USE OF FUZZY LOGIC IN WIRELESS COMMUNICATION: SURVEY

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Abstract

Fuzzy logic has played a significant role in various sectors of science. It can be seen its application in most of modern sciences. One updating field is the wireless communications. The application of Fuzzy logic in wireless communications has a particular relevance with the improvement of prediction and estimation. There are different applications of such topic such as: channel estimation, decoding and equalization. This paper presents many usages of Fuzzy logic in the field of wireless communications. In fact, it has taken recent studies which have discussed such application.

Introduction

By Maria Erman, Abbas Mohammed, and Elisabeth Rakus-Andersson [1] Fuzzy logic is recruited in different fields related to wireless communication system. Thus, fuzzy logic is utilized to demonstrate frameworks and circumstances, thinking about vulnerability and uncertainty, it very well may be a productive apparatus to be used in issues for which information on all variables is lacking or difficult to acquire.

Fuzzy logic and, all the more explicitly, fuzzy control generally integrates human master information into a standard based system. It might, nonetheless, be additionally extended the calculations to infer the fuzzy control boundaries from test information. These boundaries might acquire by join fuzzy logic with related delicate registering disciplines such as, e.g., brain organizations, developmental calculation procedures and so on. Also, Using both experience and numerical data is a technique presented by Wang el. Al [2].

Wireless communications is a quickly advancing industry, continually testing specialists for new strategies all together to fulfill the needs of ever better execution and productivity. The clearest results of Wireless communications, e.g., the overall reception of the cell phone, remote neighborhood and so forth, apply areas of strength for an on many individuals lives today.

The channel is the medium of data bearing signs are moved from a transmitter to a beneficiary, usually it is a wireless communication. The attributes of the channel are by and large obscure,

and, excepting any bending forced by the channel, i.e., in ideal circumstances, the communicated information will be gotten with next to no blunders.

Thus, the mean objective of this work is to draw in research local area craving to apply fuzzy logic and its classes to customary and arising remote correspondence issues by looking into the procedures and methods of Fuzzy Logic System (FLS) currently applied by the trailblazer scientists to break down and think about the outcomes over traditional plans and examine the advantages accomplished.

Discussion of previous studies

Nonlinear behavior in wireless communications is one of the most important. Fuzzy logic was used to control this behavior. There are various applications of fuzzy in wireless communications such as: channel estimation, Quality of Services (QoS), equalization, localization and other

A-   Channel estimation

Estimated channel is an one of more important appealing task[3]. changing in velocity with orthogonal frequency division multiplexing system is being studied. The channel is carefully modeled depending on higher order auto regressive. Moreover, to estimate channel's linearization

Non-fuzzy tracker named as alpha tracker. It is stated in [5] that "the well-known channel estimation algorithms that are lowest Mean- Square-Error (MMSE), the LS (Least Square) or the LMS (Least Mean-Square) exploits pilot supported technique, with the MMSE algorithm's enhancement is better in time-varying channels and it is proved to be more robust". the abilities of cognitive radio from tracking To motion, decision and studying In this work, fuzzy logic is used as a substantial of the reasoning engine . The Reasoning engine is used to determine different parameters In an effort to be used by the WiMAX gadget. This painting will Cognizance on one of the highest essential features of the reasoning engine I.E. Determination of the channel type and the range of Pilots used for channel estimation. The type of channel will be specified by the types of pilots. Channel estimators were also examined, Different evaluation matrics are considered such as The Least square (LS) and the Linear minimum imply Square error (LMMSE) at the side of 2d-Linear, averaging And regular coefficients interpolators. Using the minimum of square errors, evaluation can be performed. Recent study showed that the numerical results supervise the changing to higher channel estimation[6].

B-   Channel equalization

To present more obvious signal to be transferred from transmitter to the receiver,. By using robust algorithm, this is possibly achieved. T Channel equalization is the technique presented in this work. More details are presented in[7] to show neural network and fuzzy.

Getting rid of degradation of channel is called channel equalization. Usually non linear distortion is morel likely encountered because wireless chaneel is time variation adding linguistic statistics inspired by human specialists to be mixed and added to the filter. The loose parameters are

updated using the algorithm. Using adaptive filters considered the main goal of enhancing the adaptation of the algorithm.

Guidelines. The penalties propose that the bit errors fees of the fuzzy

Equalizer is close to that of the top-quality equalizer.

It is worth to mention that channel equalization issue uses the dynamic fuzzy neural network. Evaluation shows that DFNN can obtain better results compared with Bayesian MRAN (Parisi et al. (1997)) in terms of BER[10].
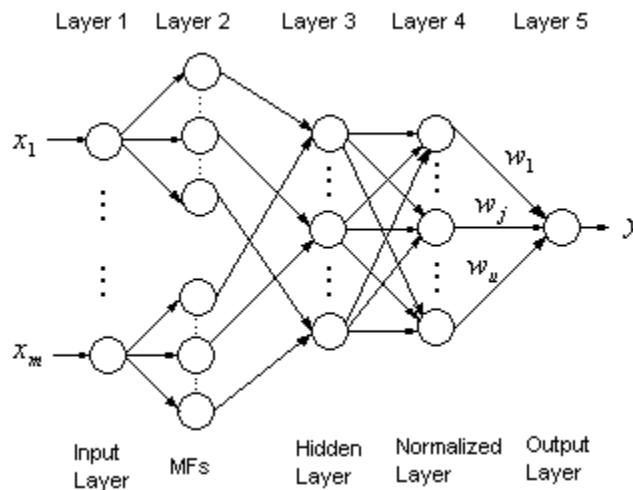

Figure 1: A structure of Fuzzy Neural Network used in [10].

C-   Quality of services (QoS)

An effective algorithm for spreading packet for upper high-quality of provider in ad hoc cellular community turned into proposed. Effective algorithmic gear is obtained using Fuzzy Self Organizing Map provide very to send packet powerfully by taking the extreme powerful course and also the bandwidth,. The outcomes shown that fuzzy logic can assure QoS of every packets within the community [11].

D-   Other applications – Mobile communication

In this part, handoff method is discussed and showing its beneficiary. Moreover, obtaining how handoff technology can be enhanced by incorporating fuzzy logic, also obtaining the advantages of such incorporatin over traditional fuzzy method[13].
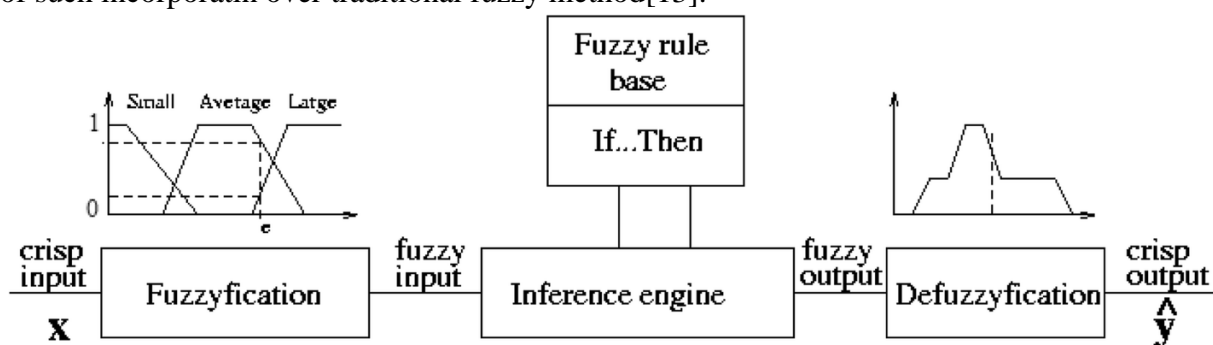

Figure 2: An example of Fuzzy logic system[14].

In we've got, two prioritization fashions based on quality function deployment quality function deployment (QFD) are developed to rank the strategic actions (SAs),or the ECs of Iran cellular cell telecommunication. QFD is a extensively used client-pushed tool for which the fulfillment of its applications may be the end result of some of its advantages, which include greater patron cognizance. It makes use of a matrix called House of Quality (HOQ)to translate client Attributes (CAs) in to ECs. But, due to the excessive diploma of subjectivity in building the HOQ, the utility of fuzzy good judgment provides an efficient tool to deal with the subjective tests. On the other hand, taking in to consideration the distance between the current nation and the fine best state for every CA,TOPSIS is used to rank CAs in a primary version. Similarly, in a second version, the use of the analytic hierarchy manner(AHP), extra standards are taken in to consideration in ranking CAs. Also, a fuzzy software issue, Bj , is used to rank SAs in each models. Each supplied models have the capacity to capture the vagueness of human thinking style, and allow consumer oriented groups, inclusive of MCI, derive blessings from the voice of the consumer (VOC)in a greater expressive manner[15].

Conclusions

In this work, various applications of Fuzzy logic in wireless communications are obtainedThus, we are able to deal with nonlinear and time varying behavior which are difficult to be modeled using different methode. These researches have launched since more than 25 years ago. Efforts were spent in modeling of Fuzzy logic in describing the behavior of the wireless channel and it has shown a reasonable outcomes.

Also it worth to mention that in this study we also presented three main objectives which are channel estimation, equalization, Quality of Services and mobile communications. Also fuzzy logic

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