# Voting System with AI and Blockchain

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# Outline

- Objectives
- Methodology
- Results
- Analysis/ Discussion of Results
- Project Status
- References

# **Objectives**

- Voting web application that incorporates blockchain for system security.
- Face recognition system for identity authentication.

# Methodology

- UI for voter to login is created
- Voter's ID is matched with database
- Second phase of authentication is via face recognition
- The authentic voters will have coin
- Voters having coin can cast the vote
- Block created for each voter
- Block are chained with headers (hash, address, etc.)

### **Block Diagram**



## **Block Diagram (CONTD...)**



Fig: Face recognition

### **Block Diagram (CONTD...)**



Fig: Security of voting information

## **Face Recognition**

- Face recognition
  - Face verification: one-to-one mapping to identify faces against a known identity
  - Face identification: one-to-many mapping for a given face against a database of known faces
- Facenet developed at Google in June 2015



- Learn similarity function
- $d(img_1, img_2) = degree$  of difference between images
  - If  $d(img_1, img_2) \le \tau$ : "Same images"
  - If  $d(img_1, img_2) > \tau$ : "Different images"
- $\tau$  is threshold value

- Based on Deep Neural Network (Inception Network)
- Encodes face data to 128 bytes
- If x is the image, f(x) is the encoded image data
- Goal of learning:
  - If  $x^i, x^j$  are the same person,  $||f(x^i) f(x^j)||^2$  is small
  - If  $x^i, x^j$  are the different person,  $||f(x^i) f(x^j)|^2$  is large

Actor(A)







Positive(p)



Negative(N)



- Want:  $||f(A) f(P)||^2 + \alpha \le ||f(A) f(N)||^2$
- $||f(A) f(P)||^2 ||f(A) f(N)||^2 + \alpha \le 0$  $d(A, P) + \alpha \le d(A, N)$
- *α* is margin

Loss function

 $L(A, P, N) = \max(||f(A) - f(P)||^{2} - ||f(A) - f(N)||^{2} + \alpha, 0)$ 

- Choosing A, P, N:
  - Choose triplets that're "hard" to train on
    - $d(A,P)\approx d(A,N)$
  - Because algorithm model will cover more features



# **Working Principle**

- Combination of AI and Blockchain
- Database for User information
- Face recognition for user authentication
- Blockchain for data security



# Output

### election

Home About Registration Login

# Vote your candidates

Democracy is about voting and it's about a majority vote. And it's time that we started exercising the Democratic process. - Debbie Stabenow Let's vote!



### Secure your spot

Your each one vote counts, Let's take a step signing up and logging!

Register

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		Demographic Details		
First Name	First Name	Middle Name	Middle Name	
Last Name:	Last Name	Mother's Name:	Mother's Name	
Father's Name:	Father's Name	Gender	Select Gender	•
Date of birth	mm/dd/yyyy	Education	Education	
Occupation	Occupation	Post	Post	
Citizenship No.	Gitizenship Number	Citizenship issued District	Select District	•
Passport No.	Persport Number	Blood Group	Blood Group	
		Address Details		
		Present Address		
State	State	Zone	Select Zone	•
District	Select District	. Rural Muncipality/ Muncipality	Rural Muncipality/ Muncipality	
Ward No.	Ward Number	Tole	Tole	
Block No.	Block Number	Contact No.	Contact Number	

#### election

Home About Registration Login

	Citizenship Number	
Citizenship Numl	er	
	Password	
Password		

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		Demographic Details		
First Name	First Name	Middle Name	Middle Name	
Last Name:	Last Name	Mother's Name:	Mother's Name	
Father's Name:	Father's Name	Cender	Select Gender	
Date of birth	mm/dd/yyyy	Education	Education	
Decupation	Occupation	Post	Post	
Citizenship No.	Citizenship Number	Citizenship issued District	Select District	
Passport No.	Ressport Number	Blood Group	Blood Group	
		Address Details		
		Present Address		
State	State	Zone	Select Zone	•
District	Select District	Rural Muncipality/ Muncipality	Rural Muncipality/ Muncipality	
Ward No.	Ward Number	Tole	Tole	
Block No.	Block Number	Contact No.	Contact Number	

Election	WELCOME, 1 VIEW SITE / CHANGE PASSWORD / LOG OUT
Home - User - Users -	
Change user	HISTORY
Demographic Details	
First name:	
Middle name:	
Last name:	
Password:	algorithm: pbkdf2_sha256 iterations: 180000 salt.rJQNYk****** hash: 1p7Ydp***********************************
Mother's Name:	
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## **Analysis/ Discussion of Result**

Analysis of result





Fig: database image

Fig: testing image(0.33040315)



Fig: testing image (0.56747013)

- Face is verified with distance 0.33040315 (for recent images)
- Face is verified with distance 0.56747013 (for 4 years gap images)
- Image is verified but distance is slightly larger
- Threshold value is 0.6

# Analysis/ Discussion of Result (Contd...)

- The distance is larger for slightly different images
- The second image is from 5 years back
- The model is quite accurate as it recognizes old image too
- The distance will be very large for completely different images (images of different person)



Fig: testing different image (0.635434)

This is True Negative case and truly classified with distance
 0.635434

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# Thank you