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Face-PIN : Face Biometric Authentication System for ATM using Deep Learning

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ABSTRACT

Automated Teller Machines also known as ATM's are widely used nowadays by each and everyone. There is an urgent need for improving security in banking region. Due to tremendous increase in the number of criminals and their activities, the ATM has become insecure. ATM systems today use no more than an access card and PIN for identity verification. The recent progress in biometric identification techniques, including finger printing, retina scanning, and facial recognition has made a great effort to rescue the unsafe situation at the ATM. This project proposes an automatic teller machine security model that would combine a physical access card and electronic facial recognition using Deep Convolutional Neural Network. If this technology becomes widely used, faces would be protected as well as their accounts. Face Verification Link will be generated and sent to user to verify the identity of unauthorized user through some dedicated artificial intelligent agents, for remote certification. However, it obvious that man's biometric features cannot be replicated, this proposal will go a long way to solve the problem of Account safety making it possible for the actual account owner alone have access to his accounts.

I. INTRODUCTION

Automated Teller Machines, popularly referred to as ATMs, are one of the most useful advancements in the banking sector. ATMs allow banking customers to avail quick self-serviced transactions, such as cash withdrawal, deposit, and fund transfers. ATMs enable individuals to make banking transactions without the help of an actual teller. Also, customers can avail banking services without having to visit a bank branch. Most ATM transactions can be availed with the use of a debit or credit card. There are some transactions that need no debit or credit card.

II. TYPES OF AUTOMATED TELLER MACHINES (ATMS)

Automated Teller Machines (ATMs) are mainly of two types. One is a simple basic unit that allows you to withdraw cash, check balance, change the PIN, get mini statements and receive account updates. The more complex units provide facilities of cash or cheque deposits and line of credit & bill payments. There are also onsite and offsite Automated Teller Machines: the onsite ATMs are within the bank premises, unlike the offsite ones which are present in different nooks and corners of the country to assure that people have basic banking facilities and instant cash withdrawals if they can't go to a bank branch. ATMs can also be categorized based on the labels assigned to them. Some of these labels are listed below-

- Green Label ATMs- Used for agricultural purposes
- Yellow Label ATMs- Used for e-commerce transactions
- Orange Label ATMs- Used for share transactions
- Pink Label ATMs- Specifically for females to help avoid the long queues and waiting time
- White Label ATMs – Introduced by the TATA group, white label ATMs are not owned by a particular bank but entities other than the bank
- Brown Label Banks- Operated by a third party other than a bank

III. USES OF AN AUTOMATED TELLER MACHINE

Automated Teller Machines have revolutionized the banking sector by providing easy access to customers and loading off the burden from bank officials. Some of the uses of an ATM are-

- The most common uses of an Automated Teller Machine include withdrawing money, checking balance, transferring money, or changing the PIN (Personal Identification Number)
- Newer and advanced ATMs also provide options to open/withdraw a Fixed Deposit (FD), or to apply for a personal loan. You can also book railway tickets, pay the insurance premiums, income tax & utility bills, recharge mobile, and deposit cash. Some of these facilities require you to register at the bank branch
- Customers can now do money transactions at their convenience. ATMs today are installed in public spaces, highways, malls, market places, railway/airport stations, hospitals, etc.
- Automated Teller Machines provide 24×7 access anywhere
- ATMs help to avoid the hassle of standing in long queues at the bank even for simpler transactions like withdrawing money. It has also helped in reducing the workload of the bank officials.

IV. ATM FRAUD

Over the last two decades, automated teller machines (ATMs) have become as much a part of the landscape as the phone booths made famous by Superman. As a result of their ubiquity, people casually use these virtual cash dispensers without a second thought. The notion that something could go wrong never crosses their minds. Most ATM scams involve criminal theft of debit card numbers and personal identification numbers (PINs) from the innocent users of these machines. There are several variations of this confidence scheme, but all involve the unknowing cooperation of the cardholders themselves.

ATM fraud is described as a fraudulent activity where the criminal uses the ATM card of another person to withdraw money instantly from that account. This is done by using the PIN. The other type of ATM fraud is stealing from the machine in the ATM by breaking in.

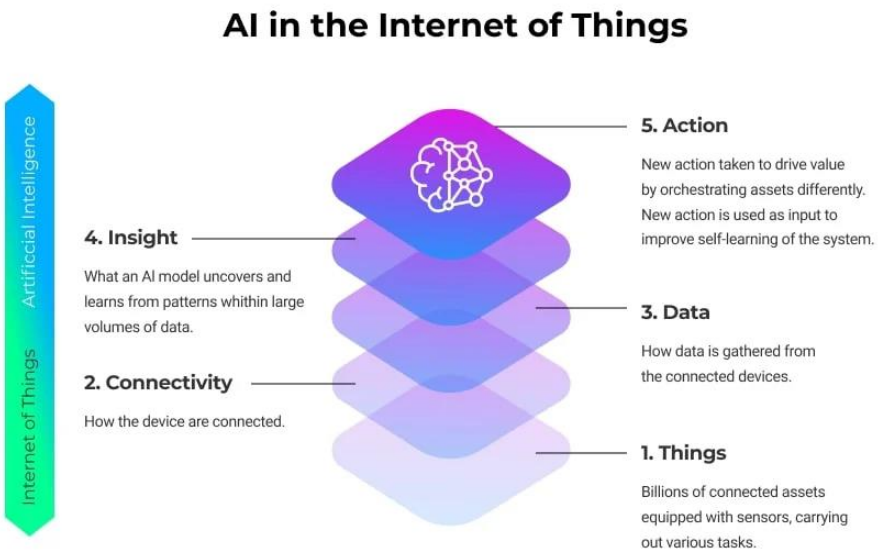
- **Skimming:** This type of ATM scam involves a skimmer device that criminals place on top of or within the card slot. To record your PIN number, the criminals may use a hidden camera or an overlay that covers the original PIN pad. Using the card numbers and PIN's they record; thieves create duplicate cards to withdraw money from consumers' accounts. Unlike losing your debit card or having it stolen, you won't realize anything is amiss until unauthorized transactions take place. Take a look at these so you know how to detect ATM skimmers.
- **Shimming:** This is the latest update to skimming. Instead of reading your card number, criminals place a shimming device deep inside the ATM to record your card's chip information. The end result is the same as skimming because thieves use the stolen chip data to create "cloned" versions of your debit card.
- **Cash-out:** This scam targets multiple accounts from the same financial institution. Armed with a hacked bank employee's credentials, the criminal alters account balances and withdrawal limits. Using stolen debit card numbers captured from a separate skimming attack, they can "cash out" the ATM until it's out of money.
- **Jackpotting:** While there are multiple types of jackpotting attacks, typically, these incidents involve gaining physical access to the inside of the machine. The criminals may replace hardware or install malicious software giving them control of the cash dispensing function. Jackpotting is similar to a cash out scam, but it does not require the criminal to have any customer account details or stolen debit card information.

V. PROBLEM IDENTIFIED

Nowadays, crimes at ATMs have become an alarming issue. Security for the customer's account is notguaranteed by PIN. Many people, who aren't familiar with the concept of PIN are unlikely to memorize andrecognize it. There are many people who mistrust PIN, such as, if they have lost their card, they would feelunsafe that their account could be accessed by others and they would lose all their money.

VI. AI WITH IOT

Individually, the Internet of Things (IoT) and Artificial Intelligence (AI) are powerful technologies. When you combine AI and IoT, you get AIoT—the artificial intelligence of things. You can think of internet of things devices as the digital nervous system while artificial intelligence is the brain of a system.To fully understand AIoT, you must start with the internet of things. When "things" such as wearable devices, refrigerators, digital assistants, sensors and other equipment are connected to the internet, can be recognized by other devices and collect and process data, you have the internet of things.



Artificial intelligence is when a system can complete a set of tasks or learn from data in a way that seems intelligent. Therefore, when artificial intelligence is added to the internet of things it means that those devices can analyze data and make decisions and act on that data without involvement by humans.These are "smart" devices, and they help drive efficiency and effectiveness. The intelligence of AIoT enables data analytics that is then used to optimize a system and generate higher performance and business insights and create data that helps to make better decisions and that the system can learn from.

VII. REAL-WORLD EXAMPLES OF AI EMBEDDED IOT DEVICES

- **Traffic Management**

Traffic is a real problem in urban areas and there is a consistent need for efficient traffic management to avoid congestion. Traffic management can be difficult if it has to be done by humans as it would only lead to chaos and confusion. AIoT, however, is a smart solution to this problem. Real-time traffic can now be managed efficiently using drones that can monitor large areas and transmit the traffic data which can then be analyzed using AI for final decision making like adjusting traffic lights without human intervention.

- **Self- Driving Cars**

Self-driving cars are another use case of IoT devices embedded with AI. Tesla's self-driving cars are the best example. With the help of installed sensors and the power of AI, this car has the ability to make human-like decisions by determining the conditions of the surroundings. For example, they can determine the optimal speed, weather and road conditions to make effective decisions.

- **Smart Homes**

IoT blended with AI has also led to the emergence of smart homes concept. Smart homes have all the devices connected to each other with the help of IoT and these devices also possess the ability to make smart decisions with the help of AI. Smart homes tend to make our lives easier by giving us the power to control our devices even remotely. For example, we can pre-decide the time of switching on the television or making a call to the

fire department in-case of fire. We can also turn our appliances on or off as required even when we are away from our homes.

- **Body Sensors**

Maintaining a good health is a big challenge for people today. Due to busy schedules, visiting doctors every now and then for regular checkups is also difficult for a huge chunk of population but this problem can also be solved with the help of wearable devices such as fitness trackers that help in tracking blood sugar levels, heartbeat, cholesterol levels and much more thereby helping in health management. These sensors can also be used by construction companies to detect the posture of their laborers in order to avoid any kind injuries while working

- **Robots for Manufacturing Industries**

Manufacturing Industries also make use of robots for manufacturing processes and these robots are nothing but another kind of AI embedded IoT devices. They help in enhancing the manufacturing processes by saving time and cost of processing. An example is the use of robots by eye wear manufacturers for manufacturing lenses with a great precision.

- **Face Detection**

Face detectors are another important use case of AIoT. Face detection becomes important for crime investigation departments and even in offices for detecting the faces of employees for the purpose of attendance. Another interesting area where face detectors are being used currently are shopping malls and other public places to keep a check on whether people are wearing masks or not and punishing the defaulters accordingly.

- **Retail Analytics**

Management of staff in retail outlets is an important task because both over staffing and under staffing can lead to inefficient operations. With the use of sensors and AI, however, people entering the outlets and their movement inside the outlet can be observed in order to estimate the time they will take to reach the checkout line. The staff at the counter can then be increased or decreased accordingly to reduce the checkout time and increase productivity. The captured data can also be used later for determining the peak hours and formulate management strategies well in advance.

- **Smart Buildings**

Another area of intersection of IoT and AI is smart office buildings. So, not only homes but a whole building can also have AIoT installed for better operational efficiency and management cost. Some companies for example, install a network of AIoT devices in their buildings and these devices can detect the presence of personnel and adjust the temperatures accordingly or turn off appliances where no one is present thereby increasing energy efficiency which ultimately leads to lower costs.

VIII. IOT AND MACHINE LEARNING

IoT is the data “supplier”, while machine learning is the data “miner”. To make the data supplied by IoT work, it needs to be refined. Dozens of IoT sensors and external factors are producing a myriad of data points. The “miner’s” task here is to identify correlations between them, extract meaningful insight from these variables and transport it to the storage for further analysis.

IX. DEEP LEARNING

Deep learning attempts to mimic the human brain—albeit far from matching its ability—enabling systems to cluster data and make predictions with incredible accuracy.Deep learning is a subset of machine learning, which is essentially a neural network with three or more layers. These neural networks attempt to simulate the behavior of the human brain—albeit far from matching its ability—allowing it to "learn" from large amounts of data. While a neural network with a single layer can still make approximate predictions, additional hidden layers can help to optimize and refine for accuracy.

Deep learning drives many artificial intelligence (AI) applications and services that improve automation, performing analytical and physical tasks without human intervention. Deep learning technology lies behind everyday products and services (such as digital assistants, voice-enabled TV remotes, and credit card fraud detection) as well as emerging technologies (such as self-driving cars).

X. SCOPE OF THE PROJECT

Face recognition can be used to secure ATM transaction and is used as a tool for authenticating users to confirm the card owner. Financial fraud is a very important problem for Banks and current secure information in the ATM card magnetic tape are very vulnerable to theft or loss. By using face recognition as a tool for authenticating users in ATMs can be confirmed as the card owner. Face Based ATM login Process the ATMs which are equipped with Face recognition technology can recognize the human face during a transaction. When there are "Shoulder Surfers" who try to peek over the cardholder's shoulder to obtain his PIN when the cardholder enters it, the ATMs will automatically remind the cardholder to be cautious. If the user wears a mask or sunglasses, the ATM will refuse to serve him until the covers are removed.

Touch less - There is no need for remembering your passwords. Only looking at the ATM camera will login the card holder instantly. No physical contact is needed.

Secure - Since your face is your password, there is no need to worry for your password being forgotten or stolen. In addition, the face recognition engine locks access to the account and transaction pages for the card holder as the card holder moves away from the camera of the ATM and another face appears Face based card holder authentication can be used as primary or as a secondary authentication measure along with ATM PIN. Face based authentication prevents ATM fraud by the use of fake card and stolen PIN or stolen card itself. Face verification is embedded with security features to prevent fraud, including liveness-detection technology that detects and blocks the use of photographs, videos or masks during the verification process.