# An adaptive approach for Human Emotions Recognition System for Neural Networks using Hidden Markov Model and Self Organizing Maps algorithms

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**Abstract.** In machine learning, recognition of human emotions by a machine is an important research area. It is informal to reason of emotions as a luxury, approximately that is needless for basic intelligent operative, and something that is problematic to encode in a computer program. Then giving expressivecapabilities to machine has been a least priority up till now. But recent studies suggest that emotions play surprisingly dangerous role in balanced and brainybehavior. Too slightfeeling can damagebalancedthoughtful and behaviour. The main impartial of this paper is the identification of emotional states of human beings.Inthis researchthe algorithms to be used are Hidden Markov Model and Self Organizing Maps..

**Keywords:** Markov Model, Self Organizing Maps algorithms, Neural Networks, Human Emotions Recognition System.

## 1 Introduction

Evidently feeling connects with intuition in manners that are non clear however significant for astute working. Passionate insight comprises of the capacity to perceive, communicate and have feelings, combined with the capacity to manage these feelings. Machines may never require the entirety of the enthusiastic abilities that individuals need, anyway there is proof that machines will need probably a portion of these abilities to seem astute while interfacing with individuals.

## 2 Existing System

The existing system uses Ratio Template Algorithm. Only the three basic emotional states can be tracked with this. (happy, sad, angry). The use of back propagation and multilayer perceptrons delays the processing speed. Accuracy achieved is only 52%

Online review structures expect a critical activity in impacting purchasers' practices and dynamic, attracting various spammers to install fake studies to control study substance and assessments. To grow utility and improve customer experience, some online review structures

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license customers to shape social associations between each other and bolster their interchanges. At this moment, target giving a profitable and amazing system to recognize review spammers by combining social relations subject to two suppositions that people will undoubtedly consider overviews from those related with them as dependable, and review spammers are less disposed to keep up a tremendous relationship arrange with conventional customers. The duties of this paper are two-wrinkle: (1) We clarify how social associations can be combined into review rating desire and propose a trust-based rating conjecture model using closeness as trust weight, and (2) We structure a trust-careful area model reliant on rating vacillation which iteratively determines customer unequivocal all in all constancy scores as the pointer for spamicity. Tests on the dataset assembled from Yelp.com show that the proposed trust-based estimate achieves a higher exactness than standard CF procedure, and there exists a strong association between's social associations and the general constancy scores

In the existing system due to the use of the aforesaid algorithms[7], the processing speed is reduced. The accuracy achieved in this case is just 52%, which is way lower than the acceptable rate.

Another major drawback here is that, there could be only 3 emotional states identified, which are anger, happy, and sad. These are just the basic emotions, and affective communication cannot be achieved with the help of this.

## 3 Proposed System

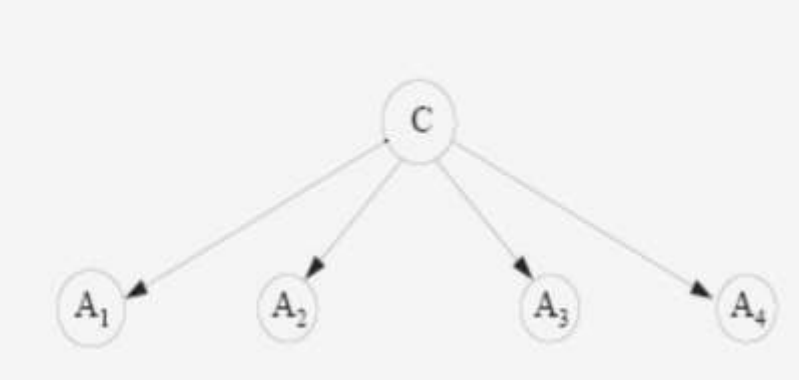
In the proposed system, we use Hidden Markov Model and self organizing maps. All emotional states are clearly identified. The use of TAN filters improves the accuracy. Accuracy can be achieved up to 86.3%. In the proposed system, TAN filters are used to identify the face region from the video input taken. The Tree-Augmented-Naive Bayes (TAN) classifier incorporates the dependencies between features, and a TAN structure is created, and the face is identified[9]. This proves to be more accurate way of face recognition from a video stream, or a sequence of input images. This improves the accuracy of the whole system.

In the proposed system, seven human emotional states are identified, which are anger, disgust, fear, happiness, sadness, surprise and neutral. This is a considerable improvement over the 3 emotional stages achieved in the proposed system. Due to all these factors, an accuracy of 86.3% is expected to achieve.

## 4 Self Organizing Maps

Oneself getting sorted out map (SOM) or Kohonen map is a subtype of fake neural organizations. It is ready utilizing lonepresuming out how to distribute low dimensional portrayal of the preparation tests while saving the topological possessions of the info interplanetary. This make SOM sensible for envisioning low-dimensional viewpoints on high-dimensional data[11], similar to multidimensional scaling. SOM were imagined by TeuvoKohonen, a teacher of the Academy of Finland, and they give a technique of addressing multidimensional evidence in much lower dimensional spaces - generally a couple of measurement.

## 5 Tree-Augmented-Naive Bayes (Tan)




**An Example of naive BayesTree-Augmented-Naive Bayes**

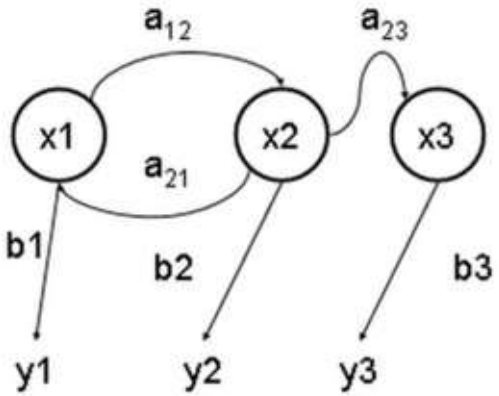
Gullible Bayes is a viable and proficient learning calculation in order. In numerous applications, in any case, a precise positioning of examples dependent on the class likelihood is more alluring. Tragically, credulous Bayes has been found to deliver helpless likelihood gauges. Various strategies have been proposed to broaden credulous Bayes for better arrangement precision, of which particular Bayesian classifiers (SBC), tree-expanded innocent Bayes (TAN), NBTree, helped gullible Bayes and AODE accomplish astounding improvement over guileless Bayes as far as order exactness.

One approach to mitigate the contingent freedom supposition that is to broaden the design of guileless Bayes to address expressly property conditions by adding curves between ascribes. Tree expanded innocent Bayes (TAN) is an all-encompassing tree-like credulous Bayes, in which the class hub straightforwardly focuses to all ascribe hubs and a characteristic hub can have just one parent from another property hub. TAN is a particular instance of general increased innocent Bayesian organizations, or essentially ANB, in which the class hub likewise straightforwardly focuses to all credit hubs, however there is no constraint on the connections among quality hubs. ANB can address discretionary trait conditions.

## 6 Hidden Markov Model

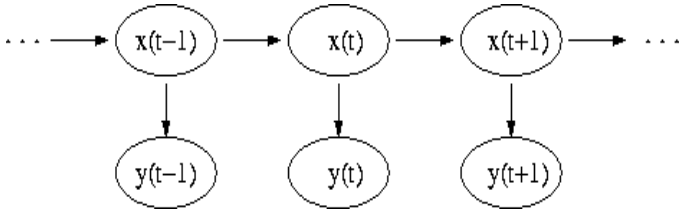
A secret Markov model (HMM) is a factual model Markov measure with obscure boundaries, and the test is to decide the concealed boundaries from the detectable boundaries. The separated model boundaries would then be able to be utilized to perform further analysis.A HMM can be measured as the least difficult unique Bayesian organization.

In a normal Markov model, the state is straightforwardly noticeable to the eyewitness, and consequently the state progress likelihoods are the solitary boundaries. In a secret Markov model, the state isn't straightforwardly noticeable, yet factors affected by the state are apparent. Each state has a likelihood dispersion over the imaginable yield token. In this way the sequence of token shaped by a HMM give some data about the group of conditions.




State transitions in a hidden Markov model (example)
*x* — hidden states
*y* — observable outputs
*a* — transition probabilities
*b* — output probabilities

## 7 Architecture of a Hidden Markov Model




General architecture of HMM.

## Conclusion

The graph beneath shows the overall engineering of a HMM. Every oval shape addresses an arbitrary mutable that can embrace various qualities. The irregular variable x(t) is the worth of the secret variable at time t. The irregular variable y(t) is the worth of the noticed variable at time t. The bolts in the graph mean restrictive conditions.

From the outline, obviously the worth of the secret variable x(t) (at time t) just relies upon the worth of the secret variable x(t − 1) (at time t − 1). This is known as the Markov stuff. Essentially, the worth of the noticed variable y(t) just relies upon the worth of the secret variable x(t) (both at time t).

## References


[1] Facial Expression Recognition with Local Binary patterns and Linear programming – X.Feng, M.Pietikäinen, A.Hadid.

[2] Toward Machine Emotional Intelligence - Rosalind W Picard, MIT Cambridge.

[3] Facial Expression Analysis - Ying-Li Tian, Takeo Kanade, and Jeffrey F. Cohn.

[4] Emotion Recognition from Facial Expressions using Multilevel HMM - Ira Cohen, AshutoshGarg, Thomas S. Huang

[5] Facial Expressions recognition from video sequences - Ira Cohen, NicuSebe, AshutoshGarg, Michael S. Lew, Thomas S. Huang. Web References.

[6] Dr. Kaliyamurthie K.P "An Application Of Non-Uniform Cellular Automata For Efficient Cryptography" ,Indian Journal of Science and Technology, Vol 6, Issue 5S, page 4648-4652 May 2013.

[7] Dr. Kaliyamurthie K.P "K-Anonymity Based Privacy Preserving For Data Collection In Wireless Sensor Networks" , Indian Journal of Science and Technology, Vol 6, Issue 5S, page 4604-4614 May 2013.

[8] Dr. Kaliyamurthie K.P "Highly Secured Online Voting System Over Network" , Indian Journal of Science and Technology, Vol 6, Issue 6S page 4831-4836 May 2013.

[9] Dr. Kumaravel. A "vehnode: Wireless Sensor Network Platform For Automobile Pollution ControL" IEEE explore, Vol Page(s): 963 – 966, 2013.

[10] Dr. Kumaravel. A "Multi- Classification Approach For Detecting Network" IEEE explore, Page(s): 1114 –1117,April 2013.

[11] T. Vijayan , M. Sangeetha , A. Kumaravel & B. Karthik (2020): FeatureSelection for Simple Color Histogram Filter based on Retinal Fundus Images for DiabeticRetinopathy Recognition, IETE Journal of Research, DOI: 10.1080/03772063.2020.1844082.

[12] D. S. Vijayan, A. Leema Rose, S. Arvindan, J. Revathy, C. Amuthadevi, "Automation systems in smart buildings: a review", Journal of Ambient Intelligence and Humanized Computing https://doi.org/10.1007/s12652-020-02666-9

[13] Vijayan T, Sangeetha M, A. Kumaravel, Karthik B, "Gabor filter and machine learning based diabetic retinopathy analysis and detection", Microprocessors and Microsystems,2020. https://doi.org/10.1016/j.micpro.2020.103353.

[14] Vijayan T, SangeethaM, Karthik B, "Trainable WEKA Segmentation of Retinal Fundus Images for Global Eye Disease Diagnosis Application," International Journal of Emerging Trends in Engineering Research,Vol 8, No.9, pp. 5750-5754, Sep 2020. https://doi.org/10.30534/ijeter/2020/136892020

[15] C. Amuthadevi, D. S. Vijayan, Varatharajan Ramachandran, "Development of air quality monitoring (AQM) models using different machine learning approaches", Journal of Ambient Intelligence and Humanized Computing, https://doi.org/10.1007/s12652-020-02724-2

[16] Vijayan T, Sangeetha M, A. Kumaravel, Karthik B, "Fine Tuned VGG19 Convolutional Neural Network Architecture for Diabetic Retinopathy Diagnosis," Indian Journal of Computer Science and Engineering (IJCSE), Vol. 11, No. 5, pp. 615-622 Sep-Oct 2020. DOI: 10.21817/indjcse/2020/v11i5/201105266.

[17] Vijayan T, Sangeetha M, Karthik B, "Efficient Analysis of Diabetic Retinopathy on Retinal Fundus Images using Deep Learning Techniques with Inception V3 Architecture," Journal of Green Engineering, Vol 10, Issue 10, pp. 9615-9625. Oct 2020