

Survey on Blockchain Based Employee Appraisal System

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Abstract:- In every educational institution , Staffs / faculties play a major role in the outcome, but in most of the cases , the ability and talents of the faculty members are going as unnoticed as that of a student. Only a few institutions make effort to recognize such faculty and the work they do. Even in those few numbers the system is either flawed or biased, this brings in the need for an appraisal system dedicated specifically for all the staffs and faculties and especially one that is not biased or cannot be tampered with. We propose such a system which awards credits to the faculties based on their certain criteria that depicts the effort they put in, provided they are valid. A staff is provided access to the application developed using html, CSS, Core JAVA and are assigned a unique id. When a criteria is met and validated by an authority it creates a block and on subsequent entries the blocks get added to a ledger. Certificates uploaded by the staff are hashed using SHA-256 and are appended to the chain with the specific id. This provides a tamper proof system. Based on the credit scores faculty / faculties can be recognised.

Keywords:- Blockchain, Appraisal System, Faculty Recognition.

I. INTRODUCTION

We are at the dawn of time where there are technologies for everything. All one has to do is ask the right question.

When one questions how to prevent data modification or tampering blockchain answers. It's a simple solution where the data is made into a public ledger bearing multiple witnesses in case of tampering. With the growth of blockchain several applications opened its doors- Documentation, banking, investing, cryptocurrency etc. The term blockchain is fairly straightforward meaning it is a chain of blocks but not literally but in the way it works. Blockchain is a distributed, decentralized, public ledger .A block is generally a piece of digital data like date, time of every transaction and other information which differentiates every block depending on the application it is used. With every new transaction the data block is added onto the respective chain and thus the name blockchain. The true highlight of this technology is that it acts like a public ledger where when a block is added onto the chain it becomes publicly available .This prevents data tampering as it hosts multiple witnesses. In an additional sense of security every block has its own hash along with previous blocks hash. This makes reverting changes almost

impossible. The Addition of blocks only occur in an ordered manner meaning data of previous blocks cannot be altered. This accounts for security issues in several ways. In previous technologies the trust is ensured to a mediator. Blockchain simply removes the need for a mediator and ensures trust onto your hands. This is the technology we chose to propose our system where it is needed. To turn a biased, flawed system to a trustworthy one.

II. LITERATURE SURVEY

In recent years many students/professionals reiterated over this idea and came out with different outcomes

Amani et al [1] proposed a system that doesn't prevent but rather identify subjectivity in a faculty appraisal system. They used of 3 different clues to identify subjectivity by employing text mining techniques. These clues are as follows

- Irrelevance - where a higher authority's answers are irrelevant to the domain of respective faculty appraisals
- Duplication - where a higher authority is using the same reasoning for multiple appraisals or faculties.
- Insignificance - where the authority's answers or reasoning is straight up meaningless. With each level they added a data pre-processing layer and then followed it up with a machine learning layer to improve future accuracy. By making use of these Amani and Alaa arrived at what they destined to do. They achieved around 80%-90% accuracy in all three levels on an average. Also they added that future work could involve more clues in addition to the three as mentioned. Although such a system can be effective in subjectivity detection today's world requires a system that prevents rather than diagnosing such subjectivity.

Pratik,Deepak et al [2] proposed their approach toward faculty appraisal system. They provide a different approach to the faculty evaluation and comparison rather than a different system. Their approach makes use of data visualization and data analytics to implement their approach. Their approach like many takes away the need of a manual labour by making use of a web application where the data entry is automated. Their approach reduced downtime and provided easy handling, recording and retrieving of data. In addition to digitizing the data they also added data visualization techniques like pie charts, graph etc. which makes evaluation and analysis easier. Dr.Swati and her team also added that future works can be carried upon their application to adapt to different inputs and even different scenarios. Their successful

implementation also helped in cutting down resource cost used in other methods.

Basit Shazad et al [3] brings to attention the biggest problem of our country - Voting and suggests a solution to it by making use of blockchain. The author says that current methods is flawed to its core with inconsistencies, security issues, repetitions etc. He suggests an online voting system where blockchain plays the major role. He proposes use of consortium blockchain owned by the government for this purpose which prevents restricted access to authorized personnel only. The paper explains a framework for such an online voting system including the hashing algorithms used, data accumulation methods, block creation, utility and result declaration. The author Basit believes this brings the people a trust upon the fact that they are the ones choosing their ruler and also helps in democratization of the process. Although such a proposal is valid and applicable not a lot of countries are willing to partake in such a risk. He also suggests blockchain can be further expanded by the government as they see fit for the process.

Abhishek et al [4] proposes a central framework for different educational institutions like school, colleges and Universities and even companies who collaborate together. Such a framework is implemented by making use of blockchain. According to their proposed framework student records, completion certificates and other important documents are uploaded onto the blockchain which can then be accessed by the associated parties in a secure manner. This removes the need of maintaining individual frameworks for each institution and sharing data manually over a volatile network. In this proposed system when a student registers for an institution a block is created and upon further transactions regarding the particular student more blocks are added forming a chain. Furthermore, they also add a credit like system where credits are awarded upon completion and such credits are later considered for transactions. This provides a simplified computing compared to existing systems. This provides a homogenous system for all the collaborating institutions irrespective of their administrative and legal policies. The author proposes future work can be done upon adding more credit modules and improving the system in ways to actually implement in existing institutions.

Huaqun Wang et al [5] proposes a system for anonymous reporting of criminals. The author and his team took into consideration the fear of public for reporting criminals on account of intimidation by the criminals. Hence he and his team proposed an anonymous reporting system that masks the identity of the individual reporting. This promotes more individuals to come forward to report crimes. In addition they also added another module for rewarding where the same anonymity mask is used to reward those who reported for their service. Or this purpose they used BB2AR by using the novel technique-blockchain and the other cryptographic techniques. This solves the existing realization problems between the anonymous reporting and rewarding. However the author believes

additional changes to schemes and protocols that improve security are welcome.

George et al [6] proposes a system to include the performance of an employee from all aspects in the evaluation and giving timely feedback to ensure that the employee is able to set goals before the next appraisal. The author describes various techniques used in performance appraisal systems and categorizes it into 4 major categories such as Rating, comparative, narrative, behavioural methods. The evaluation process includes employee evaluation from their management, colleagues, self and as well as their customers. The author frames 7 phases in 720 Degree appraisal system after which a timely feedback is given to the employee and their performance is evaluated again based on the targets that are set, this methodology increases the accuracy in tracking the efficiency of the employee for a performance based appraisal system.

Safrizal, Lili Tanti et al [7] proposes the use of a decision support system with profile matching to determine the most potential employees in an organization. This method determines a weight value for each attribute and proceeds with a ranking process. This methodology produced results with an accuracy level of 93% with 193 employee's data. The aspects of evaluation are divided into two major types, General assessment and mastery of field work with various attributes under each with their own weightage. The results are provided in a ranking form to easily determine the best employees of the company.

Ingo Shihong Zou, Jinwen XI et al [8] proposes Blockchain-based anonymous reporting system called ReportCoin for the management in smart cities. It highlights issues such as reporting with a real name is highly recommended, but it is difficult to send trusted and reliable reporting messages without revealing the reporter's identity.

The existing anonymous reporting system, such as your voice and say something, can protect the true identity of the reporter from being known by other users, but the security and reliability of the centralized structure has always caused people's concerns, and there is no guarantee that they will not disclose the reporter' private information. The reporting messages may contain user-related private information, such as user identities, which should be hidden during the reporting process. Reporting with real name makes the reporters suffered from retaliation, even causing harm to their family and property. The reporting messages in the anonymous reporting system should be open, transparent, and tamper-resistant. The first part is reporting announcement protocol, named Report Announcement, in which threshold authentication technology improves the adaptability and flexibility of communications in an untrusted environment and provides a higher level of privacy and reliability for anonymous reporting communication in ReportCoin. In order to solve the problem of a lack of enthusiasm in the anonymous reporting network, they propose the novel Blockchain-based incentive mechanism in ReportCoin, which is able to

work well with Report Announcement, encouraging mobile users to honestly forward the true reporting announcements. Their detailed analysis and their detailed experiments shows that it is efficient and practical

Andriy Pukas et al [9] proposes Software Module for Data Correctness and Completeness Control in the Academic Staff Performance Appraisal System .The main stimulus of academic staff high-performance is the adequate assessment and accounting of the results of their work and the corresponding pay.As there are a large number of scientific and pedagogical staff and a significant period of performance appraisal, rating is a complex and time-consuming process, which requires large time and human resources for data analysis, reporting and data integrity control thus this system is proposed. There are four types of users with their interfaces: administrator, reviewer, academic staff and head of the department. The whole report is divided into 6 categories: achieved qualification, research teaching, methodical work, organizational work, additional criteria. Each criterion consist of description and answer type that is selected: descriptive or numerical; with the filling of numerical data for a formula that is described by the administrator when creating a field; with documents of the report, or select them from existing ones. Once the report is activated by the administrator, each academician can start to fill it in. After completing the report, the academician should save the entered data and within a specified period may return to complete the report until the system is blocked by the administrator or the report will not be finalized and blocked by the head of the department. After fulfilling the report by the academician, it is opened by the head of the department for checking. The system allows the head of the department to view reports, and when it detects incompletely verified data or incorrectly entered data, describe the error in the comments to each criterion. The system will send a letter to the academician with the data in the report, the data on the criteria and comments. This process can take several iterations until the administrator has been blocked from

entering and verifying reports. After confirmation of the cumulative report by the head of department and the data reviewer, the report is recalculated by the system in points and credited to the corresponding academician by the proposed module we can have correctness and completeness of the data. The appraisal indicators provides greater opportunity to influence the staff.

Jaideep Kaur et al [10] proposed a framework which classifies raw Internet of Things data into three activities, Positive, negative and neutral and co-locates employee and activity to calculate employee implication and performs cognitive decision making using fuzzy logic.

The proposed system comprises of three sections:

- Internet of Things section
- Data processing section
- Decision making section

Internet of Things devices are installed in industrial infrastructure and are used to acquire data from surroundings, this section also attains the location of employees from Global Positioning System (GPS).

The data processing section includes collection and classification of data into Positive, Negative or Neutral activity sets.

- Positive: Actions profitable to industry
- Negative: Activities that results in loss to company
- Neutral: Activities neither responsible for profit nor loss but are necessary for proper working of industry

Activity set from data processing section and employee location are used to co-locate to find employee participation. Decision making section automates industrial decision process by using fuzzy logic. The proposed system is capable of eliminating favouritisms, discriminatory, dissatisfaction among employees which in turn is capable of earning profit for industry.

PAPER NO.	TITLE	AUTHORS	TECHNNIQUES	RESULTS	ISSUES
1	Detecting Subjectivity in Staff Performance Appraisals by Using Text Mining	Amani A. Abed,Alaa M. El-Halees	Text mining, Machine Learning (Support Vector Machine, Naïve Bayes and K-nearest Neighbour Algorithms)	Presented a faculty appraisal system with 80-90% accuracy in data pre-processing, machine learning layers	It only detects subjectivity but doesn't prevent it
2	Comprehensive Faculty Appraisal and Development System Using Data Analytics and Data Visualization	Pratik Borse, Aishwarya Chinchpure, Rajat Singh Deepak, Dr. Swati Shinde,	Data visualization, Data analytics	Presented a faculty appraisal system which had reduced downtime , easy handling, recording and retrieval of data which used minimal resources	It provides a comprehensive appraisal system but it is not free from subjectivity/bias
3	Trustworthy Electronic Voting Using Adjusted Blockchain Technology	Basit Shahzad, Jon Crowcroft	Blockchain	Presented a Blockchain based voting system	The technology is not widely implemented and

					governments are not willing to take the risk
4	A Distributed Credit Transfer Educational Framework based on Blockchain	Abhishek Srivastava, Pronaya Bhattacharya, Arunendra Singh, Atul Mathur, Om Prakash, Rajeshkumar Pradhan	Blockchain	Presented a central framework for different educational systems to collaborate together for secure file sharing and access	The differences between multiple educational institutions makes it impossible for such a system to be implemented
5	Blockchain-Based Anonymous Reporting Scheme With Anonymous Rewarding	Huaqun Wang, Debiao He, Zhe Liu, Rui Guo	Blockchain	Presented a anonymous reporting system for witnessing crimes	Linking anonymous reporting and rewarding is a tedious process
6	720 Degree performance appraisals: An effective tool to efficiency of modern employees	George J	Feedback based appraisal system.	Resulted in an highly accurate performance appraisal track record of an employee taking in all aspects in the environment	Time consuming, higher expectations for the process, insufficient training and process understanding, computer data entry overload.
7	Employee Performance Assessment with Profile Matching Method	Safrizal, Lili Tanti, Ratih Puspasari, Budi Trinadi	Profile Matching method	Presented a ranked employee performance track record using profile matching methodology with 93% accuracy level	Evaluation can be biased based on evaluator.
8	Reportcoin: A Novel Blockchain-Based Incentive Anonymous Reporting System	Shihong Zou, Jinwen Xi, Siyuan Wang, Yueming Lu and Guosheng Xu	Blockchain	Presented a novel based Blockchain incentive system	The security and reliability of the centralized structure has always caused people's concerns, and there is no guarantee that they will not disclose the reporter' private information.
9	Software module for data correctness and completeness control in the academic staff performance appraisal system	Andriy Pukas, Andrii Simak, Oleh Syrnyk, Lilana Horal Vira Shyjko, Oleksandr Papa	Data based appraisal system	Proposed an efficient and high performance academic staff appraisal system.	As it follows atomic approach even if one misses out the entire iteration happens again
10	A Fuzzy Approach for an IoT-based Automated Employee Performance Appraisal	Jaideep Kaur, Kamaljit Kaur	Fuzzy approach	Proposed an automated employee performance appraisal system which uses fuzzy logic on data sensed from IoT devices.	Since the entire process is automated, unless the input data for fuzzy logic is true the system is unreliable

Table 1

III. CONCLUSION AND FUTURE WORKS

Appraisal system is an effective way to increase staff/faculty productivity and correspondingly can boost morale among workforce. But in cases where if such a system is flawed or biased this can be the reason for conflict. Hence designing such a system takes care and consideration. Further modules can be

Added based on input type or based on scenario used. Although the currently proposed system is effective and secure further security improvements are also welcome. But such a system must be done with faculty in mind not the authority.

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