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

*Rohit Raja, Hiral Raja, RajKumar Patra, Kamal Mehta, Akanksha Gupta and Kunta Ramya Laxmi*

## Abstract

This research aims to examine the scientific study related to fingerprint patterns and brains lobes. Generally, this method is used to find and develop the inborn potential and personality especially of children. Every person is having inborn potential and personality, which will help us to analyze strength and weakness. The present work is based only on the analysis and used as a reference for scientific research in the field of Galtian and statistical study conducted based on the fingerprint processing. Human brain is divided into two parts, left hemispheres and right hemispheres. Fingers of right hand represent the functions of left brain and fingers of left hand represent the functions of right brain. Human brain is divided into 10 lobes and each lobe is related with each finger. Each lobe represents different intelligences. A detailed analysis of the fingerprint would help the researchers to find the inborn talents. It will provide them the most appropriate learning habits from young age and improve learning ability effectively. The vital factor of an individual's intelligence is determined by neural network connection of brain cells. Cognitive science is the scientific study that will help you to know about yourself.

**Keywords:** Galtian characteristic, pattern recognition, neural network, cognitive cell, intelligence

## 1. Introduction

Clinical specialists, through tracking, recording, comparison, induction, and also professional 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 also allotment of cerebral characteristic of a selected and additionally elements suitable statistical document of person's innate intelligence. Thus, it permits increase of the man or woman in international of leading information.

This can help the guide/mentor to recognize the inherent qualities and powerful conversation mode of the man or woman. It will provide the maximum right discovering behaviors from the young age, which would be over and above to finding out capabilities. It can likewise help the guide/mentor to recognize the development of

more than one intelligence and also uncover the opportunity of the man or woman. Therefore, it will be very easy to decorate their vulnerable factor through the proposed method in a good way to accomplish ordinary development.

Last but not least we would really like to carry the message to all guides/mentors in addition to people that the aim of this test is to permit you to absolutely recognize and also appreciate precise differences of anyone and additionally provide education and mastering and/or schooling for this reason.

Our thoughts are separated into hemispheres, left and right. Each hemisphere of the mind has its very own resilience. Fingers of right hand constitute the features of left mind as well as arms of left hand represent the features of right brain. Each intelligence has its very own weight age. Overall distribution of intelligences' portion can be 100%.

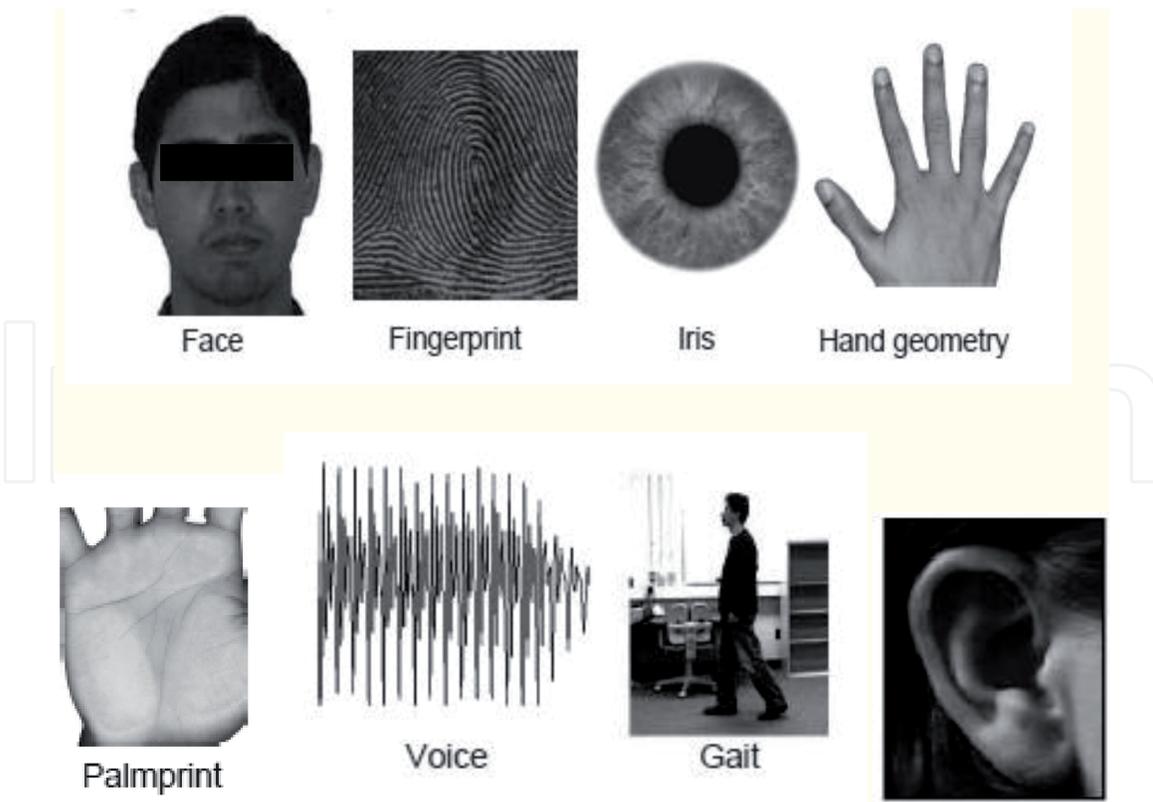
In this chapter, authors applied bifurcation, termination, and neural network for feature extraction and got 90.06% accuracy for identifying an authorized person with the help of a proposed figureprint recognition method [1]. For human face recognition from side view of face, authors used Manhattan distance and support vector machine of artificial neural network, along with front view analysis and achieved up to 95.3528% accuracy in their work [2]. In the chapter, authors compared the performance of different biometric technologies like fingerprint, hand geometry, key stroke, etc. on the basis of EER, FAR, and FRP. The chapter is based on standardized fingerprint model for fingerprint matching. The author used mean images and genetic algorithm. Transformation is also used for synthesizing a fingerprint [3].

In this chapter, authors had thrown the light on the many preexisting methods and techniques of fingerprint recognition system. All four stages of fingerprint recognition system were elaborated briefly. Database related to fingerprint recognition had shown with characteristics [4]. For fingerprint recognition, the popular technique is "Euclidean distance" and "neural network classifier", whereas for pre-processing of images, "histogram equalization" and "fast Fourier transformation" are used. The result of this work was significantly better than the previous work [5].

In the chapter, authors first developed a CNN framework for more hygiene and accurate contactless fingerprint recognition and this work also helped to alleviate spoofing of fingerprint and shown much greater security than the preexisting methods [6]. In the chapter, authors used color coding scheme, Sobel and Canny method, HSV histogram, edge detector method, and Corel-1 K dataset for detection of color object [7]. In this chapter, authors gave a thorough knowledge of fingerprint recognition and also proposed a secured fingerprint recognition payment system [8].

This chapter defined many aspects, methods, and techniques like Gabor filter, FFT, minimum distance classifier, histogram equalization, fusion and context switching framework, etc. for fingerprint-based identification system [9].

In this chapter, authors applied LGXP and ANN techniques for face recognition to handle variation in human face due to change in pose, illumination condition, viewing direction, and expression of different ages [10]. In this fingerprint-based biometric review paper, authors briefly discussed different attacks, and compared different existing methods of biometric cryptosystem, cancellable biometrics, etc. for fingerprint template protection [11]. The most widely used biometrics is fingerprint technology. The fingerprint is a pattern of ridges and valleys present on the surface of a fingertip [12]. The finger ridge configurations do not change throughout the life of an individual, except in case of accidents such as burns or cuts on the fingertips. The fingerprints are so unique that two identical twins have different fingerprints [13]. Matching accuracy using fingerprint is very high as compared to other biometrical traits. Initially the fingerprint technology of biometric identification is used for forensics and criminal investigation (**Figure 1**) [14].



**Figure 1.**  
*Examples of body traits that can be used for biometric recognition (courtesy: <http://images.google.co.in>).*

## 2. Proposed methodology

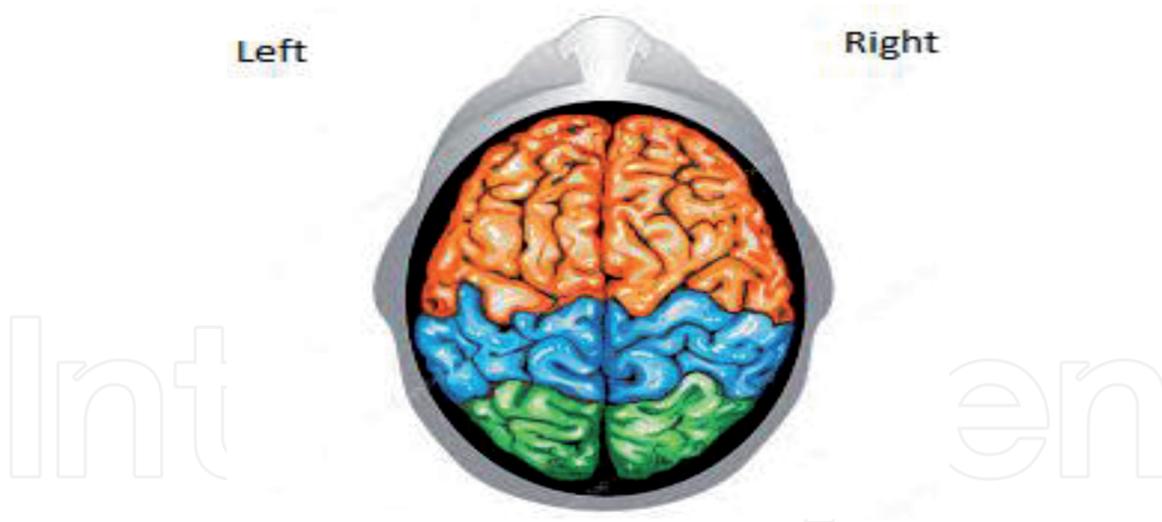
Various pattern kinds will definitely display the flow of different worth. In ordinary situations for the general public of people, the worth will truly range from 8 to 30. If the worth is high, it indicates that the function of the thoughts cortex assignment stage is high. Everybody has the capability for selected natural pinnacle traits. With boosting and locating out, it is easy to turn out to be being a better human. Support the thought that every of us can absolutely stimulate our viable and might accomplish first-rate future (**Figures 2–4**).

### **Inborn intelligence potential:**

Low potential  
Average potential  
Good potential  
Very good potential  
Excellent potential  
Hyper active

### 2.1 Left brain

Analytical mind is more likely to exhibit self-awareness, logical thinking, language & grammar, curiosity, and love [15]. They individuals are usually desirable in teachers. They have convergent reasoning and can deliver their power and also emphasis at one factor. They prefer to respond to Spoken guidelines. They want to fix the issues by searching at the parts of points [16]. They are in a position situate the difference transgression comparable points speedy. They are an awful lot more supposed and also based. Prefer more than one option checks. They have



**Figure 2.**  
*Left and right part of brain (<https://www.google.com/>).*



**Figure 3.**  
*Fingerprint of left and right hand of 5 years child.*

the functionality to manipulate their feeling and emotions. They like foundation, problems, word developing, problem resolving, crosswords, and so forth [17].

They include coping with the problems via checking out the problem usual. They are able draw the whole image in their thoughts quick. They are extra intuitive and paintings upon sensations. Their feelings and emotions do not have any limitations, and that they typically seem [18].

## 2.2 Right brain

Creative mind is tons more inclined toward social talents, creativity, gross electric powered motor competencies obligations, tune, sun shades, photos, dance, art, rhythms, appearing, paint, modeling, style, outside sporting sports, and so on. They are generally brilliant in extracurricular sports, generally creative ones. They have a tendency to throw the dismiss of window [19]. They have specific reasoning that incorporates creativeness and also thoughts. As properly as they are commonly misplaced in their personal ideas, thoughts and global. They may be actually present, psychologically lacking. Right mind individuals choose to answer to proven path (Figure 5) [20].

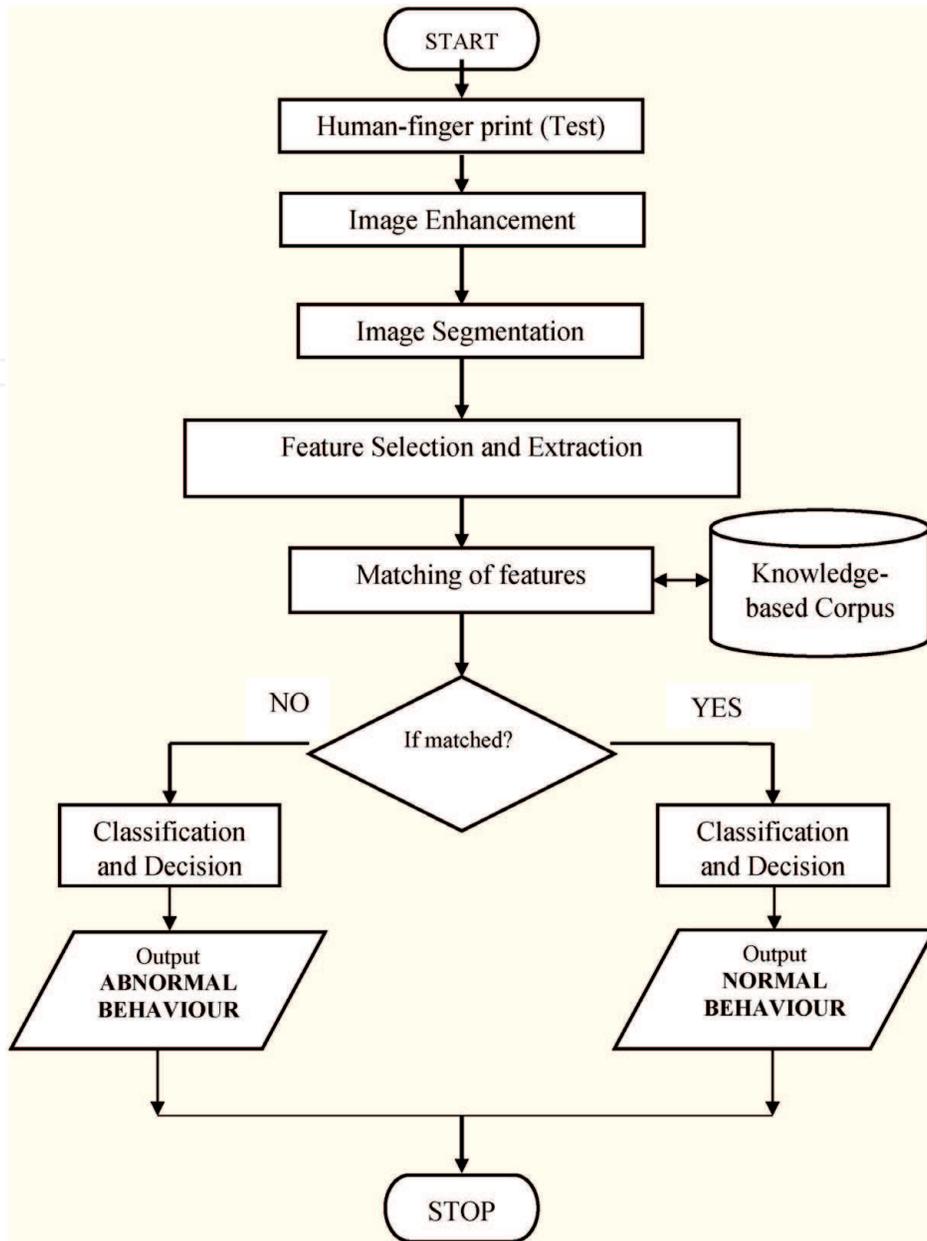


Figure 4.  
Workflow diagram.

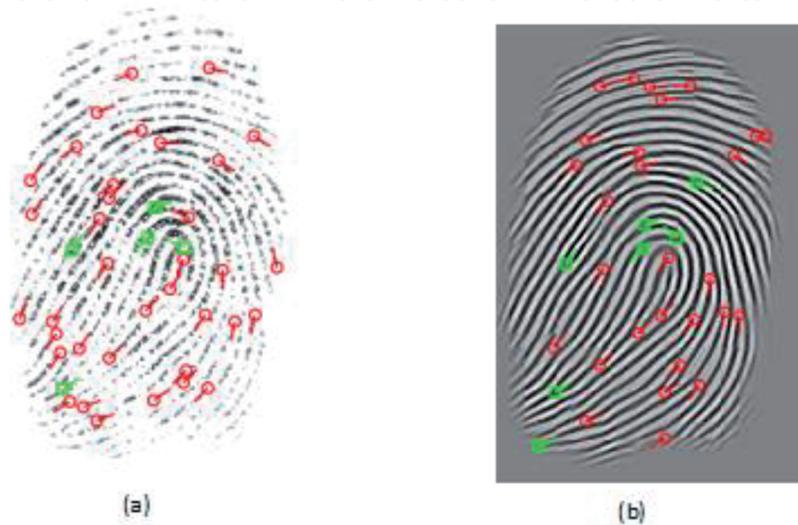


Figure 5.  
Feature extraction from fingerprint.

### 3. Functions of brain of different sections

The brain is responsible for personality and characteristics. Impulse control, capability to evaluate social situations, socializations, spontaneity, capacity to override as well as subdue unwanted social practices, movements. Cognitive features (Exec Features) [21]: judgment, thinking, problem addressing, planning, social capabilities, control, abstract reasoning, imagination, and initiative responsibilities that need the assimilation of data in time, capability to decide similarities and differences between matters or activities, and mental features [22].

The brain is responsible for creative thinking and visualization. Abstract concept, hassle solving, summary thinking, language tasks of math, thinking, coping with phrases as well as grammar syntax, visualization, creativeness, and ideas in addition to principles formation [23].

The brain is responsible for processing auditory information. They differentiate differences in sound, pitch, and also quantity and set up their importance. The proper temporal lobe is in rate of musical appreciation, even as the left temporal lobe is liable for the expertise of speech. Left temporal lesions lead to damaged reminiscence for verbal product. Right aspect lesions lead to impaired recall of nonverbal product, consisting of track [24].

The brain is responsible for processing visual information. They process information about objects, colors, motion distance, words, signs identification of objects, and symbols [25]. Responsible for spatial awareness and for processing and analyzing sensory stimuli. They play vital roles in incorporating sensory info from several detects in addition to within the manager of things. Portions of the parietal lobes are covered with visible-spatial potential [26].

- Rational thinking, planning, coordinating, controlling, executing achievement, self-motivation, and self-awareness.
- Leadership, interpersonal skill, creativity, and goal visualization.
- Self-esteem, intuition, and the ability to understand others point of view.
- Logical reasoning, computation process, analytical skills, and conceptual understanding.
- Numeric, grammar syntax, and cause and effect relationships.
- Imagination, idea formation, visualization, 3D recognition, visual spatial ability, and hand-eye co-ordination.
- Fine motor skills, action identification and understanding, finger control, and control of body movements.
- Gross motor skills, body movement and sensory information, and eyes body co-ordination.
- Language ability, language understanding, and audio identification.
- Ability and syntax of language.
- Tone understanding, sound and voice understanding, music, emotions, and feelings.

- Visual identification, interpretation, reading, observation, image appreciation, and recognition of shapes and colors.
- Visualization, visual appreciation, art, and esthetic.
- Sense understanding of maps, visuals, graphical, and communications [27].

Further mind is cut up into two components, left brain in addition to right brain. Left brain controls a great aspect of the body and vice-versa. Science has showed that within the very identical wattle, left and right brain do different precise obligations. So, mind has 10 booths, 5 left and 5 proper; every compartment has info and pre-detailed feature [28]. Additionally, our brain has approximately one hundred billion Neuron cells, which are separated in arbitrary order into those 10 areas. It is hard that two people have very identical nerve cellular distribution [29]. One could sincerely want to do that place's paintings, in which the nerve cell count number is a lot greater. He will in reality revel in that paintings and will simply discover it clean. It will actually be longevity region. One could despise to try this compartment's work, in which nerve mobile dependency is a lot less. He will now not adore it and will without a doubt locate it difficult to do. It will in reality be a susceptible region [30].

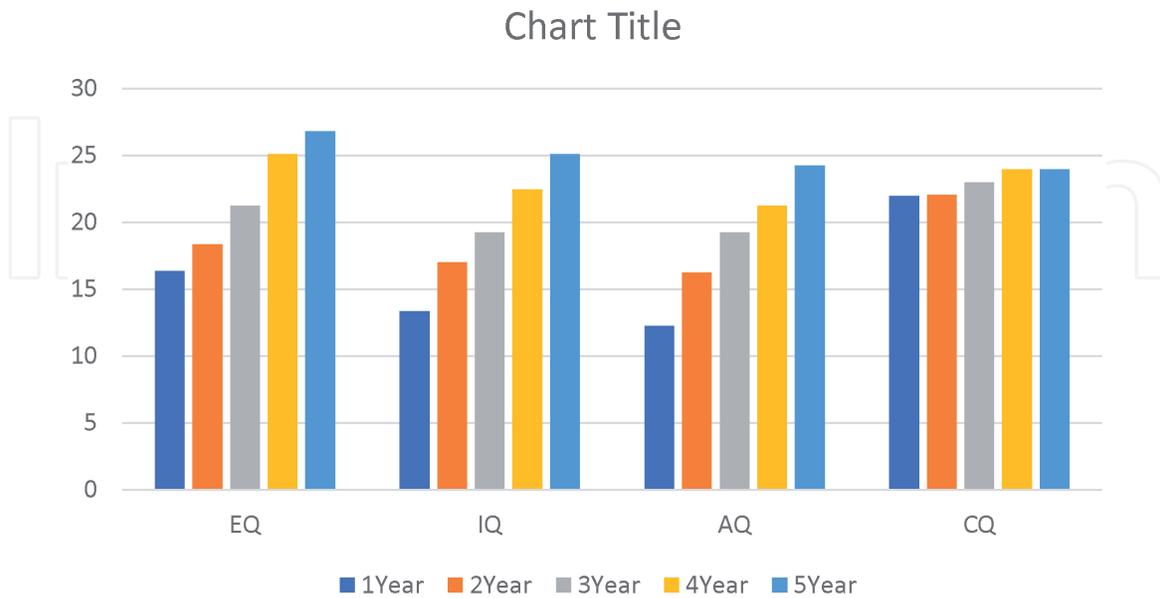
### **3.1 Verbal intelligence**

Preferences: write, read, tell stories, talk, memorize, work at solving puzzles, etc.  
Learns through: hearing and seeing words, speaking, reading, writing, discussing, debating, etc. Needs: books, tapes, papers, diaries, writing tools, dialog, discussion, debates, stories, etc. [31].

Activity involve in

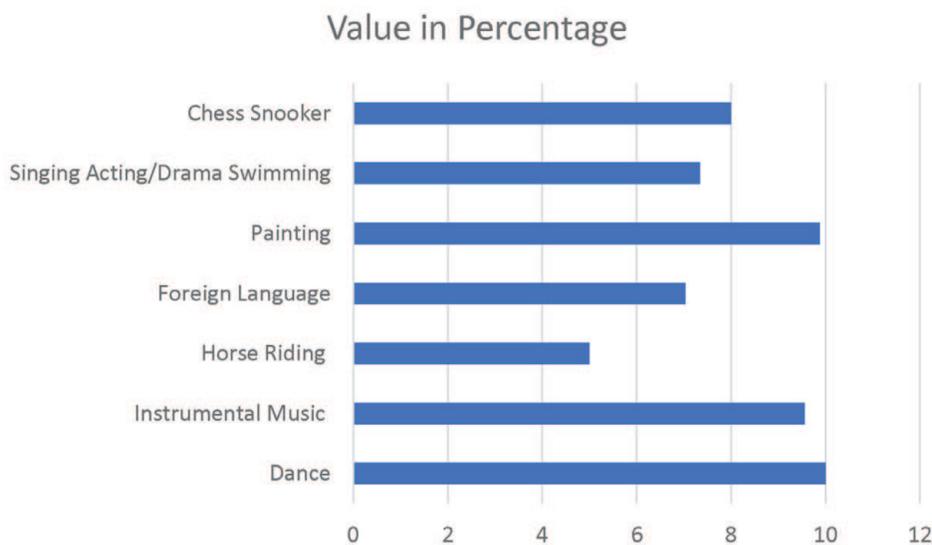
- Most in all likelihood to concerts or musicals.
- Establish a collection of preferred musical recordings in addition to pay attention to them on an everyday foundation.
- Join a community choir.
- Take legit music training in a specific tool.
- Work with a song's specialist.
- Spend 1 h every week taking note of an ordinary design of songs (jazz, the United States of America; western, classical, people, international; or other categories).
- Establish an ordinary household sing-alongside time.
- Purchase an electronic keyboard and also find out honest tunes in addition to chords.
- Purchase percussion contraptions at a plaything shop and play them in rhythm to historical past track.
- Take a course in song appreciation or songs concept at a local institute.

- Read songs objection in papers and courses.
- Purchase contemporary gadgets (MIDI interface, computer machine software program) with a purpose to definitely (**Figures 6 and 7; Table 1**) [32].



**Figure 6.**  
Graphical representation of EQ, IQ, AQ, CQ.

	Value in Percentage
Dance	10
Instrumental Music	9.56
Horse Riding	5
Foreign Language	7.03
Painting	9.88
Singing Acting/Drama	
Swimming	7.34
Chess Snooker	8



**Figure 7.**  
Graphical representation.

	EQ	IQ	AQ	CQ
1 Year	16.34	13.34	12.21	21.94
2 Year	18.34	16.98	16.21	22.03
3 Year	21.21	19.2	19.21	22.94
4 Year	25.08	22.45	21.21	23.94
5 Year	26.78	25.08	24.21	23.94

**Table 1.**  
*Values of EQ, IQ, AQ, and CQ from fingerprint of children from 1 to 5 years.*

## 4. Conclusion

Cognitive science, cognitive informatics, and computer modeling with pattern recognition of finger require some basic fundamentals for their implementation as cognitive concept in various applications of science and engineering, and the chapter has introduced and has bright future perspectives. It can be used as a useful adjunct to aid in preliminary study of field and behavior of child. Such measures can also help the couple to seek appropriate medical care and services for affected children. It will help the parents to be better equipped with management of such children. Also, the early detection of inborn errors is crucial because it can be used as a vital tool to counsel the couple about avoiding conception of further affected fetuses. Historical background of cognitive science, cognitive map, and perception to conception were introduced in addition to cognitive network, modeling, and architecture for brain mapping with human fingerprint.

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## References

- [1] Siddiqui AMN, Telgad R, Lothe S, Deshmukh PD. Fingerprint recognition system for person identification using termination and bifurcation minutiae. *IOSR Journal of Computer Engineering (IOSR-JCE)*:33-38. 2015. e-ISSN: 2278-0661, p-ISSN: 2278-8727. Available from: [www.iosrjournals.org](http://www.iosrjournals.org)
- [2] Raja R, Sinha TS, Dubey RP. Recognition of human-face from side-view using progressive switching pattern and soft-computing technique. *AMSE Journals—2015-Series: Advances B*. 2015;58(1):14-34
- [3] Ravi Subban and Dattatreya P. Mankame, A study of biometric approach using fingerprint recognition, *Lecture Notes on Software Engineering*. May 2013;1(2):209-213
- [4] Hoang Thai and Ha Nhat Tam, Fingerprint recognition using standardized fingerprint model. *IJCSI International Journal of Computer Science Issues*, May 2010 , Vol. 7, Issue 3, No 7. ISSN (Online): 1694-0784 ISSN (Print): 1694-0814.
- [5] Ali MMH, Mahale VH, Yannawar P, Gaikwad AT. Overview of fingerprint recognition system. In: *International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT)*. Chennai. 2016. pp. 1334-1338. DOI: 10.1109/ICEEOT.2016.7754900
- [6] Martin Sagayam K, Narain Ponraj D, Jenkin Winston YJC, Esther Jeba D, Clara A. Authentication of biometric system using fingerprint recognition with Euclidean distance and neural network classifier. *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*. 2019;8(4):766-771. ISSN: 2278-3075
- [7] Nirmal SB, Kinage KS. Contactless fingerprint recognition and fingerprint spoof mitigation using CNN. *International Journal of Recent Technology and Engineering (IJRTE)*. 2019;8(4): 9271-9275. ISSN: 2277-3878
- [8] Raja R, Kumar S, Mahmood RM. Color object detection based image retrieval using ROI segmentation with multi-feature method. *Wireless Personal Communications*. 2020;112:169-192. DOI: 10.1007/s11277-019-07021-6
- [9] Jadhav VV, Patil RR, Jadhav RC, Magikar AN. Efficient biometric authentication technique using fingerprint. *International Journal of Computer Science and Information Technologies*. 2016;7(3):1132-1135. ISSN: 0975-9646
- [10] Rani P, Sharma IIP. A review paper on fingerprint identification system. *International Journal of Advanced Research in Computer Science & Technology (IJARCST 2014)*. 2014;2(3):58-60. ISSN: 2347-8446 (Online) ISSN: 2347-9817 (Print)
- [11] Raja R. Physiological trait-based biometrical authentication of human-face using LGXP and ANN techniques. *Int. J. Information and Computer Security*. 2018;10(2/3):303-320
- [12] Yang W, Wang S, Hu J, Zheng G, Valli C. Security and accuracy of fingerprint-based biometrics: A review. *Symmetry*. 2019;11:141. DOI: 10.3390/sym11020141
- [13] Jain AK, Prabhakar S, Pankanti S. On the similarity of identical twin fingerprints. *Pattern Recognition*. 2002;35(11):2653-2663
- [14] Jain AK, Maltoni D, Maio D, Prabhakar S. *Handbook of Fingerprint Recognition*. New York: Springer; 2003. ISBN: 9781848822535
- [15] S. Chikkerur, C. Wu and V. Govindaraju, "A systematic approach

for feature extraction in fingerprint images,” in First International Conference, ICBA, Hong Kong, 2004.

[16] Bartunek JS, Nilsson M, Sallberg B, Claesson I. Adaptive fingerprint image enhancement with emphasis on preprocessing of data. *IEEE Transactions on Image Processing*. 2013;22(2):644-656

[17] Pieter P. Historical cognitive science—Analysis and examples [Dissertation of PG Diploma in Logic, History and Philosophy of Science]. Belgium: Ghent University; 2015

[18] Shih JJ, Krusienski DJ, Wolpaw JR. Brain-computer interfaces in medicine. *Mayo Clinic Proceedings*. 2012;87(3):268-279. DOI: 10.1016/j.mayocp.2011.12.008

[19] Basar E, Basar-Eroglu C, Karakas S, Schurmann M. Are cognitive processes manifested in event-related gamma, alpha, theta and delta oscillations in the EEG? *Neuroscience Letters*. 1999;259(3):165168

[20] Wiggins GA, Bhattacharya J. Mind the gap: An attempt to bridge computational and neuroscientific approaches to study creativity. *Frontiers in Human Neuroscience*. 2014;8:540555

[21] Hasson U, Nusbam HC. Emerging opportunities for advancing cognitive neuroscience. *Trends in Cognitive Neuroscience*. 2019;1898:13

[22] Grillner S, Ip N, Koch C, Koroshetz W, Okano H, Polachek M, et al. Worldwide initiatives to advance brain research. *Nature Neuroscience*. 2019;19:11181122

[23] Robert NM, Harvey W. Introduction: New frontiers in the cognitive science of religion. *Journal of Cognition and Culture*. 2005;5:113

[24] Stefanie M. Selective deployment of attention to time and modality and

its impact upon behavior and brain oscillations [PhD thesis in Department of Experimental and Health Sciences]. Salvador: University of Barcelona; 2016. p. 242

[25] David GS. Models of memory: Wittgenstein and cognitive science. *Philosophical Psychology*. 1991;4(2):203218

[26] Silvia C. The multisensory visual cortex: Cross-modal shaping of visual cortical responses and perception [PhD thesis for Doctoral Program in Experimental Psychology, Linguistics and Cognitive Neuroscience]. Bicocca: University of Milano; 2014

[27] Iris VR. The tractable cognition thesis. *Cognitive Science*. 2008;32:939984

[28] Pulin A, Stan F, Javier S. Sensory memory for grounded representations in a cognitive architecture. *ACS Poster Collect*. 2018;1:118

[29] Włodzisław D. Neurocognitive informatics manifesto. Series of information and management sciences. In: 8th International Conference on Information and Management Sciences (IMS 2009). Kunming-Banna, Yunnan, China: California Polytechnic State University; 2009. p. 264282

[30] Adam CJ. On the use of cognitive maps [PhD dissertation]. Faculty of the Graduate School, University of Minnesota; 2008

[31] Elyana S. Interaction between visual perception and mental representations of imagery and memory in the early visual areas [PhD thesis]. Finland: Institute of Behavioral Sciences, University of Helsinki; 2005

[32] Salvador SF, Charles S, Donna L, Alan K. Moving multisensory research along: motion perception across sensory modalities. *Current Directions in Psychological Science*. 2001;13(1):2932