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RELIABLITY OF AADHAR CARD: A FORENSIC PERSPECTIVE

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Abstract: *Objective: Indian Government attempted to empower residents of India with a unique identity and a digital platform to establish their identity anytime and at any place by providing aadhaar card. The objective of this study is to find out whether this identity can be forged or not. Materials and Methodology: Photocopies of the samples of both printed and posted cards were taken. Various measurements of various parameters were done using scales. Results: When the results of all the samples were compared, it was observed that variations were present in between the cards printed by oneself and posted through the authority. Variations in dimension of photographs, lengths of bar code, dimensions of card etc. were observed. Conclusion: From the present study it can be concluded that no strict pattern or guidelines are followed while printing aadhaar cards of the individuals and it is suggested that the authorities should make standards so that these cannot be easily forged. It is suggested to install aadhaar card reader devices wherever aadhar card is asked as an identity proof.*

Keywords: Forensic Sciences, Biometric, Fingerprint, Identity Card, Forgery, Aadhar Card, National Identity.

I. INTRODUCTION

In present time, identity theft is one of many crimes which are committed by imposing oneself as any other person. There are also huge chances of criminals slipping by the hands of law and makes the tracking of such persons/criminals a difficult procedure and wastes a lot of time of the investigating agencies. Identity in any means has been in use since early times. Earlier, people used to carry tokens or coins of their kingdom wherever they go as a mark of identity[1]As the time passed, the tokens and coins are replaced by identity cards (ID's) issued by some responsible organization either a Government or private. The identity cards issued by the Government of India are ration card, voter ID card, passport, driver's license, pan card, aadhaar card etc. The identity cards are used at various places including airports, offices, cinema halls, examination centers as identity proof or; sometimes for age verification purposes during bank account opening, making driver licenses etc. Identity cards are made after complete verification of an individual's permanent or current resident address, criminal record etc. After verifications of these particulars, an individual's identity card is prepared by including various parameters like name, age, address, fingerprints gender, age, height, etc. Since these parameters are very easy to manipulate and forge thus, the identity these days implies technology and adding biometric data to those identities (demographic attributes) to make it unique. The basic premise of biometric authentication is that everyone is unique and an individual can be identified by his or her intrinsic physical traits[2]. Physiological characteristics used for biometric authentication include retina scan, iris scan, fingerprint pattern scans, palm print scans, face recognition etc. of an individual[3]. Indian Government is attempting to empower residents of India by providing aadhaar number card which is embedded with person's unique biometric as well as demographic characteristics to establish their identity anytime and anywhere. Aadhaar number is a 12-digit random number issued by Unique Identification Authority of India (UIDAI) to the residents of India[4]. Aadhaar card is used as an identity proof at number of places. The aadhaar card can be obtained through printing by person himself from any café or post from Unique Identification Authority of India (UIDAI). It has been observed that differences

are noted in aadhaar card of one person obtained by printing from the website of UDAI by putting enrolment numbers and received through the post sent by UDAI. So, the study has been carried out to demonstrate the huge variations observed in the printed and posted aadhaar cards. These variations in aadhaarcard can encourage the identity thieves to produce a manipulated aadhaar cards of somebody else as his own his to get benefits from number of places.

II. MATERIALS & METHODOLOGY

To carry out the study, a total of 10 samples of the aadhaar cards were collected from 5 different subjects who have both printed out and received the aadhaar cards from UDAI. Samples 1-5 are the aadhar cards that are sent by the UIDAI by post whereas the samples 6-10 are cards that are printed by individuals by logging on to website (Table No. 1).All the aadhaar cards were collected with consent of the candidate after narrating the research work to be carried out. It was made believed to the candidates that aadhaar cards will not be misused in anyway and returned to them after completion of project. The aadhaar cards were studied and examined on basis of measurements of various entities present on them. Twenty parameters have been selected on the card at various positions (Table-1, Figure 1 and Figure 2).The parameters were measured using a 15cm scale and a meter scale. The measurements were recorded and evaluated.

III. RESULTS

The study has been carried out to demonstrate the variations present on adhaar cards obtained by a person by post of UDAI or by printing through website. The different parameters selected for the study has been evaluated and examined (Table No. 1).
(Table-2 to Table-7) shows variations of various parameters undertaken and (Table-8) shows the range of variation of each demographic entity selected for study in both types of aadhaar cards i.e. printed & posted.
In the present endeavor, the observations on measurement of selected parameters for aadhaar cards have been made and analyzed. There have been variations present in dimensions of the aadhaar card samples in both the cases i.e. printed and posted.(Refer Table-8)

1. Variations are observed in **dimensions of the aadhar card** (denoted by "I", "II" and "III"). In case of cards posted by UIDAI a variation from (8.7-8.5)cm for I, (5.7-5.3)cm for II and (10.3-10.2)cm for III is observed whereas in case of cards printed by oneself the variations are found to be in range of (8.7-7.4)cm for I, (6.8-5.4)cm for II and (10.6-10)cm for III. (Figure 3)

2. Variations are observed in **dimensions of the photograph** (denoted by "X", "Y" and "Z"). In case of cards posted by UIDAIa variation from(2.3-1.95)cm for X, (3.1-2.4)cm for Y and (3.9-3.1)cm for Z is observedwhereas in case of cards printed by oneself the variations are found to be in range of (2.5-1.9)cm for X, (2.7-2.4)cm for Y and (3.6-3.1)cm for Z.(Figure 3)

3. Variations are also observed in **length of Bar Code**(denoted by "B"). In case of cards posted by UIDAI a variation from (5.2-2.7)cm is observed and in case of cards printed by oneself the variations range between (2.6-0)cm.(Figure 4)

4. Differences in spacing between the **name and the year of birth/date of birth** were also observed in samples (denoted by "A"). In case of cards posted by UIDAI a variation of (1.4-0.15)cm is observed and in case of cards printed by oneself the variations between (0.3-0.2)cm.(Figure 4)

5. Variations are also observed in **distance of the photograph** from the lower, left and upper margin of the card(denoted by "C", "D" and "E"). In case of cards posted by UIDAI a variation from (1.9-1.3)cm for C, (0.55-0.2)cm for D and (1.75-1.2)cm for E is observed whereas in case of cards printed by oneself the variations are found to be (2.8-1.25)cm for C, (0.5-0.05)cm for D and (1.9-1)cm for E.(Figure 4)

6. Variations are also observed in **lengths of aadhar number**(denoted by "F").In case of cards posted by UIDAI a variation of (2.7-2.2)cm is observed and in case of cards printed by oneself the variations between(3.2-2.5)cm.(Figure 5)

7. Variations are also observed in **distances of QR Code** from the right, lower and upper margin of the card (denoted by "Q^X", "Q^Y" and "Q^Z"). In case of cards posted by UIDAI a variation of (0.4-0.25)cm for Q^X, (1.3-1.2)cm for $Q^Y$and (2.55-2.5)cm for $Q^Z$is observed whereas in case of cards printed by oneself the variations are found to be (1.65-0.15)cm for Q^X, (2.1-1)cm for Q^Y and (4-2.6)cm for Q^Z.(Figure 5)

8. Variations are observed in **dimensions of QR Code** (denoted by "Q^I", "Q^{II}" and "Q^{III}". In case of cards posted by UIDAI a variation of (2-1.8)cm for Q^I, (2-1.8)cm for $Q^{II}$and (2.9-2.6)cm for Q^{III} is observed whereas in case of cards printed by oneself the variations are found to be (1.8-1.4)cm for Q^I, (1.8-1.4)cm for Q^{II} and (2.6-2)cm for Q^{III}.(Figure 6)

9. Variations in **lengths of "a" and "b"** are observed. In case of cards posted by UIDAI a variation of (4.3-0)cm for a and (0.9-0.3)cm for b is observed whereas in case of cards printed by oneself the variations are found to be (4.3-3.2)cm for a and (0.6-0)cm for b.(Figure 7)

10. On the back side of the card the **address is printed in columns** in samples-1, 2, 3, 5, 6, 7, 8, 9 and 10.(Figure 7)

11. The **address is printed in rows** in sample- 4 only.(Figure 8)

12. It was also observed that some symbols were printed on the lower margin of back side of the card like website, helpline number, address of the issuing authority.(Figure 8)

13. Aadhar number is printed on the front side of all the samples.

14. Both Bar code and QR code are observed in samples-1 and 7 only.

15. Only **Bar Code** was found in samples-3, 4 and 5.

16. Bar Code is present on **front side** of the samples-1, 3, 4 and 5.

17. Bar Code is present on **back side** of the sample-7 only.

18. Only **QR Code** is present in samples-2, 6, 8, 9 and 10.

It has been observed that"**आधार – आमआदमीकाअधिकार**" is printed on the front side of the card on samples-1, 3, 4, 5, 6, 7, 8 and 9 and in sample 2 the same has been written in different language.

IV. DISCUSSION

When the cards were observed, the first thing noticed was the dimensions of the card. In the samples taken under study, it was found that aadhaar cards delivered at the postal addresses by the UDIAI and the cards that were printed out by individuals varied significantly in sizes.

Huge variations have been observed in all the parameters.

It was found that "**A**" showed variations upto1.25cm in cards posted by UIDAI whereas for same parameter it was 0.1cm in cards printed by individuals. Similarly, parameter "**B**" showed a variation of 2.5cm in cards by UIDAI and it was 2.6 when cards that were printed by individuals were observed. Parameters "**C**", "**D**" and "**E**" reflected variations of 0.6cm, 0.35cm and 0.55cm in cards by UIDAI whereas it showed huge variations of 1.55cm, 0.45cm and 0.9cm in cards that were printed by individuals. Parameter "**F**" was observed with a variation of 0.5cm in UIDAI printed cards and 0.7cm in cards printed by individuals.

In cards printed by UIDAI, "**I**", "**II**" and "**III**" were found with variations of 0.2cm, 0.4cm and 0.1cm. When same parameters were observed in cards printed by individuals these were found to be 1.3cm, 1.4cm and 0.6cm. Parameters "**X**", "**Y**" and "**Z**" were observed with variations of 0.35cm, 0.7cm and 0.8cm in case of cards printed by UIDAI whereas these were 0.6cm, 0.3cm and 0.5cm in case of cards printed by individuals. Parameters "$\mathbf{Q^X}$", "$\mathbf{Q^Y}$" and "$\mathbf{Q^Z}$" were observed with variations of 0.15cm, 0.1cm and 0.05cm in cards through UIDAI. The same parameters were found with 1.5cm, 1.1cm and 1.4cm variations in cards printed by individuals.

Variations in cards printed by UIDAI were observed in parameters "$\mathbf{Q^I}$", "$\mathbf{Q^{II}}$" and "$\mathbf{Q^{III}}$" as 0.2cm, 0.2cm and 0.3cm and in cards printed by individuals these were observed to be 0.4cm, 0.4cm and 0.6cm.

Parameter "**a**" was observed with variation of 4.3cm in UIDAI printed cards whereas it was found to be 1.1cm in cards printed by individuals. Similarly "**b**" was observed with variation of 0.6cm in UIDAI printed cards and was found to be varied by 0.6cm in cards printed by individuals.

Huge variations were observed in parameters "A", "B", "Y", "Z" and "a" in cards printed by UIDAI and were observed in parameters in "B", "C", "E", "F", "I", "II", "Q^X", "Q^Y", "Q^Z" and "a" in cards printed by individuals.

From the above data it was observed that no strict pattern or guidelines are followed while printing aadhaar cards of the individuals. Thus, it is concluded that aadhaar card contain massive variations in printed as well as posted samples. It is suggested to create an online system in the departments where the copy of aadhaar card is attached as proof so that it can be verified immediately. These variations must be taken account by UDAI otherwise the aadhaar card can be easily forged and misused by any individual.

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TABLES

Code given to measurement made	Measurement Made
A	Distance between the name and the year/date of birth
B	Length of the Bar Code
C	Distance from lower margin of

	Photograph to the lower margin of the Card
D	Distance from Left margin of the Photograph to the Left margin of the Card.
E	Distance from Upper margin of the Photograph to the Upper marginof the Card.
F	Length of Aadhar number
I	Length along X-Axis of the Card.
II	Length along Y-Axis of the Card.
III	Length along Z-Axis of the Card.
X	Length along the X-Axis of the Photograph.
Y	Length along Y-axis of the photograph.
Z	Length along Z-axis of the photograph.
Q^{I}	Length along X-Axis of the QR Code.
Q^{II}	Length alongY-Axis of the QR Code.
Q^{III}	Length along Z-Axis of the QR Code
Q^{X}	Distance between the right margin of the QR Code to the right margin of the Card.
Q^{Y}	Distance frombase of the QR Code to the Base of the Card.
Q^{Z}	Distance between uppermargin of the QR Code to the upper marginof the Card.
A	Distance from address bar to the left margin of the card
B	Distance from address bar to distance between the addresses column

Table 1: Showing the parameters measurements made on aadhaar cards.

S.No.	Status of aadhaar card obtained	A(cm)	B(cm)	F(cm)
1	Posted by UDAI	0.9	5.2	2.2
2	Posted by UDAI	1.4	0	2.7
3	Posted by UDAI	0.8	2.7	2.7
4	Posted by UDAI	0.15	2.7	2.7
5	Posted by UDAI	0.75	2.7	2.7
6	Printed	0.2	0	3.2
7	Printed	0.2	2.6	3.1
8	Printed	0.25	0	2.5
9	Printed	0.3	0	2.6
10	Printed	0.3	0	2.8

Table 2: showing measurements recorded for A, B, and F denoting distance between the name and year of birth or date of birth, length of bar code and length of aadhaar number.

S.No.	Status of aadhaar card obtained	C(cm)	D(cm)	E(cm)
1	Posted by UIDAI	1.9	0.2	1.2
2	Posted by UIDAI	1.3	0.4	1.2
3	Posted by UIDAI	1.45	0.25	1.55
4	Posted by UIDAI	1.7	0.55	1.75
5	Posted by UIDAI	1.4	0.5	1.65
6	Printed	2.1	0.25	1
7	Printed	1.25	0.05	1.9
8	Printed	2.8	0.2	1.4
9	Printed	2.5	0.5	1.8
10	Printed	1.9	0.35	1.8

Table 3: showing measurements recorded for C,D and E denoting distances from lower, left and upper margins of the image on the card.

S.No.	Status of aadhaar card obtained	I(cm)	II(cm)	III(cm)
1	Posted by UIDAI	8.6	5.7	10.3
2	Posted by UIDAI	8.5	5.7	10.3
3	Posted by UIDAI	8.6	5.4	10.2
4	Posted by UIDAI	8.6	5.3	10.2
5	Posted by UIDAI	8.7	5.7	10.3
6	Printed	8.7	5.6	10.4
7	Printed	8.6	5.4	10.1
8	Printed	7.4	6.7	10
9	Printed	7.85	6.8	10.4
10	Printed	8.4	6.5	10.6

Table 4: showing measurements recorded for I, II, III denoted the dimensions of the card in x, y and z axis respectively.

S.No.	Status of aadhaar card obtained	X(cm)	Y(cm)	Z(cm)
1	Posted by UIDAI	2.2	2.5	3.3
2	Posted by UIDAI	2.3	3.1	3.9
3	Posted by UIDAI	1.95	2.5	3.2
4	Posted by UIDAI	1.95	2.4	3.1
5	Posted by UIDAI	1.95	2.5	3.2
6	Printed	1.9	2.5	3.1
7	Printed	2.3	2.65	3.6
8	Printed	2.2	2.4	3.2

9	Printed	2.2	2.5	3.3
10	Printed	2.5	2.7	3.6

Table 5: Showing measurements recorded X, Y and Z denoting the dimensions of the photograph.

S.No.	Status of aadhar card obtained	Q^I(cm)	Q^{II}(cm)	Q^{III}(cm)	Q^X(cm)	Q^Y(cm)	Q^Z(cm)
1	Posted by UIDAI	1.8	1.8	2.6	0.4	1.3	2.55
2	Posted by UIDAI	2	2	2.9	0.25	1.2	2.5
3	Posted by UIDAI	0	0	0	0	0	0
4	Posted by UIDAI	0	0	0	0	0	0
5	Posted by UIDAI	0	0	0	0	0	0
6	Printed	1.8	1.8	2.6	1.65	1.25	2.6
7	Printed	1.65	1.65	2.3	0.4	1	2.7
8	Printed	1.4	1.4	2	0.3	2.1	3.1
9	Printed	1.55	1.55	2.2	0.15	1.5	3.7
10	Printed	1.5	1.5	2.1	0.4	1	4

Table 6: Showing measurements recorded for Q^I, Q^{II}, Q^{III} denoting dimensions of QR Code and , Q^X, Q^Y, Q^Zdenotes distance of QR Code in respect to the right, lower and upper margin of the card.

S.No.	Status of aadhar card obtained	a(cm)	b(cm)
1	Posted by UIDAI	4	0.7
2	Posted by UIDAI	4.3	0.3
3	Posted by UIDAI	4.05	0.9
4	Posted by UIDAI	0	0.7
5	Posted by UIDAI	4.1	0.4
6	Printed	4	0.6
7	Printed	4.3	0
8	Printed	3.2	0.3
9	Printed	3.5	0.4
10	Printed	3.9	0.3

Table 7: Showing measurements recorded for "a" and "b" denoting distance from address bar to the left margin of the card and distance between the addresses column respectively.

S. No.	Parameters	Measurement Made	Posted by UIDAI (1-5)	Print By Individuals (6-10)
1	A	Distance between the name and the year/date of birth	1.4-0.15(1.25)	0.3-0.2(0.1)
2	B	Length of the Bar Code	5.2-2.7(2.5)	2.6-0(2.6)
3	C	Distance from lower margin of Photograph to the lower margin of the Card	1.9-1.3(0.6)	2.8-1.25(1.55)
4	D	Distance from Left margin of the Photograph to the Left margin of the Card.	0.55-0.2(0.35)	0.5-0.05(0.45)
5	E	Distance from Upper margin of the Photograph to the Upper margin of the Card.	1.75-1.2(0.55)	1.9-1(0.9)
6	F	Length of Aadhar number	2.7-2.2(0.5)	3.2-2.5(0.7)
7	I	Length along X-Axis of the Card.	8.7-8.5(0.2)	8.7-7.4(1.3)
8	II	Length along Y-Axis of the Card.	5.7-5.3(0.4)	6.8-5.4(1.4)
9	III	Length along Z-Axis of the Card.	10.3-10.2(0.1)	10.6-10(0.6)
10	X	Length along the X-Axis of the Photograph.	2.3-1.95(0.35)	2.5-1.9(0.6)
11	Y	Length along Y-axis of the photograph.	3.1-2.4(0.7)	2.7-2.4(0.3)
12	Z	Length along Z-axis of the photograph.	3.9-3.1(0.8)	3.6-3.1(0.5)
13	Q^x	Length along X-Axis of the QR Code.	0.4-0.25(0.15)	1.65-0.15(1.5)
14	Q^y	Length alongY-Axis of the QR Code.	1.3-1.2(0.1)	2.1-1(1.1)
15	Q^z	Length along Z-Axis of the QR Code	2.55-2.5(0.05)	4-2.6(1.4)
16	Q^I	Distance between the right margin of the QR Code to the right margin of the Card.	2-1.8(0.2)	1.8-1.4(0.4)
17	Q^{II}	Distance from base of the QR Code to the Base of the Card.	2-1.8(0.2)	1.8-1.4(0.4)
18	Q^{III}	Distance between upper margin of the	2.9-2.6(0.3)	2.6-2(0.6)

		QR Code to the upper margin of the Card.		
19	a	Distance from address bar to the left margin of the card	4.3-0(4.3)	4.3-3.2(1.1)
20	b	Distance from address bar to distance between the addresses column	0.9-0.3(0.6)	0.6-0(0.6)

Table 8: Showing the range of variation of each demographic entity selected for study in both types of aadhaar cards i.e. printed & posted.

FIGURE LEGENDS

Figure 1-Showing the measurements made on front side of aadhaar card.

Figure 2-Showing the measurements made on back side of aadhaar card.

Figure 3– Parameters X, Y, Z, I, II and III are represented by red lines.

Figure 4 - Parameters A, B, C, D and E are represented by red lines.

Figure 5 – Parameters F, Q^X, Q^Y and Q^z are represented by red lines.

Figure 6 – Parameters Q^I, Q^{II} and Q^{III} are represented by red lines.

Figure 7 – Parameters a and b are represented by red lines. Address written in columns are represented by blue boxes.

Figure 8 – Address written in rows are marked in red boxes. Blue boxes contain various logos present on the back side of the cards.