieu of the corroboration method for bestowing security to users for giving QOS feedback and desist treachery activity.

Module 1 is performed with the help of cloud Abettors or cloud agents who succor users to interact with cloud. As Abettors are entangled to help for procuring awareness of QOS of Services in cloud, so the model induced can also be called as Abettor-based model. The architecture for

clinching Stage1 procedure is given in the following figure and stage1 is transacted by using steps 1 to 6 in the architecture.

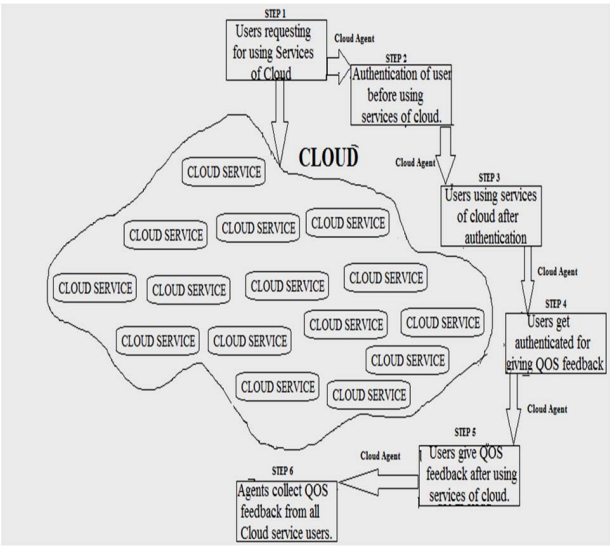

Figure 3.1 Procuring feedbacks about QOS of services

Stage 2: Cumulating feedback information in the Server: For performing clustering the feedback data of all services in cloud computing should be collected and kept ready. At each service some Abettors will be available for collecting feedback information. The collected feedback about QOS of services in cloud from all users for all services is gathered from all Abettors and one Abettor maintains all gathered feedback information in cloud. The Abettor collect all feedback information for each service used by each user orderly and form a database of feedback of QOS of services in cloud. The feedback information database is stored in a server by the Abettor so that it can be directly taken as input for clustering from server. The figure for Stage2 is given below.

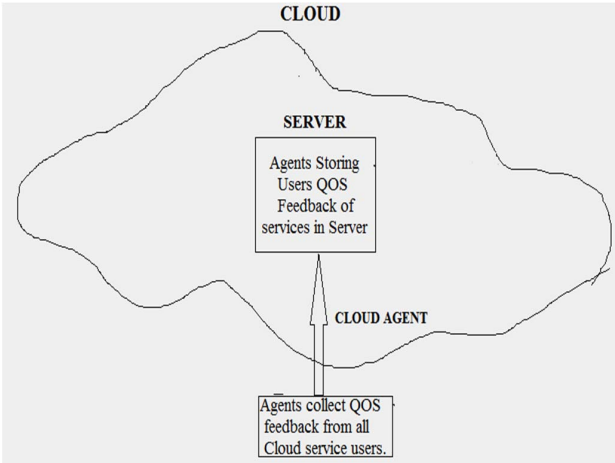

Figure 3.2 Cumulating feedback information in the Server

Stage 3: Clustering the collected feedback information by using intutionistic Fuzzy C-means algorithm:

This stage is the paramount one of the whole process, where feedback for services (QOS values of services in distributed system) given by users who use service in future is clustered by Intutionistic Fuzzy C-means algorithm. The feedback information i.e. QOS values of services stored in database is collected from the server and given as input for clustering by Abettors. Each service will be used by different users in cloud and each user given values for QOS attributes or parameters of each service they used. For suppose if there are 'n' services S_1, S_2,…… S_n in cloud and each service consists 'm' QOS attributes then each user will give m QOS values to each service S_i they use.

If there are U_1, U_2,…….U_r users using a particular service in cloud then $S_{ij} = x_1, x_2, x_3, \ldots\ldots x_m$ represents feedback i.e m QOS values given by j^{th} user to i^{th} service where m represents number of QOS attributes of service . The feedback collected by an Abettor for a particular service S_i given by r users after using the service is represented as

$S_1=x_{11}, x_{12},\ldots\ldots\ldots\ldots x_{1m}$

$S_2=x_{21},x_{22},\ldots\ldots\ldots\ldots x_{2m}$

……

……

……

$S_r=x_{r1},x_{r2},\ldots\ldots\ldots\ldots\ldots\ldots x_{rm}$

This is only for service S_i, like this feedback is collected by Abettors for all n services S_1 to S_n.

The feedback information of a particular service S_i in cloud for all r users using the service is aggregated and represented as below

$S_1=x_1,x_2,x_3\ldots\ldots\ldots\ldots\ldots x_m$ and $x_1,x_2,x_3\ldots\ldots\ldots\ldots x_m$ are calculated as follows:

$x_1=(x_{11}+x_{21}+x_{31}+\ldots\ldots\ldots\ldots x_{r1})/r,$

$x_2=(x_{12}+x_{22}+x_{32}+\ldots\ldots\ldots\ldots x_{r2})/r,$

$x_3=(x_{13}+x_{23}+x_{33}+\ldots\ldots\ldots\ldots x_{r3})/r,$

$,\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots x_m=(x_{1m}+x_{2m}+x_{3m}+\ldots\ldots\ldots\ldots x_{rm})/r.$

Similarly aggregated feedback for all n services given by all users that used the services in the distributed system is represented. The QOS attribute values for each service aggregated by users who use the service in the cloud is represented below and this is the data set which should be given as input for intutionistic Fuzzy C-means algorithm.

$$
\mathbf{S_{ij}} = \begin{matrix}
S_{11} & S_{12} & S_{13} & S_{14} & S_{15}\ldots\ldots\ldots\ldots S_{1m} \\
S_{21} & S_{22} & S_{23} & S_{24} & S_{25}\ldots\ldots\ldots\ldots S_{2m} \\
S_{31} & S_{32} & S_{33} & S_{34} & S_{35}\ldots\ldots\ldots\ldots S_{3m} \\
S_{41} & S_{42} & S_{43} & S_{44} & S_{45}\ldots\ldots\ldots\ldots S_{4m} \\
S_{51} & S_{52} & S_{53} & S_{54} & S_{55}\ldots\ldots\ldots\ldots S_{5m} \\
. & . & . & . & \ldots\ldots\ldots\ldots \\
. & . & . & . & \ldots\ldots\ldots\ldots \\
. & . & . & . & \ldots\ldots\ldots\ldots \\
. & . & . & . & \ldots\ldots\ldots\ldots \\
. & . & . & . & \ldots\ldots\ldots\ldots \\
S_{n1} & S_{n2} & S_{n3} & S_{n4} & S_{n5}\ldots\ldots\ldots\ldots S_{nm}
\end{matrix}
$$

DATA SET for CLUSTERING

Here $\mathbf{S_{ij}}$ represents j^{th} QOS attribute value for i^{th} service. Here total numbers of services are 'n' and total QOS attributes are 'm' for each service.

The above aggregated feedback data set '$\mathbf{S_{ij}}$' is given as input for clustering by Abettors and clustering is performed by using intutionistic Fuzzy C-means algorithm. The intutionistic Fuzzy C-means algorithm clusters the services into C clusters and each cluster will have services which consist of similar feedback QOS values. Hence the services with similar quality of service are grouped into one cluster by intutionistic Fuzzy C-means algorithm and this makes easy to analyze quality of service of services for the users who are going to use services in future.

Initially number of clusters and partition matrix are initialized by taking aggregated feedback $\mathbf{S_{ij}}$ as input.

Clustering of QOS of services can be performed by using k-means algorithm where K represents number of elements in a cluster is fixed but this clustering algorithm is not efficient as simple Euclidean distance formula is used. Hard C-means algorithm can be used for clustering where C represents number of clusters are fixed and crisp set notions are used to achieve clustering. These clusters are acquiring aciculate boundaries. But in palpable life times, where ambivalence is a decisive aspect and as it doesn't helve obscurity in data it is not much avail. In order to helve with this palpable life situations contigency based method like the Fuzzy C-means can be availed.

To ensnare uncertainty in data and characteristic function of sets, Zadeh inaugurated the memo of classified membership and hence consummating the intellection of Fuzzy set. Fuzzy set is peculiar of the primitive epitome to abduction roughness in data. A Fuzzy set X subset of Z where Z is Universal set and is spaded by membership function connoted by μ_X such that μ_X μ_X : $X \to [0,1]$, that is every y belongs to X is associated with a real number $\mu_X(y)$, called the membership value of x, which satisfies $0 \le \mu_X(y) \le 1$.

As trial in factual life ballgame, the cumulating of data by hard C-means leads to segregation of the dataset. This is unsought in various cases and so the pertinence of hard C-means has been curbed. Howbeit the intellection of Fuzzy sets is availed, so data or element can permeate to incommensurable clusters with incommensurable membership values.

Fuzzy C-means cope with the ambivalence in data but if there is a situation like users feel vapid and not willing to give feedback of QOS of services they used in a cloud computing than Fuzzy C- means clustering algorithm is not much efficacious, proficient for clustering QOS values of services. For handling this stereotype of situations it is foremost to use Intutionistic Fuzzy C-means. With the proviso of Fuzzy sets the non-membership values and the non-membership values of data or elements of data set are ones complements of one another. Attanasov ascertained that it is not the situation in much factual life time. Consider as an instance polling vote in patronage of a situation, some elect disapproval of situation, where as few others abnegate from electing. Similarly, in a "no"/ "yes" cases some contributors elect for 'can't say". Such cases can be handled and designed suitably by intutionistic Fuzzy sets. We define this model below.

An intutionistic Fuzzy set X construed over a universe U by using two functions from A to [0, 1], called as the membership and non-membership functions denoted by μ_X *and* V_X, satiating the characteristic that for any y belongs to X, $0 \le \mu_X(y) + V_X(y) \le 1$. There is an concord function with each intutionistic Fuzzy set which is named as the hesitation function, represented by $\pi_X(y)$ and is construed as $\pi_X(y) = 1-(\mu_X(y) + V_X(y))$.

We construe the augmented membership function $\mu'_X(y)$ or an intutionistic Fuzzy set A as $\mu'_X(y) = \mu_X(y) + \pi_X(y)$. Thus intutionistic Fuzzy C-means can be used for clustering the feedback Of QOS of services given by users as well for the feedback that is given not given by users who used the service. This clustered information can be used by future users for analysis and decision making to use the best service among available services in a cloud computing.

Intutionistic Fuzzy C-means Algorithm

STEP 1: Speculate 'n' data points and consider X= $\{x_1 \ldots\ldots x_n\}$, at nascent stage C is Precontrived, $2 \le C < n$, m € $(1,\infty)$ and initial partition matrix $U^{(0)}$ is Precontrived .

STEP 2: For each iteration l, l = 0,1,2,……procure the C-means cluster centers

$$v_{ij} = \frac{\sum_{k=1}^{n} (\mu'_{ik})^{m'} . x_{kj}}{\sum_{k=1}^{n} (\mu'_{ik})^{m'}}$$

Where μ'_{ik} = $U^{(l)}$, and i=1,2,……C.

STEP 3: Amend $U^{(l)}$ to $U^{(l+1)}$ using formula

$$U^{(l+1)} = \mu'_{ik} = 1 / \left[\sum_{j=1}^{c} \left(\frac{d_{ik}}{d_{jk}} \right) \right]^{2/(m-1)} \quad , 1 \le i \le C, 1 \le k \le l.$$

STEP 4: Juxtaposition U(l) with U(l+1) if $\| U^{(l)}$ to $U^{(l+1)} \| <$ € for petite constant € then stop, contrarily set l = l + 1 and go to Step 2.

Clustering can be performed by taking data set X as input differently in two ways. In one way clustering can be performed on feedback of all n services for all m QOS attributes. In the second way clustering is performed on feedback of n services for each QOS attribute. As there are m QOS attributes totally m times clustering is performed on feedback of n services for each QOS attribute.

So in the algorithm X represents data set that need to be clustered i.e X is the whole data set S_{ij} that need to be clustered or X can also be taken as feedback values of n services for each QOS attribute, for example the data set X can be represent as X= {S_{11}, S_{21},.....S_{11} }, like this for all 'm' QOS attributes data sets clustering is performed totally m times. C represents the number of clusters, V represents cluster centers, d represents distance between data point and cluster centre, U represents the partition matrix where each element of matrix denote the augmented membership value congruous to cluster C of a data point.

Based on the feedback information the services are clustered into C-Clusters for all QOS attributes or for each QOS attribute by using above algorithm. Services belonging to one cluster consists almost similar QOS values so there are grouped in one cluster. One cluster consists of services with high QOS values which can be considered as cluster with services having good quality of service. Similarly by seeing the clustered information we find services which provide average quality of service, bad quality of service, worst quality of service and so on.

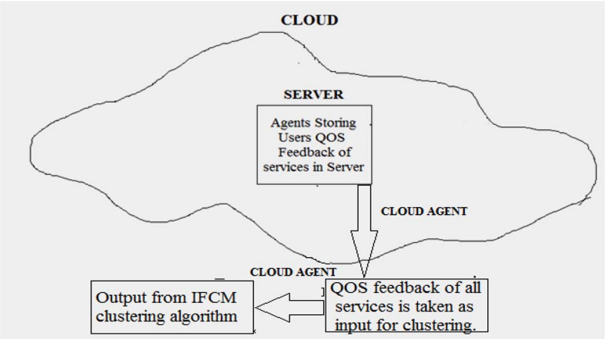

Figure 3.3 clustering the accumulated feedback information by using intutionistic Fuzzy C-means algorithm

Stage 4: Storing Clustered information in the server:
As clustered information is used for analyzing which services are good, bad, better, best, average, worst quality of service, Abettors keep the clustered feedback information in the server of distributed system so that everyone in the distributed system can easily access. Based on the feedback information the services are clustered into C-Clusters by using above algorithm. Services belonging to one cluster consists almost similar QOS values so there are grouped in one cluster. One cluster consists of services with high QOS values which can be considered as cluster with services having good quality of service. Similarly by seeing the clustered information we find services which provide average quality of service, bad quality of service, worst quality of service and so on.

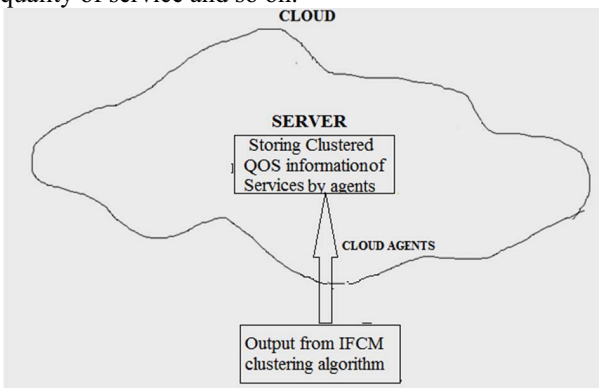

Figure 3.4 Storing Clustered information in the server

Stage 5: Giving Clustered feedback information to users who use services in future:
The whole process in this methodology is useful for users who are going to use the services of distributed system in future, so the Abettors collect the clustered feedback information kept in the server and pass the information to users who use services in future.

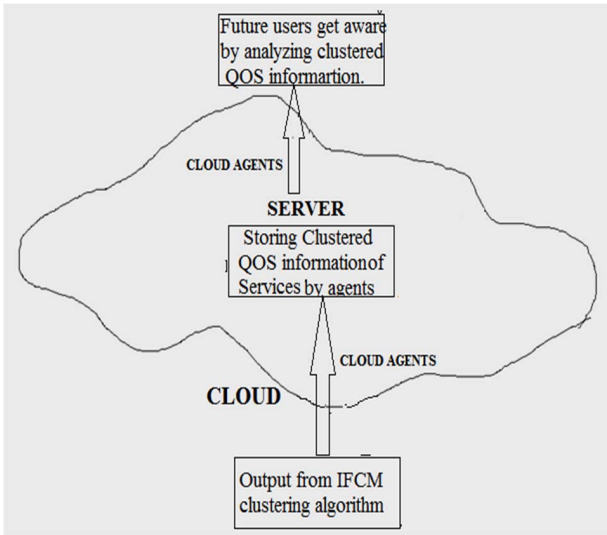

Figure 3.5 Giving Clustered feedback information to users who use services in future

3.2 Module 2:
The person who devours service eventually got to the nod consumer and the person who will remuneration for the service used got the nod customer. The term indemnification comes when customer and consumer is oppugn with the service. Customer's upshot with his expectancy

disenchanted which that denouement from juxtaposition services used or customer's motility of delectation. The amusement scare up by customer from the usage of services in cloud accorded by cloud service provider is customer satisfaction. Customer satisfaction can be measured by using dimensions like quality of service, speed of service, pricing, problems or complaints, trust in service providers, closeness or relationship or behavior of cloud service provider with customers etc.,. Customer satisfaction always revitalizes or innervates cloud service provider.

3.2.1Need of this module:

The output of module1 can be used or analyzed to start this module2. This module is mainly useful for service providers who provide services in cloud. Cloud service providers provide services to gain some profit but profit can be obtained to service providers only if the customers or users or clients use services offered by them more or frequently. Customers or users or clients use the services of cloud frequently only if there are satisfied with the service they use in the past. So for using services in cloud by more customers and frequently customer satisfaction is more important. Customers will be satisfied based on QOS of services in cloud so it is very important for cloud service provider to provide service with good quality to gain profit, to improve his service usage and to sustain in the business world. As there are many services in cloud computing service providers compete among them to gain profit and to increase their business. Cloud service providers should give best QOS of service or should improve quality of service as to sustain in business world or to gain profit or to improve business. To provide good QOS Service providers not only should get aware of the QOS service they provide but also they should get aware of QOS of services offered by other services of cloud. Therefore it is very important for a cloud service provider to get aware or cognizance of QOS of all services in cloud for improving QOS of service they provide, to gain profit, to improve business etc.

Awareness of QOS of services to cloud service providers can be obtained by output obtained in module 1. Cloud service providers can get knowledge or cognizance of QOS of all services in cloud by analyzing the output of clustering obtained in module 1. By analyzing the clustering output users get aware of different services of cloud that are clustered together based on QOS of services in cloud. Clustering is performed by taking feedback of QOS of services in cloud from users who already used the services in cloud and QOS of services feedback is clustered by using Intutionistic Fuzzy C-means Algorithm. By analyzing this clustered feedback information about services quality, service providers can easily get aware of QOS of all services in cloud. That means by analyzing clustering output service providers come to know which services quality in cloud is good, average, better, best, worst etc. As service providers can easily get aware of service quality of all services in cloud by using module 1 clustering output service providers can easily know if there service quality is very bad and can improve their service quality. By using below method service providers of cloud can improve service quality if the QOS of service they offered is very bad. Model for Improving QoS of service provided by cloud service provider for the service they offered here. As quality of service plays major role in gaining user satisfaction which is helpful for service providers to improve their service usage so it is very important for a service provider to improve service quality for the services they offered. Therefore this approach is mainly induced for service providers to improve service quality.

The architecture of this module2 is given below:

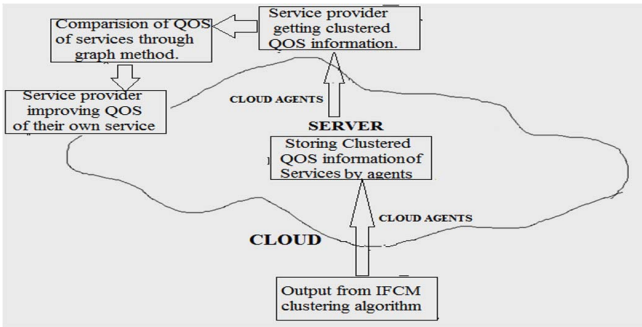

Figure 3.6 Improving service qualities by cloud service provider

This model is mainly useful for service providers having services of not good quality. Abettors are used for giving the clustered feedback information about QOS of services that is obtained in module 1 to cloud service providers. As by analyzing module 1 clustering output service provider can get information of services which are having best or good service quality. Cloud service providers to improve their quality of service first monitors the services which provide the good quality service required by user and for achieving user satisfaction.

The service provider who wants to improve their service quality must first keep the list of all services which provide good quality of service by analyzing the clustered feedback output obtained in module 1. After collecting the services with good quality service provider should monitor each service with quality so he can obtain information about each and every thing of service like design of service, implementation of service, deploying the service, availability of service etc that are needed for improving quality of service. Cloud service should draw a Pandect by using the collected information about each service while monitoring the service. Like this Pandect for each service with good service quality is drawn and maintained. Another Pandect for service with the quality which the user wants to improve is drawn and maintained separately by using the service about the service by service provider. This separate Pandect of service with bad quality is compared with each

and every Pandect of services with good quality services by service provider. By comparisons of Pandect of service of good quality of service and with service of bad quality of service, service provider can easily know what and where modifications should be done in the service that he provides to improve quality of service. Like this by comparison of all good service quality of services Pandects with bad quality service are useful for knowing the advantages of good quality services and drawbacks of bad quality of services. By noting the all changes required for improving the quality of service from comparison of Pandects service provider should do changes and updating necessary. This method can be used by all service providers with services having bad quality of service for improving their service quality and this method can also be called graph method.

By this Pandects maintenance and comparison method service provider can do modification to service they provide and improve quality of service. As Quality of service of service is improved by service provider obviously users or customers will feel happy and satisfied by using the service. As customer satisfaction is achieved for services provided by service provider obviously customer's usage of service will increase. As customers or users usage of service increase obviously cloud service providers can gain profit in providing the service in cloud, improve their business and can sustain in business field.

The architecture for module1 and module2 is combined and induced below. Awareness of QOS of Service to forthcoming users and improving QOS of service by cloud service providers can be performed by the steps 1 to 14 in the architecture.

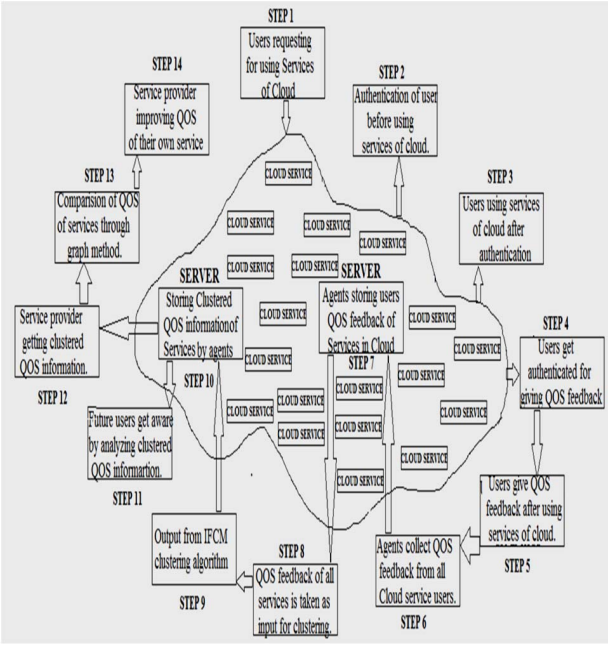

Figure 3.7 Combined architecture of Module 1 and Module 2

IV Conclusion

The accession made acquainted in this paper predominantly confide in on the feedback of QOS of services rendezvous by Abettors who used services in past and is very much propitious for forthcoming users who use services in cloud. This technique is also subsidiary for service providers to amend their service QOS quality that they proffer. Users of cloud can scrutinize the services quality and can make obstinacies easily to use the services among all services available in cloud by the approach proffered in this paper. Actually assimilating aware of QOS of all services in cloud is a striving and time conceiving task as cloud bestow numerous services but the accession in this paper dexterously elucidate this predicament. This whack output is from service quality feedback of the users input who already used the service. So the output data is not predictive analysis but it is from user's practical experience with the service quality when they used the service. This approach is benevolent for the users who want to use the services in cloud in future .The services available in cloud are dexterously clustered based on the Quality of service by using Intutionistic Fuzzy C-means algorithm. Forthcoming users can agilely get aware of each service quality by exemplifying clustered data which is output of Intutionistic Fuzzy algorithm and can enact agilely decision in using the service among all services. Intutionistic Fuzzy gives better clustering results than K-means and Hard C-means algorithm. Fuzzy concept handles uncertainty of data. The feedback data given by users and feedback data not given by users who used services are handled by intutionistic Fuzzy concept as it consists of hesitation function. Time and money of user is conserved because users use the service of quality what they importune or best quality service is used among the available services in cloud. As users use the service that he importune they feel happy, jubilant, satiated by using the service and show more engrossment further for using services of cloud in forthcoming. Clustering method agilely helps cloud service providers to get aware of service Quality. If service quality is not recherché, pandect method really bestows cloud service provider to recuperate service quality in cloud. Security predicament is also elucidated and solved in this paper by corroboration technique which is simple and facile technique to collect feedback of services from service users securely.

V Future Work

In the urged stab the feedback data about service quality (input) is taken as input from each user who heretofore used the services of cloud. Based on user's feedback given by users who heretofore used the service the output is rendered and this is benevolent for forthcoming users to get aware of quality of service of services available in cloud. So the proposed approach is useful for the user's forthcoming users only and methods must be proposed so that all users must

get latched on of service quality in cloud at the right time. This whack works only based on the user's feedback about services they used but if new services are added to cloud and if no user used the new service than we don't get any feedback for the new services added. So cognizance of newly added services QOS should also be taken care in future work. Rough set concept can be used for clustering as it handles missing data. Further clustering algorithms like RFCM and IRFCM can be used in future for clustering feedback data given by users of cloud who used services, as in RFCM and IRFCM both uncertainty and vagueness of data is handled. Corroboration method sometimes will not grantee to accord security while collecting feedback from service users in cloud so any other security method can be used while collecting feedback from service users after using services of cloud. For improving service quality in cloud any other new methods also can be used by cloud service provider if a particular service quality is not good. Cognizance of QOS service is provoked by accumulating feedback from users who used services but in some cases the feedback may be wrong so any other techniques can also be used for getting awareness of QOS and service providers can improve QOS of their services.

REFERENCES

[1] Attanasov, K. T.: Intutionistic Fuzzy Sets, Fuzzy Sets and Systems, 20, (1986), pp.87–96.

[2] Bezdek, J.C.: Pattern Recognition with Fuzzy Objective Function Algorithms, New York, Plenum, (1981)

[3] Dubois, D. and Prade, H.: Rough Fuzzy rough sets, Int. Jour. General systems, (1990), 17, pp.191-209.

[4] Gonzalez, R.C. and Woods, W.E.: Digital image processing, 2nd edition (Prentice Hall, New York), (2002).

[5] Kim, D.W., Lee, K.W. and Lee, D.: A novel initialization scheme for the Fuzzy C-means algorithm for Colour clustering, Pattern recognition letters, 25 (2004), pp.227-237.

[6] Mitra, S. and Acharya, T.: Data Mining: Multimedia, Soft Computing, and Bioinformatics. New York, Wiley, (2003).

[7] Mitra, S.: An evolutionary rough partitive clustering, Pattern Recognition Letters, vol. 25, no. 11, Sep. (2004), pp. 1439-1449.

[8] Mitra, S. and Barman, B.: Rough-Fuzzy clustering: an application to medical to medical imagery, Proceedings RSKT'08, LNCS 5009, (2008), pp.300-307.

[9] Pawlak, Z.: Rough sets, Int. Journal Comp and Information Science, 11, (1982), pp. 341–356.

[10] Pawlak, Z.: Rough sets, Theoretical aspects of reasoning about data, Kluwer Academic Publishers, (1991).

[11] Sugeno, S.: Fuzzy measures and Fuzzy integrals, in Fuzzy Automata and Decision Process, edited by M.Gupta, G.N. Sardis and B.R. Gaines (North Holland, Amsterdam, New York), (1977), pp. 82-102.

[12] Wu, M.N., Lin, C. C. and Chang, C. C.: Brain tumor detection using color-based k-means clustering Segmentation, in Proc. IEEE Third int. Conf. on Information hiding and multimedia signal processing, IEEE Explorer, California, (2007)

[13] Zadeh, L. A.: Fuzzy sets, Information and Control, 8, (1965), pp.338–353.

[14] Armbrust M, Fox A, Griffith R, Joseph AD, Katz R, Konwinski A, Lee G, Patterson D, Rabkin A, Stoica I, Zaharia M (2010) A view of cloud computing. Commun ACM 53(4).

[15] Zhang Q, Cheng L, Boutaba R (2010) Cloud computing: state-of-the-art and research challenges. J Internet Serv Appl 1(1).