The Role of National Academic Depository Based Smart Education System

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Abstract

The paper proposes Education institutes need to collect basic information of each perspective students including Name, Gender, Date of Birth, Address etc. Each student needs to fill it manually for traditional process and in case of online process it needs to be entered in the system. This data is critical and important for admission process apart from other academic credentials. Graduation certificates issued by universities and other educational institutions are one of the most important documents for a graduate. It is a proof of graduate's qualifications and can be used to advance in one's career and life. However, due to advances in software, printing and photocopying technologies, forgery of those certificates is made easy and as good as the original, making them difficult to detect. Several universities and educational institutions as well as businesses started to dedicate resources for verifying certificates however that is usually a tedious and quite costly process and there isn't a clear model that can be adopted by those institutions that could decrease cost and speed up the process. There are many techniques proposed for paper based document verification and this paper analyzes and expatiate the issues on those techniques.

Keywords—Graduation certificate verification, Graduation certificate authentication, Academic Depository, Digital Certificates, Dematerialization of Academic Records, E-verification of Mark Sheets, Certificate ID.

I. INTRODUCTION

Aadhaar, the Unique Identification Number that 890 million Indians have could soon find a mention on all educational certificates from Class X onward, in a move that will, apart from helping students and employers, also tackle the fake educational degree menace in India. The Ministry of Labour and Employment and the Ministry of Human Resource Development controlled Central Board of Secondary Education (CBSE) are in talks on the subject. The idea is to link Aadhaar to the performance record of students mark sheets, merit certificates and migration certificates, among others from Class X onwards. CBSE of students who have passed Class X and XII from schools

affiliated to the board with the labour and employment ministry for uploading onto the National Career Service (NCS) portal, two government officials said, requesting anonymity. At least five million CBSE students' details will be uploaded over a period of time after the labour ministry verifies that all of them have Aadhaar numbers. Aadhaar is mandatory for registering on NCS, a portal that Prime Minister launched as a precursor to establishing a national labour market information system[1].

Beginning with CBSE, we can go to other boards and do the same. The purpose is to develop a kind of permanent career number," said one of the two government officials cited above. Once the Aadhaar number is seeded in a marksheet, it will continue to be replicated in all marksheets/certificates at the higher level, thus becoming a permanent number," the official explained. Once implemented, the move will also help both students and employers, the second official said. The NCS portal will act as a repository and an employer can request for a background verification through it. By just verifying the Aadhaar number, the background screening of a student can be done in minutes, and the NCS portal can facilitate was found to have falsified his degree[1].

Aadhaar could also kick-start the plan to build a national academic repository an old plan of the human resource development ministry. The Aadhaar-linking would also be helpful in tracking students' mobility by creating an electronic registry and could be used while dematerializing (or putting in electronic form) academic certificates as was planned by the earlier government. The government is in favour of such a repository and plans to table an Academic Repository bill in Parliament. Till the time a formal repository is created, NCS will act as one. With the government in favour of a single labour market information system, where qualification providers, skill trainers, career counselors, job seekers and job providers can run on a single platform, such a move could be of real value. Verification of educational credentials are not easy in India now because of the sheer number of students, colleges and institutions, "There is no integrated system, no aggregator for such a purpose. It is largely unorganized and background screening of candidates at times is very challenging,"

 In this Quarantine period, with so much time in hand, make it a point that you undertake all the important work that you had put on the back burner due to paucity of time. One such thing that you should work on is the assembling and sorting out of your important documents and papers. With time on hand, make e-copies for all your government IDs and get rid of the documents that have no use to you. This way you will get rid of unnecessary clutter, plus all your important documents will be sorted and assembled at one place. One of the documentation work that you can pay attention to is linking your Aadhaar with your educational degrees. If you are one of those who have delayed this work for the longest possible time, then it is better to do it right away. One of the reasons why you should link your Aadhaar with the educational degree is because you will be able to use the same digitally. This will be a digital bank for all your educational qualifications related documents. Another significant reason linking of Aadhaar with educational degrees was introduced was to prevent forgery of the university and college degrees and certificates. You can avail of this service by visiting the NAD website. However, documents are available from only those universities or colleges that have partnered with NAD and give the details of their academic record in NAD's depository system. This way the students from those academic institutions can access their certificate records in their accounts even while on the go. Also, this provides access to verification agencies deputed by institutions

such as banks, employers and other academic institutions for your dealings with them when necessary. NAD (National Academic Depository) aims to ease the digital issuance, storage and access to all academic awards issued by academic institutions. This was an initiative taken under Digital India by Ministry of Human Resources Development, Govt. of India (MHRD). Under this initiative, all your academic documents are assembled at one place and are linked with your Aadhaar number for proof.

Document verification is a vast field such that there is bank type of documents, governmental type of documents, transactions type of document, educational certificates type of document and many more other kinds. Each of the domain and types can be treated differently and the content vary tremendously. For example transactions can contain number in tabular form while educational certification may contain only textual information presented in paragraphs. Due to the vast differences in types of documents and how they are presented the research will focus on digital verification of paper-based graduation certificates. Verification is the process of determining or confirming that someone (or something) is original. Documents Verification on the other hands can be defined in various ways such as the researchers [9] define document verification as the process of proving the correctness or authenticity of a document by using a proven method or technique. While the researchers [8] defines it as the process of ensuring that documents received from holder are genuine and that the holder is the rightful owner.

II. DOCUMENT VERIFICATION

The main aim of document verification is the ability to trace the origins of a document to a specific person, the device that produced it or the place where it was produced [14]. Forgeries pose a huge threat to the integrity of documents, with significant dangers in terms of authentication and trust. It is therefore important to protect the integrity of a document to prevent problems arising from the modification of a document by intruders [14]. According to the research conducted by [12], all documents or credentials that are printed are potentially subject to counterfeiting and forgery. Forgery can cause a lot of damage when it comes to trust and authenticity [15].

There is a high market for forgery as well as opportunity with low-cost, high quality results available [8]. Researchers have also found several significant problem areas when it comes to document verification. For instance, the technologies that are put forth to stop or prevent forgery do not seem to be moving as fast as the evolution of the forging techniques [16]. With respect to academic documents, further authentication problems include the variations from one school to the next, which causes consistency issues that can be taken advantage of, especially in international situations [17]. There are two basic document categories that are considered in document verification literature; digital based documents and the traditional paper or printed document. The research in this case deals with certificates. Almost all documents can be handled in a digital way, except for the certificate. The reason for this exception is that all digital documents are easy to forge without leaving any clues [18]. Furthermore, the prevalence of forged certificates results from the increased global demand for higher education, which exceeds the university capacity of the world [17].

According to the research conducted by [18] two main types of forgery, type 1 and type 2. Type 1 forgery is when some part of the original document is changed to benefit someone who was not benefitted by the original document.

In this case, the base substance, normally the paper or plastic card, remains legal and valid, but the information that is contained there is forged. The second, type 2 forgery is when both the base substance and the information contained there is fake. However, it is often very difficult to tell whether it is real or fake because the base substance and the style of the document normally look authentic [18]. The researchers of the research [10] outlined the characteristics of the classic unforgivable document.

Benefits of NAD[6]

For Academic Institutions

Permanent and safe record of keeping all academic awards issued;

- No need for issuing duplicate academic awards, students can get it from NAD;
- Effective deterrence to fake and forged paper certificates;
- All academic awards verification needs can be addressed by NAD;
- Efficient, effective and transparent administration.
- Reduced Administrative Overhead: Aimed at the concept of paperless governance. It reduces the administrative overhead by minimizing the use of paper and curtailing the verification process.
- Digital Transformation: Provides trusted issued documents.
- Secure Document Gateway: Acts as a secure document exchange platform like payment gateway between trusted issuer and trusted Requester/Verifier with the consent of the Students.
- Real Time Verification: Provides a verification module to verify data directly from issuers after obtaining user consent[6].

For Students

- Immediate availability of academic awards upon upload by Academic Institution
- Online, permanent record of academic awards
- No risk of losing, spoiling, damaging the academic awards
- Anytime, anywhere and convenient access to academic awards
- Important Documents Anytime, Anywhere!
- Authentic Documents, Legally at Par with Originals
- Digital Document Exchange with the consent of the student.
- Faster service delivery Government Benefits, Employment, Financial Inclusion, Educational admission, Health.
- For Verification Users(Employer Companies, Banks etc.)
- Online, quick and reliable verification of academic awards (with prior consent of the student concerned)
- Access to authenticated copy of academic awards
- No risk of fake and forged Certificates.
- Reduction in cost, time and efforts for verification[6]

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III. DOCUMENT VERIFICATION WORKFLOW

There are three entities must be present to carry out the process of document verification which are the issuer, the owner and the verifier. The issuer represents the entity that issues the document such as an educational institution or business organization or even a charity organization. The owner represents the person who owns the document. The verifier represents the employer/third parity that verifies the document. Based on that, the document verification workflow can be diagrammatically

IV. TYPES OF DOCUMENTS

Documents can be categorized to two categories which are paper based documents and digital based document [18]. Paper based document has characters, digits, tables, etc. Its digital version or digital document is a computer file. Digital document is designed to produce visual information on the computer monitor [18]. Forgery of documents has increased jeopardizing the integrity of both the document holder and the organization that issued the document [12-13]. The forgery of document is classified into two types which are 1) altering part of an authentic document that is original and 2) producing a new fake certificate with false information [18]. Forgery of document has become easier than the past mainly because of the technological advancements.

V. PAPER BASED DOCUMENT

This section will describe and detail on the first type of documents mentioned earlier and is the paper based documents. Its importance is described and how they are verified.

A. Importance of Paper based Document Verification

The paper based documents are still widely used. There are many types of paper based document such as graduation certificates, birth certificates, etc. The information inside the paper based documents are subject to threats like forgery; despite measures taken to protect them attacks still happen. Author in [16] attributes that to the lack of verification. There are many cases where documents were forged throughout the globe. For example one that happened in New Delhi, where five people obtained loans and cheated the banks using fake documents [14]. Another example is one that happened in Bagdad, an investigation of 20,000 government employees by Iraqi's parliament showed that some employees have used forged educational certificates and fake diplomas to get their jobs. The issue extended in that those employees that used fake certificates became senior officials in the government [14]. Forgery of documents can happen in any discipline or line of work. In U.S.With that has been mentioned document verification is important to overcome many issues that could even do with life and death. Imagine a doctor forging his way into a medical school. Or a politician forging his way to power. As a result, many could be harmed of such a behavior. Document verification of a paper based document has to be efficient to allow of seamless verification.

VI. THE GRADUATION CERTIFICATE

A university is an example of an organization that creates so many documents for their students. It issues a certificate and academic transcript for each of its graduates. The certificate has information that certifies a person has graduated from a certain specialization and obtained results as stipulated in the certificate. The certificate can then be used for job hunting or pursuing academics or any other purpose. The graduation certificate issued by the universities/institutions is one of the important documents for the graduate. It is a proof of graduate's qualification and can be used anywhere. Every year millions of students graduate from colleges and Universities, and their numbers are growing. Institutions issue certificates to those who have successfully completed the requirements of graduation. A graduation certificate is still in the form of a paper-based document because, as of yet, an electronic document cannot effectively replace a physical certificate [21]. With the rise of graduates and advancements in printing and photocopying technologies, came the rise of fake certificates as well threatening the integrity of both the certificate holder and the university that has issued the certificate [26]. This means that document validation and verification has become an important task the graduation certificate has to be verified to make sure that its content is true and to make sure that the issued certificate comes from a real source [9]. Fake certificates can be created easily and the quality of a fake certificate can now be as good as the original. The certificates of many prominent universities have been forged and these forgeries are very difficult to detect. Educational establishments try to combat fraud and forgery in several ways [15], however, most of the methods are time consuming because they are manual and involve human interaction. A lot of the time is spent in either reaching out to the university to verify a certificate or in awaiting a reply from the university that the certificate is valid and true. This process can be extremely laborious and expensive especially if a company needs to check the certificates of several hundreds of applicants. This adds to need of having a cost effective fast solution to verify certificates.

A. Importance of Graduate Certificate

Graduate certificates are of great importance to land a job or pursue further education they are the proof that the holder possesses the necessary knowledge to take a given place or pursue education. If these certificates are forged the foundation could collapse such that the employee would hold a place is not entitled to and could ruin or bring down the company. If it is in an educational institution it could mean many things of which a seat could be occupied by unworthy person instead of a worthy person. The graduate certificate as mentioned earlier can either be paper based or digital.

B. Paper-Based Certificate

Paper based certificates are still widely spread mostly because it is considered more secure than the digital certificate [14],[16]. Paper based certificate have stamps and signatures on them which can say originality [25]. Many entities must a stamp and a signature to accept a given document and graduation certificates are no different. However, the issue that arises is that the holder would be bound to providing the original copy every time the stamp and signatures are required. Another importance for paper based certificate is that they are easy to note from and on;

Say the manuscript; modules can easily be highlighted and marked. Allowing multiple reviewers to go through it and do the same.

Paper based certificates despite being widely used they can be damaging. The most important disadvantages are:

- With paper based certificates is risk of loss and damage. Paper based certificates can easily be lost especially now as it is easy to move between different places and countries.

- Paper-based certificates is that they can be costly especially if changes are required on the document; such as a faulty name was printed, more papers would have to be used and that extra cost for the entity issuing the certificate; this indirectly also effects the environment.

Despite these drawbacks with Paper based certificates entities still use it.

C. Digital based Certificate

The graduate digital certificate is the certificate that is issued in a digital form. It usually issued through a secure certification and verification method [24]. It is mostly adopted in order to solve the management problems of paper based certificate [23]. However one of the important reasons why digital certificates are widely adopted is that digital certificates give a unique feature which is portability [25]; it is easy to transfer documents when they are digital.

Digital based certificates are considered environment friendly and can easily be organized without taking much space. The digital certificates in the simplest form is the easiest to forge without the need for special hardware [25]. Editing software's are widely spread and changes to manuscripts and graduation certificates can easily be made. Digital certificates are easily generated and can be amended with ease. Despite the advantages the digital based certificates they are not widely spread as the paper based certificates and are not the preferred method for many universities. Even if digital based certificates are issued paper based certificates are still required and needed.

How to link Aadhaar with an educational degree certificate[5]

STEP 1

Visit the NAD website and click on Register > Join Now

STEP 2

Then select 'Click Here' to start your Aadhaar based registration

STEP 3

Enter your Aadhaar Number and then the Security Code visible on the screen

STEP 4

Now enter the OTP that you receive on your registered mobile number

STEP 5

Enter the Share Code to protect your file; this share code is a password that lets you access your document

STEP 6

Click on 'Download', you will receive an encrypted XML file in which your Photo, DOB, Email, Mobile, Gender and Address will be included

STEP 7

This file will be used to undertake your KYC on NDML; so upload this offline e-KYC and enter you share code

STEP 8

Enter the Verification Code and Submit

Once you have filled and submitted all the required details, you will receive a page with all the details mentioned in it. This page is called acknowledgement copy and this need to be kept with you for reference if you forget anything in the future [5]

This way you will be able to register with NAD and you can then ask for any certificate and verify the same based on certificate details such as issuing AI Name, Course details, Year of passing, Student Roll Number. You can also verify the certificate using NAD issued Certificate ID

VII. RELATED WORK

There are several incidents where fake documents were discovered. As a result, many techniques arose like holograms, stamps and wet-signatures [10],[15]. However, these techniques can easily be replicated to create forged documents. Fortunately, there are continuous researches aiming to give newer and better means to authenticate, validate, and verify the paper based documents. This made for several techniques to verify the paper based documents.

Print signature is another technique which is proposed to verify tickets [27]. Print signature has two rules which are the 1) registration and 2) authentication. The registration procedure is given to the document to be protected; and the authentication procedure is to verify the authenticity and originality of the printed document. The verification process is made based on Optical character recognition (OCR) techniques. The use of hash value for verification was proposed by the researchers [28]. The proposed method in the conducted research contains two stages which are document enrolment stage and authentication stage. They proposed to compute a hash value in the document enrolment stage and then store it in hash value database. The document is authenticated through computing the hash value again in the authentication stage and compared to the hash value in the database. If it matched, the document is authentic and if it not, the document is not authentic. The generation of hash value depends on the content in the certificate which will help in protecting the document from any changes. However, this approach does not consider securing the stored hashed value from leakage or being attacked.

Barcode is one of the most well-known approaches which can be used for document verification. Barcode technology is one of the most important parts of AIDC. The barcode can be analyzed to obtain the hided data. In term of encoding type, the barcode can be classified into two categories, namely, are 1D barcode and 2D barcode. The 1D barcode usually consists of varying of parallel lines different in both widths and space. Barcode offers several benefits such as High data capacity; error correction ability; and no additional storages [29].

VIII. DISCUSSION

With today's availability of low-cost scanning devices, high-quality printers and better color copy machines, the production and circulation of fake certificates became cheap and easy because a paper document can easily be forged [11],[19]; however, the forgery of important document like graduation certificate became a real issue. The 21th century has experience a lot of fraudulent activities and misconduct most especially in the practices of certificate forgery. The resultant effect of these habits in most cases normally reduces the integrity of institution concern [28]. Hence, anti-counterfeit method has becoming a worldwide research focus.

It is clearly shown in the previous sections that there are some proposed techniques that were made with graduation certificates in mind and there are other techniques made for other purposes that could be adopted to verify the graduate certificates such as QR code, 2D barcode, watermarked QR code and RFIDs. An RFID tag solution is very complex, costly process and the lifetimes of such devices are very limited [24]. compared to computer chips and RFID tags, data hiding technologies like Quick Response (QR) code are much cheaper and do not require specialized hardware for retrieving data. QR codes are inexpensive, and they are passive read-only elements whose content cannot be altered. Decoding of the QR code can be done by many low-cost devices, including smart phones. As QR Code has high capacity, all the standardized features extracted from the fingerprints could be encoded in it. It can be read from any direction and standard encryption techniques can be applied to the QR code to make it even more secure. With each of these techniques there are limitations as reflected earlier. Despite the scare resources in literature, the available literature that focuses on graduate certificate verification is very limited and there is no clear model to graduate certificates verification that could be adopted by universities. Universities do not have a model to work with they simply execute different techniques which are not necessarily suitable and cost effective. The verification process can consume a lot of resources (time and money) for both entities the issuer and verifier. For example, the verifier would call the university and the university would interns consult its records and reply to the verifier. This process is tedious and resources hungry.

IX. CONCLUSION

A lot of challenges are faced by the students and educational institutions for authorization of NAD. The depository may go along with educational institutions to start with. Both students and educational institutions store the data from so many years; the depository becomes full proof solution. If National Academic Depository is established effectively, it would prove to be helpful for storing, retrieving and verifying the degrees. It will enhance the quality of teaching and learning by decreasing the administrative workload on staff recruited in educational institutions. The educational institutions may take up many more important tasks such as analysis of quality of test items, preparation of performance on items and feedback report to teachers, students and parents. It would help in allocating the main purpose of evaluation by enhancing quality of teaching and learning to educational institutions at all levels.

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