

## **HAAR: An Effectual Approach for Evaluation and Predictions of Face Smile Detection**

*Oday A. Hassen*

*Department of Mathematics*

*College of Science*

*University of Mustansiriya, Iraq*

*Nur Azman Abu*

*Senior Lecturer*

*Faculty of ICT*

*Universiti Teknikal*

*Malaysia Melaka (UTeM)*

### **ABSTRACT**

Face Smile Detection is one of the critical spaces of research in the surge of digital image processing in relationship with machine learning and predictive analysis. The key thought process of face smile detection is to break down and arrange the movements of a person on the lips and extraction of real feelings amid the situation under scrutiny. The execution of profound learning based classification and forecast approaches in relationship of HAAR based integration might be utilized for the higher level of classification with minimum error factors. This is on account of these methodologies are superior methodologies which can be utilized for face examination. Various algorithms are contrived so far still the execution of nature inspired methodologies and metaheuristic approaches are very noticeable and mindful with the minimum

error rate. Grouped regular inspired methodologies contrived so far for taking care of the designing issues in arranged spaces yet there is immense extent of research in the fragment. Nature gave us various methodologies which can be utilized for the settling and in addition taking care of the issues in various spaces including building and social viewpoints. Nature Inspired Algorithms is an exceptionally dynamic research range as issues with which we are ordinarily well-known are getting increasingly mind boggling because of size and different perspectives, additionally to new issues springing up all the time on which existing strategies are not viable. Nature appears to have been there and done it, in a manner of speaking. That is the reason we appear to get a considerable measure of motivation from it nowadays and within a reasonable time-frame. The current Nature

Inspired algorithms incorporate the Artificial Bee Colony Algorithm, the Firefly Algorithm, the Social Spider Algorithm, the Bat Algorithm, the Strawberry Algorithm, the Plant Propagation Algorithm, the Seed Based Plant Propagation Algorithm and numerous others. In this proposed research work, the novel and powerful methodologies for profound learning and classification of face smiles should be utilized so the face smile classification on various classes should be possible with minimum error factor.

*Keywords: Face Detection, Face Smile Detection, Face Analytics, Digital Image Processing*

## **INTRODUCTION**

Face Detection is one the key domain of research in digital image as well as real time video processing. In face analysis, there are assorted segments which are required to be investigated in terms of getting emotions and feelings of the person. These segments include Lips, Eyes, Cheeks, Ears, Eye Brows, Nose and many others. Lips Detection is used to analyze the emotions of the person in terms of Sadness, Happiness, Frustrations and many others. Using this research work, it is proposed to work on the Lips based Smile Detection on faces to analyze the Smile Detection using metaheuristic approach which makes use of global optimization of results. In this area, the use of artificial neural networks or support vector machine can be used for classification of the Smile on Human Face.

## **KEY POINTS OF THE RESEARCH**

This research work focus on the implementation of metaheuristic approaches based classification and

pattern recognition for the Lip Smile Detection from Human Faces. The high level algorithm with the multilayered approaches for classification shall be devised and implemented using Artificial Neural Networks and Support Vector Machines with the Predictive Analysis and comparing the performance of these algorithms.

## **REVIEW OF LITERATURE**

This section presents a detailed review of literature on face detection with the segment analysis on human faces. This chapter also presents the review of literature on the assorted approaches and algorithms devised and implemented to human faces for prediction of smiles and their classes. This chapter showcases prior literature and research related to studies exploring various disciplines, relationships, areas of concern, and other issues. To propose and defend the research work, a number of research papers are analyzed. Following are the excerpts from the different research work performed by number of academicians and researchers. The review of literature is one the imperative task while performing the research work as it is required to analyze the number of research papers, articles and manuscripts from assorted sources in the similar domain.

Following are the excerpts from different research papers and related journals which address the thrust and approaches associated with the human face detection and lips based smile analysis.

<b>Research Work and Key Dimension</b>	<b>Author(s)</b>	<b>Year</b>
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Robust Features Face	Israel N, Wolf L, Barzilay R, Shoval G.	2017	Applications of Computer Vision (WACV)		
Implementation of Real Time and Dynamic Facial Recognition on the Expressions with Nonverbal Communication	Md. Sazzad Hossain and Mohammad Abu Yousuf	2017	Recognition and Face Detection Using Infrared Images and Visible Light	Mohammad Ali Banaee1 , Ali Akbar Khazaei	2016
Evaluation of facial parameters and segments with the scoring in terms of emotions detection	Yuki Nakayama, Yuji Takano, Masaki Matsubara, Kenji Suzuki, Hiroko Terasawa	2017	Spontaneous smile detection with Application of landmark points Supported by visual indications	Karolina Nurzynska and Bogdan Smolka, Yannawar Pravin	2016
The work on the estimation of gender with the integration of smile-dynamics	Antitza Dantcheva, Francois Bremond	2017	Virtual U: Defeating Face Liveness Detection by Building Virtual Models	Yi Xu, True Price, Jan- Michael Frahm, Fabian Monrose	2016
Implementation of PSO algorithm for face smile recognition and classification	Zhijie Li, Xiaodong Duan, Cunrui Wang, Jian Yun, Bo Lu	2017	Automatic Detection of Facial Expressions from Video Streams	Manza Ganesh R	2015
Evaluation of real time dynamic video and extraction of emotional aspects and perspectives for classification	Xiaoming Chen and Wushan Cheng	2016	Virtual Makeup Application Using Image Processing Methods	Gozde Yolcu Oztel, Serap Kazan	2015
Can we still avoid automatic face detection?. In	M. J. Wilber	2016	F. Estimating smile intensity: A better way. Pattern recognition letters	Girard JM, Cohn JF, De la Torre F	2015
			Enhancing Facial Action Recognition	Bombale G.R, Prof. Rokade P.	2015

Using Multikernel-Review	P.	
Verbal and Nonverbal Clues for Real-life Deception Detection	Verónica P´erez-Rosas, Mohamed Abouelenien, Rada Mihalcea, Yao Xiao, CJ Linton, Mihai Burzo	2015
The empirical work on the Face Expression Analysis and Recognition with the effectual approach	Jharna Majumdar, Ramya Avabhith	2014
Real time analytics and Expression of Face Modules for the Classification	Jaya Prakash S M, Santhosh Kumar K L, Jharna Majumdar	2014
Effectual implementation for movement analysis and face recognition for the evaluation of expressions	Mar Saneiro, Olga C. Santos, Sergio Salmeron-Majadas, and Jesus G. Boticario	2014
Face Detection and Classification using metaheuristic approach	Rekha N, Dr.M.Z.Kurian	2014
The detection psychological	Zuzana Metenková,	2013

manifestations of non-verbal communication by Interrogator	Jozef Metenko	
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### HAAR CLASSIFIER

Haar-like features are digital image features utilized as a bit of object recognition. They owe their name to their characteristic identicalness with Haar wavelets and were utilized as a bit of the imperative reliable face detector. All things considered, working with basically image powers (i.e., the RGB pixel respects at every last pixel of image) made the errand of feature calculation computationally costly. An era by Papageorgiou et al. talked about working with an other feature set in light of Haar wavelets instead of the standard image qualities. Viola and Jones adjusted utilizing Haar wavelets and built up the showed Haar-like features. A Haar-like feature considers close-by rectangular areas at a particular zone in a recognition window, wholes up the pixel drives in each region and finds the capability between these entireties. This capability is then used to portray subsections of an image. For instance, let us say we have an image database with human appearances. It is an ordinary recognition that among all faces the locale of the eyes is darker than the scope of the cheeks. Thusly an average haar feature for go up against recognizing verification is a strategy of two neighboring rectangles that lie over the eye and the cheek area. The position of these rectangles is portrayed concerning a recognizing evidence window that showings like a skipping box to the objective object (the face for this situation).

In the recognition time of the Viola–Jones object unmistakable verification structure, a window of the objective size is moved over the information image, and for every subsection of the image the Haar-like feature is figured. This capability is then showed up distinctively in connection to an educated limit that withdraws non-objects from objects. Since such a Haar-like feature is just a delicate learner or classifier (its divulgence quality is conceivably superior to anything eccentric assessing) multitudinous like features are basic to delineate an object with adequate accuracy. In the Viola–Jones object ID system, the Haar-like features are along these lines managed in something many insinuate as a classifier course to shape a solid learner or classifier.

The key incredible position of a Haar-like feature over most phenomenal features is its calculation speed. By virtue of the utilization of fundamental images, a Haar-like feature of any size can be enlisted in enduring time (around 60 microchip headings for a 2-rectangle feature).

The benchmark and normalized dataset of faces shall be fetched from the research repositories of faces and digital images having emotions. The proposed work shall be implemented using MATLAB / Python based OpenCV implementation so that the effectual results can be fetched out with the higher degree of accuracy with the minimum false rate.

The comparative analytics shall be done on multiple parameters including

1. Confusion Matrix

2. False and True Rates of Predictions
3. Cost Factor
4. Execution Time
5. Complexity
6. Overall Performance

### **PROPOSED EFFECTUAL APPROACH**

For implementation and predictive analysis, the metaheuristic approaches shall be used so that the global optimal results can be achieved with minimum errors. This proposed work is proposed to give the effective results in terms of very less error rate and high efficiency in getting the probability factor of malware still this work can be further enhanced using other optimization approaches. In this work, the new metaheuristic approach SFO for optimization is proposed to be implemented. There exist another approach hyper-heuristic that can be integrated for deep learning of malware and predictive analysis. The key demarcation line between metaheuristics and hyper-heuristics is that nearly all the implementations in metaheuristics makes search in the search space in the span of solutions of problem. The hyper-heuristics takes the cases and search space within the range and domain of heuristics.

### **CONCLUSION**

This proposed work underline to present the effective results in terms of very less error rate and high efficiency in getting the probability factor of malware still this work can be further enhanced using other optimization approaches. In this work, the new metaheuristic approach for classification and optimization of error factor shall be integrated.

There exist another approach hyper-heuristic that can be integrated for deep learning of malware and predictive analysis. The key demarcation line between metaheuristics and hyper-heuristics is that nearly all the implementations in metaheuristics makes search in the search space in the span of solutions of problem. The hyper-heuristics takes the cases and search space within the range and domain of heuristics.

The prominent soft computing approaches which can be used for further optimization include

- Ant Colony Optimization
- Bat Algorithm
- Bayesian Network
- Bees Algorithm
- Cuckoo Search
- Evolutionary Approaches
- Firefly Algorithm
- Flower Pollination Algorithm
- Fuzzy Logic
- Nature Inspired Algorithms
- Particle Swarm Optimization
- River Formation Dynamics
- Simulated Annealing
- Swarm Intelligence

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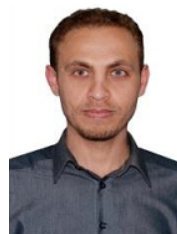
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#### ABOUT THE AUTHORS



Nur Azman Abu is currently serving as a senior lecturer at Faculty of ICT, Universiti Teknikal Malaysia Melaka (UTeM). He

obtained his bachelor and master degree from Purdue University in 1992 and 1994 both in Mathematics He is currently undergoing his PhD program at Universiti Teknikal Malaysia, Melaka. His current interests include cryptography, random number generation, image processing and TSP



Oday A. Hassen received the B.Sc. degree in mathematics from the Department of Mathematics, University of Mustansiriyah, Iraq in 2004, and M.Sc from department of information

technology, science college, Alexandria University, Egypt. Currently he is PHD student in university Teknikal Melaka (UTeM), Malaysia. His research and professional interests include image processing, authentication and security technologies.

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