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# Automated Enhanced Learning System using IoT

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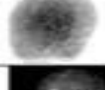
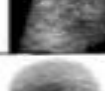

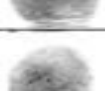

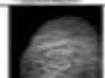

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**ABSTRACT:** The paper discusses the significance of fingerprint analysis in application of learning. It highlights the use of deep learning, for improving precision and model efficiency in fingerprint classification. Additionally, it presents a novel approach for enhancing fingerprint security by leveraging deep learning and minutia-based authentication. The paper also delves into the relationship between fingerprint patterns and brain lobes to uncover inborn potential and personality traits. Lastly, it touches upon dermatoglyphics and its role in identifying genetic anomalies and their influence and education quality.

## I. INTRODUCTION

Learning styles play an important role in grasping and understanding the power of a student. If the activities, assignments, tutorials etc. are designed as per the preferential learning styles of the student it can result in significant improvement in grasping and understanding the subject by the student. Fingerprints are formed in the womb of the mother, and they can be utilized to identify the learning style of the student. There are four general patterns of fingerprint i.e., whorl, loop, arch, and accidental as shown in figure. Ridges on the skin of the palm and toes begin to form after the 13th week embryo grows in the maternal body. The formation of these patterns i.e. dermal lines will complete during the 24th week. Once fully developed the dermal patterns remain unchanged for the whole life. The formation and analysis of these patterns

Clinical specialists, through tracking, recording, comparison, induction, and trials showed that fingerprints deliver the exact evaluation of a character's innate talents. The evaluation gadget opinions the distribution of mind's understanding ability and allotment of cerebral characteristics of a selected and additional elements suitable statistical document of a person's innate intelligence. Thus, it permits the increase of the man or woman in international leading information.

S.No.	Name	Fingerprint	Type
1.	Aalekh		Loop
2.	Akshat		Loop
3.	Aryan		Loop
4.	Ashutosh		Whorl
5.	Avichal		Loop
6.	Dipali		Whorl
7.	Ishan		Whorl
8.	Kartikay		Arch
9.	Kirti		Whorl

### Why This Method Is Better Than Others-

Fingerprint authentication has become a norm in our day-to-day society that its vulnerability is never challenged. However, due to technology advancements, malicious attempts which bypass security systems using fake fingerprints have been increased. Many systems today use algorithms that match the records in the database with the input provided by the scanner for user authentication. As these methods in specific applications are not modified and updated regularly at a pace that equals or exceeds the progress made by malicious individuals, it leaves biometric recognition at an increased risk and makes them susceptible to cyber-attacks. [2]

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Dermatoglyphics involves the study of epidermal ridges found in fingerprints and palm prints, which develop in tandem with a fetus's neural growth during the prenatal stage. This field can be utilized to detect genetic anomalies congenital deformities, and various medical conditions, offering early insights into brain function. In conjunction with the Myers-Briggs Type Indicator (MBTI), which assesses psychological traits influencing decision-making and perception, a deeper exploration of the link between Dermatoglyphics and personality types can offer valuable insights. This understanding may be employed to assess a child's potential, shape career choices, and guide parents in addressing emotional and social needs, as well as making informed hiring decisions. [3]

Intellectual quotient (IQ) is a widely acknowledged measure of an individual's thinking ability, despite there being eight distinct types of intelligence. This study aims to establish the relationship between IQ and fingerprint patterns to better comprehend the connection between fingerprint ridge structures and intellectual indicators, which can inform educational strategies. While some research suggests a significant correlation between the "Arch" fingerprint pattern in the left thumbs of females and their intellectual performance, the need for additional global studies to arrive at a universally accepted conclusion is emphasized.

Fingerprint patterns are genetically determined and remain unchanged throughout one's life. Notably, it's not just the connection between fingerprint patterns and IQ that's important; factors like height, skeletal morphology, and lifestyle changes also strongly influence an individual's intelligence quotient. [4]

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## II. LITERATURE SURVEY

Assessment Methods of Cognitive Ability of Human Brains for Inborn Intelligence Potential Using Pattern Recognitions

Conclusion:

It can be used as a useful adjunct to aid in preliminary study of field and behavior of child.

Limitation:

while pattern recognition is a valuable tool for assessing cognitive abilities and inborn intelligence potential, it should be used cautiously, considering its limitations, and supplementing it with a broader range of assessment methods for a more accurate understanding.

Secure Fingerprint Authentication Using Deep Learning and Minutiae Verification:

Conclusion:

The inception model is used for filtering out bad fingerprints. If the output of the inception model says that it is a good fingerprint, it is given to the verification module where matching of the fingerprint is performed.



**Limitation: Generalization to Various Conditions:** The proposed system's ability to handle variations in fingerprint conditions, such as wet or dry fingers, aging, and different scanning devices, is essential for practical usability. The paper should discuss the system's robustness in diverse environments.

**Integration Challenges:** Implementing a secure fingerprint authentication system involves integration into existing frameworks. The paper should acknowledge and discuss potential challenges in integrating the proposed solution.

**Decoding Human Personality Through Dermatoglyphics:**

**Conclusion:**

jects for personality types, presented in the form of a pie chart in Figure Figure1,1, INFJ accounts for 26% of all observed personality types, making it the most prevalent. In other research investigations, this personality type is not the most pervasive.

**Limitation:**

**Limited Scientific Validation:** The scientific community may not universally accept dermatoglyphics as a reliable method for personality assessment. The lack of robust empirical evidence linking specific fingerprint patterns to personality traits can be a significant limitation.

**Fingerprint Classification Based on Deep Learning Approaches: Experimental Findings and Comparisons:**

**Conclusion:**

The appearance of the whorl patterns on the right forefingers' accounts for 27.66%, while the loop patterns appear the most and the fewest are the Arch, 9.47%. On the left thumbs, the whorl patterns' frequency is 15.10%, the loop patterns appear the most with 71.53% and the lowest frequency belongs to the Arch with 13.07%.

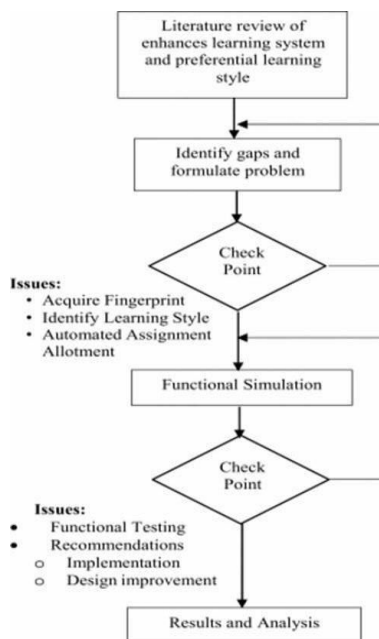
**Limitation:**

**Cultural Bias:** Intelligence assessments and fingerprint patterns might be influenced by cultural factors. If the study does not account for these cultural nuances, it may not accurately reflect the relationship between fingerprint patterns and intelligence within the Vietnamese cultural context.

**Ethnic and Genetic Variability:** Genetic factors contribute to both fingerprint patterns and intelligence. Failing to consider the genetic diversity within the Vietnamese population may lead to incomplete conclusions about the relationship between these variables.

**Dataset Quality and Diversity:** The effectiveness of deep learning models heavily relies on the quality and diversity of the training dataset. If the dataset lacks variety in terms of fingerprint patterns, ethnicities, and environmental conditions, the model's generalization may be limited.

**III. FLOWCHART**



#### IV.METHODOLOGY

##### Gaussian Blurring:

Gaussian blur is the result of blurring an image by a Gaussian function.

It is a widely used effect in graphics software, typically to reduce image noise and reduce detail. It is also used as a preprocessing stage before applying our machine learning or deep learning models.



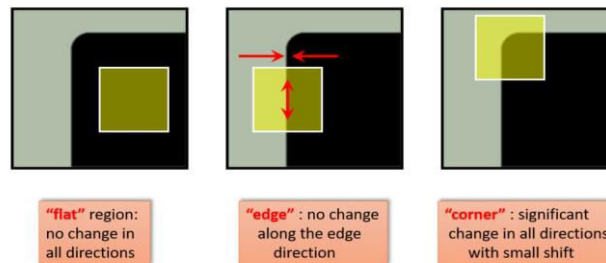
##### B. Harris Corner detection:

This algorithm was developed to identify the internal corners of an image.

The corners of an image are basically identified as the regions in which there are variations in large intensity of the gradient in all possible dimensions and directions. Corners extracted can be a part of the image features.

Harris Corner Detection is a method to extract the corners from the input image and to extract features from the input image.

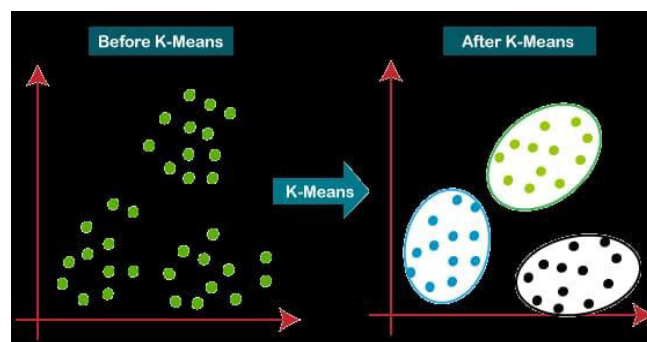
#### Corner Detection: Basic idea



##### C.K-Means Clustering:

K-means is an unsupervised learning method for clustering data points. The algorithm iteratively divides data points into K clusters by minimizing the variance in each cluster.

Here, we will show you how to estimate the best value for K using the elbow method, then use K-means clustering to group the data points into clusters



How does it work?

First, each data point is randomly assigned to one of the K clusters. Then, we compute the centroid (functionally the center) of each cluster and reassign each data point to the cluster with the closest centroid.

We repeat this process until the cluster assignments for each data point are no longer changing.

D. Algorithm:

Apply the Gaussian blur to reduce noise.

Detect minutiae using the Harris Corner Detector

Perform clustering to classify patterns.

Use K-means clustering to classify patterns.

Classify the fingerprint pattern.

Define patterns based on labels (Loop, Arch, Whorl). Display the classified fingerprint pattern and its percentage.

Step 1: Searched questions to make an online Google Form.

Step 2: Assembled all information, images, paragraph and separated them.

Step 3: Accordingly arranged them in respective form. Step 4: Made Google Form.

Step4: Collected the score.

E. Patterns:

**Loops** - prints that recurve back on themselves to form a loop shape. Divided into radial loops (pointing toward the radius bone, or thumb) and ulnar loops (pointing toward the ulna bone, or pinky), loops account for approximately 60 percent of pattern types.



**Whorls** - form circular or spiral patterns, like tiny whirlpools. There are four groups of whorls: plain (concentric circles), central pocket loop (a loop with a whorl at the end), double loop (two loops that create an S-like pattern) and accidental loop (irregular shaped). Whorls make up about 35 percent of pattern types.



**Arches** - create a wave-like pattern and include plain arches and tented arches. Tented arches rise to a sharper point than plain arches. Arches make up about five percent of all pattern types.



## F. Authors and Affiliations:

1. Assessment Methods of Cognitive Ability of Human Brains for Inborn Intelligence Potential Using Pattern Recognitions The study highlights the potential of pattern recognition techniques in assessing cognitive ability and inborn intelligence potential through the analysis of fingerprint patterns. This suggests that such methods could offer efficient and reliable means of evaluating human cognitive capabilities.

2. Secure Fingerprint Authentication Using Deep Learning and Minutiae Verification The utilization of deep learning and minutiae verification in secure fingerprint authentication presents promising advancements in biometric authentication systems. These findings suggest that leveraging deep learning techniques can significantly enhance the accuracy and robustness of fingerprint-based authentication systems, thereby bolstering security measures.

3. Decoding Human Personality Through Dermatoglyphics. *By decoding* human personality traits through dermatoglyphics, this research sheds light on the intricate relationship between fingerprint pattern and psychological attributes. This suggests that dermatoglyphic analysis could serve as a valuable tool for understanding individual personality characteristics based on fingerprint features.

4. Association Between Fingerprint Patterns and Intelligence Quotient of Vietnamese Students The association between fingerprint patterns and intelligence quotient (IQ) among Vietnamese students unveils intriguing insights into the potential correlation between biological traits and cognitive abilities. These findings may have implications for educational practices, offering opportunities for personalized learning approaches tailored to individual students' cognitive strengths and weaknesses.

5. Fingerprint Classification Based on Deep Learning Approaches: Experimental Findings and Comparisons The experimental findings and comparisons of fingerprint classification based on deep learning approaches underscore the efficacy of deep learning techniques in enhancing the accuracy and efficiency of fingerprint classification systems. This suggests that deep learning-based approaches hold promise for advancing fingerprint recognition technologies, with potential applications in various domains such as law enforcement, border control and access control system.

## V. RESULT

```

1 import cv2
2 import numpy as np
3 from sklearn.cluster import KMeans
4
5 # Load the fingerprint image
6 fingerprint_image = cv2.imread('fingerprint.png', cv2.IMREAD_GRAYSCALE)
7
8 # Apply Gaussian blur to reduce noise
9 fingerprint_image = cv2.GaussianBlur(fingerprint_image, (5, 5), 0)
10
11 # Adaptive thresholding for binarization
12 fingerprint_binary = cv2.adaptiveThreshold(fingerprint_image, 255, cv2.ADAPTIVE_THRESH_GAUSSIAN_C, cv2.THRESH_BINARY, 11, 2)
13
14 # Detect minutiae using the Harris Corner Detector
15 def extract_minutiae_harris(image):
16     gray = image.astype(np.uint8)
17     dst = cv2.cornerHarris(gray, 2, 3, 0.04) # Adjust parameters as needed
18     dst = cv2.dilate(dst, None)
19
20     # Threshold the result to get the minutiae locations
21     minutiae = []
22     threshold = 0.01 * dst.max()
23     for i in range(dst.shape[0]):
24         for j in range(dst.shape[1]):
25             if dst[i, j] > threshold:
26                 minutiae.append((i, j, 'ending'))

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```

PS C:\Users\jenil\OneDrive\Desktop\Python> & C:/Users/jenil/AppData/Local/Microsoft/WindowsApps/python3.11.exe c:/Users/jenil/OneDrive/Desktop/Python/Major_project.py
C:\Users\jenil\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-packages\Python311\site-packages\sklearn\cluster\_kmeans.py:1416: FutureWarning: The default value of 'n_init' will change from 10 to 'auto' in 1.4. Set the value of 'n_init' explicitly to suppress the warning
  super()._check_params_vs_input(X, default_n_init=10)
Loop: 39.97%
Arch: 30.54%
Whorl: 29.56%
The fingerprint pattern is: Loop
PS C:\Users\jenil\OneDrive\Desktop\Python>

```

## VI. CONCLUSION

In conclusion, our automated learning system, utilizing k-means clustering, Gaussian blur, and the Harris corner detector, identifies learning abilities through fingerprint analysis. The system groups individuals with similar learning profiles using k-means clustering, allowing for personalized educational strategies. Gaussian blur enhances fingerprint data quality, reducing noise for more accurate analysis. The Harris corner detector further Improves precision by identifying intricate details within fingerprints. This innovative approach establishes a connection between unique fingerprint patterns and learning potential, potentially revolutionizing education with data-driven, personalized strategies. Our project underscores the significance of individual differences in cognitive abilities and the potential for tailored education to help individuals realize their full learning capabilities.

## REFERENCES

1. R. Raja, H. Raja, R. Patra, K. Mehta, A. Gupta, and K. Ramya Laxmi, 'Assessment Methods of Cognitive Ability of Human Brains for Inborn Intelligence Potential Using Pattern Recognitions', Biometric Systems. IntechOpen, Feb. 10, 2021. doi: 10.5772/intechopen.93268.
2. Praseetha, V.M., Bayezed, Saad and Vadivel, S.. "Secure Fingerprint Authentication Using Deep Learning and Minutiae Verification" Journal of Intelligent Systems, vol. 29, no. 1, 2020, pp. 1379-1387. <https://doi.org/10.1515/jisys-2018-0289>.
3. Venurkar, Shreya et al. "Decoding Human Personality Through Dermatoglyphics." Cureus vol. 14,10 e30445. 18 Oct. 2022, doi:10.7759/cureus.30445.
4. C. Militello, L. Rundo, S. Vitabile, and V. Conti, "Fingerprint Classification Based on Deep Learning Approaches: Experimental Findings and Comparisons," Symmetry, vol. 13, no. 5, p. 750, Apr. 2021, doi: 10.3390/sym13050750.
5. Mai Van Hung, Tran Thi Minh, Nguyen Ngoc Linh and Phung Thi Kim Hue, 2020. Association Between Fingerprint Patterns and Intelligence Quotient of Vietnamese Students. Asian Journal of Scientific Research, 13: 170 174.<https://scialert.net/abstract/?doi=ajsr.2020.170.174>





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