



## Prediction of Hypertension and Cold Using ANFIS

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**Abstract:** The proposed work is targeted on personalised healthcare and scientific carrier. The repute of a tongue is the important indicator to diagnose one's fitness like physiological and clinic pathological modifications of internal elements of the frame. The tongue diagnosis is suffering from exam occasions including mild supply, affected person's posture, and physician's condition. The tongue image popularity is included with advanced device studying version including deep gaining knowledge of (Adaptive Neuro Fuzzy Interface System) into the conventional model correctly for increasing the evolution. The syndrome differentiation and prescription choice are the maximum vital two steps of this concept. We classify the tongue popularity the use of the CNN classification, and we're validating with the staked auto-encoder and multi-modal deep mastering model for syndrome reputation of high blood pressure and cold.

**Keywords:** Tongue, Convolutional Neural Network, Multimodal Deep Learning, Staked Auto Encoder.

### 1. Introduction

#### 1.1. Hypertension

Hypertension is some other name for high blood stress. It can lead to intense fitness complications and growth the danger of coronary heart disease, stroke, and every now and then dying. Blood pressure is the force that someone's blood exerts in opposition to the walls of their blood vessels. This pressure depends on the resistance of the blood vessels and the way difficult the coronary heart has to paintings.

Almost 50% of adults within India have high blood pressure, however many are not privy to this fact. Hypertension is a primary hazard issue for cardiovascular disease, consisting of stroke, heart assault, heart failure, and aneurysm. Keeping blood strain beneath manipulate is critical for keeping fitness and decreasing the danger of those dangerous conditions.

The forms of high blood pressure are crucial or secondary. High blood strain with an unknown motive is essential hypertension. High blood stress



with an acknowledged or direct motive is secondary hypertension. Some of the causes of secondary hypertension consist of kidney ailment, tumours or medicinal drugs inclusive of use of start control capsules. The most common causes of hypertension include smoking, obesity or being obese, diabetes, having a sedentary lifestyle, lack of bodily hobby, excessive salt or alcohol consumption ranges, inadequate intake of calcium, potassium or magnesium, a deficiency in nutrition D, strain, getting older, chronic kidney ailment and adrenal and thyroid conditions or tumours. Some individuals can also be genetically predisposed to hypertension.

### 1.1.2. Symptoms

- i. Hypertension is not often observed by using signs and symptoms, and its identification is normally through screening.
- ii. Some humans with excessive blood stress file headaches as well as lightheadedness, vertigo, tinnitus altered vision or fainting episodes.
- iii. These symptoms, but, is probably related to associated tension in place of the high blood strain itself.

## 1.2. Cold

The commonplace cold is an upper respiratory tract contamination due to many unique viruses. The not unusual bloodless is transmitted by means of virus-infected airborne droplets or by using direct touch with infected secretions.

### 1.2.2. Symptoms

- i. cough,
- ii. sore throat,
- iii. coughing,
- iv. sneezing,
- v. Runny nose.

Being in bloodless climate does no longer purpose the common bloodless, however cold weather promotes close touch. Over-the-counter medicinal drugs can be used for treatment of the commonplace bloodless. Antibiotics aren't essential for the not unusual bloodless. The not unusual bloodless is a self-confined disorder which could normally be controlled at home. The commonplace bloodless has no cure, and there's no to be had vaccine.

## 1.3. Convolutional Neural Network

A convolutional neural community (CNN) is a kind of artificial neural network used in photo reputation and processing this is in particular



designed to manner pixel facts. [2] discussed about Intelligent Sensor Network for Vehicle Maintenance System. Modern automobiles are no longer mere mechanical devices; they are pervasively monitored through various sensor networks & using integrated circuits and microprocessor based design and control techniques while this transformation has driven major advancements in efficiency and safety. In the existing system the stress was given on the safety of the vehicle, modification in the physical structure of the vehicle but the proposed system introduces essential concept in the field of automobile industry. It is an interfacing of the advanced technologies like Embedded Systems and the Automobile world. This “Intelligent Sensor Network for Vehicle Maintenance System” is best suitable for vehicle security as well as for vehicle’s maintenance. Further it also supports advanced feature of GSM module interfacing. Through this concept in case of any emergency or accident the system will automatically sense and records the different parameters like LPG gas level, Engine Temperature, present speed and etc. so that at the time of investigation this parameters may play important role to find out the possible reasons of the accident. Further, in case of accident & in case of stealing of vehicle GSM module will send SMS to the Police,

insurance company as well as to the family members.

CNNs are effective picture processing, artificial intelligence that use deep gaining knowledge of to carry out both generative and descriptive obligations, often the use of system vision that includes photograph and video recognition, along with recommender structures and herbal language processing. A CNN uses a device much like a multilayer perceptron that has been designed for reduced processing requirements. The layers of a CNN consist of an input layer, an output layer and a hidden layer that includes more than one convolutional layers, pooling layers, completely related layers and normalization layers. The elimination of boundaries and boom in performance for photo processing outcomes in a system that is a ways greater powerful, less difficult to trains limited for photo processing and herbal language processing.

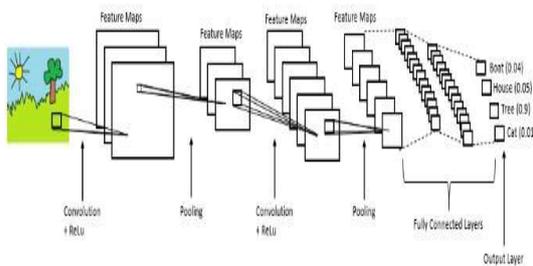
**Steps:**

- i. Provide input image into convolution layer
- ii. Choose parameters, apply filters with strides, padding if require .Perform convolution at the image and follow ReLU activation to the matrix.
- iii. Perform pooling to reduce dimensionality size



- iv. Add as many convolutional layers till glad
- v. Flatten the output and feed into a totally linked layer

### Overall convolutional neural network diagram



#### 1.3.1. Advantage

- i. Local connectivity of the hidden gadgets, which means that every hidden unit is simplest linked to a small neighborhood area of the enter picture.
- ii. Parameter sharing, which means that plenty of the hidden gadgets will percentage parameters with each different.
- iii. The use of pooling and sub sampling operations among the hidden layers.

## 2. RELATED WORKS

In the research work of N. Srivastava the technique of Multimodel is used for

finding the images that are tagged with textual analysis and in the work of Chun-Mei Huo, is used for finding the efficiency which is decreased, then in the work of Classification of Tongue Color Based on NN is used for finding the non-uniform datasets, augmented tongue images, hierarchical structure.

### 2.1. PROPOSED SYSTEM

An inquiry and tongue inspection are the maximum extensively used approaches for acquiring the patient's symptoms statistics that is heterogeneous. Specially, the signs and symptoms facts obtained from inquiry are typically structural at the same time as tongue inspection obtains a image of the patient's tongue. In this paper, we gift a multi-modal deep computation model to recognize the syndrome based at the heterogeneous symptoms records received by using inquiry and tongue inspection. In the supplied version, a stacked vehicle-encoder and a convolutional neural network are built to research the capabilities of the signs and symptoms statistics from inquiry and the photo of the patient's tongue, respectively. Afterwards, the vector outer product is used to concatenate to found out the functions of shape and characteristic matrix that is taken as enter for a deep computation version for syndrome differentiation. Finally, we conduct experiments to validate the

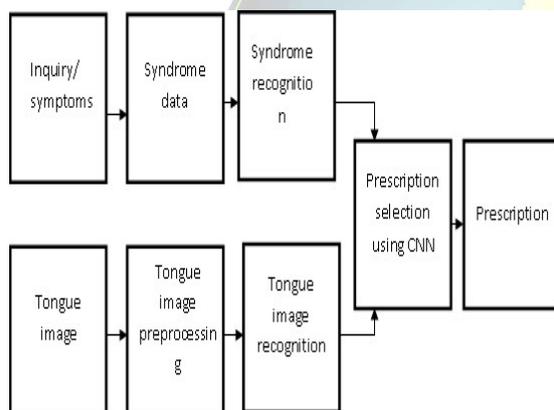


capability of the presented version through comparing with the stacked vehicle-encoder and the multi-modal deep getting to know version on Chinese clinical datasets for spotting the syndrome of hypertension and bloodless in terms of the category accuracy.

## 2.2. Advantages

- i. It improves the velocity.
- ii. It has higher overall performance.

### Block diagram



## 3.1. OVERALL DESCRIPTION

### Inquiry session

- Tongue picture pre-processing
- Syndrome recognition using inquiries
- Feature extraction in tongue images
- Prescription selection by classifier

### 3.1.1. Inquiry consultation

In inquiry session, some questions depending on .hypertension signs and symptoms and cold signs queried right here. We are answering a few questions or all questions. Then the answer is used to decide the signs. In this consultation, the information is gathered by queries.

### 3.1.2. Tongue picture pre-processing:

The tongue picture improved the usage of median filtering. To the use of this, we get a cleared photo without noise and undesirable errors.

### 3.1.3. Syndrome recognition using inquiries:

The stacked auto-encoder that is made of an input layer and two hidden layers is used to research capabilities of the affected person's signs.

### 3.1.4. Feature extraction in tongue pictures:

#### (i) Shape Extraction:

In this procedure, the unwanted picture components are removed and we are able to get a clear photograph of the segmented tongue. Since the tongue is in



abnormal shape, the rims will now not be a related one, so with assist of the vicinity growing approach we can conquer this hassle.

### **(ii) Texture Extraction:**

The texture of the tongue is used to extract the technique which is known as Local Gabor XOR Patterns (LGXP) method. This approach initially forces the photo to go through a Gabor filtering, wherein the convolution of the photo with the Gabor kernels is achieved to get the required output. After the Gabor filtering, the filter generates a complicated variety with real and imaginary parts at every photo pixel. With the help of these two parameters importance and section of the picture are calculated. But in our technique we make use of only the phase facts of each pixel and then processing it and plotting histograms in response to the evaluation made on every pixel. The 2nd component is a convolutional neural community that's accountable for function learning of the patient's tongue image. Specially, the convolutional neural network consists of a convolutional layer, a pooling layer and a fully-related layer. The convolutional layer aims to compress the parameters and to apprehend the primary vicinity of the tongue image with the aid of the load sharing.

### **3.1.5. Prescription choice by way of classifier**

The absolutely-linked layer is used to store the functions of the affected person's tongue image. Typically, the parameters of the convolutional neural network are skilled through the gradient descent approach with the lower back-propagation set of rules.

After getting to know the features of the signs and the tongue picture, the vector outer product is used to concatenate the learned functions for acquiring a joint representation. Finally, a deep computation version with hidden layers is constructed for syndrome reputation on the joint representation. Specially, the deep computation model is stacked through tensor auto-encode

## **4.0. IMAGE PROCESSING**

In photo processing the concept of feature detection refers to techniques that purpose at computing abstractions of photo statistics and making neighborhood choices at each picture factor whether or not there's an picture characteristic of a given type at that factor or no longer. The resulting features could be subsets of the image area, regularly within the form of isolated factors, continuous curves or connected regions. Bag of phrases based picture class tactics by and large depend



upon low stage neighborhood form capabilities. However, it has been shown that combining multiple cues inclusive of shade, texture, or form is a challenging and promising challenge that may improve the classification accuracy. Most of the modern-day feature fusion methods usually intention to weight the cues without thinking about their statistical dependence in the software at hand. [4] discussed about a system, GSM based AMR has low infrastructure cost and it reduces man power. The system is fully automatic, hence the probability of error is reduced. The data is highly secured and it not only solve the problem of traditional meter reading system but also provides additional features such as power disconnection, reconnection and the concept of power management. The database stores the current month and also all the previous month data for the future use. Hence the system saves a lot amount of time and energy. Due to the power fluctuations, there might be a damage in the home appliances. Hence to avoid such damages and to protect the appliances, the voltage controlling method can be implemented.

In imaging technological know-how, picture processing is processing of pixel the usage of mathematical operations by means of the usage of any form of signal processing for which the input is an photo, such as a image or

video frame; the output of photo processing may be both an photograph or a set of traits or parameters related to the photo. Most photo-processing strategies contain treating the photograph as a two-dimensional sign and applying standard signal processing strategies to it.

Image processing usually refers to digital photograph processing, but optical and analog photograph processing are also possible. This article is about standard techniques that apply to all of them. The acquisition of pixel (generating the enter picture in the first region) is known as imaging.

Closely associated with photograph processing are pc photographs and computer vision. In pc graphics, pics are manually made from bodily fashions of gadgets, environments, and lighting, in preference to being acquired (through imaging gadgets inclusive of cameras) from herbal scenes, as in maximum lively films. Computer imaginative and prescient, alternatively, is often taken into consideration excessive-degree photo processing out of which a gadget/pc/software intends to decipher thebodily contents of an image or a sequence of pictures (eg, movies or 3d complete frame magnetic resonance scans).



In cutting-edge sciences and technology, pictures additionally benefit a whole lot broader scopes because of the ever growing significance of medical visualization (of often large- scale complicated scientific/experimental statistics).

Examples consist of microarray facts in genetic research, or real-time multi- asset portfolio buying and selling in finance.

#### **4.1. Purpose of Image processing**

The purpose of photo processing is split into five businesses. They are:

- i. Visualization - Observe the gadgets that aren't seen.
- ii. Image polishing and recuperation - To create a better photograph.
- iii. Image retrieval - Seek for the photograph of interest.
- iv. Measurement of sample - Measures numerous items in an picture.
- v. Image Recognition – Distinguish the gadgets in an image.

The two varieties of strategies used for Image Processing are Analog and Digital Image Processing. Analog or visual strategies of image processing may be used for the tough copies like printouts and photos. Image analysts use diverse fundamentals of interpretation while using those visual techniques. The picture processing isn't simply restricted

to vicinity that must be studied but on knowledge of analyst. Association is any other important tool in photograph processing thru visible techniques. Photograph processing thru visible techniques. So analysts practice a combination of private expertise and collateral statistics to photograph processing.

#### **4.2. Images and Pictures**

Human beings are predominantly visual creatures: we depend heavily on our imaginative and prescient to make sense of the sector around us. We not only have a look at things to pick out and classify them, however we will experiment for differences, and attain an average hard feeling for a scene with a short glance.

Humans have developed very particular visible talents: we will perceive a face in an on the spot; we will differentiate hues; we will system a huge amount of visible facts in no time. However, the world is in constant movement: start at some thing for long enough and it'll change in some way. Even a big solid structure, like a constructing or a mountain, will trade its appearance depending on the time of day (day or night time) quantity of daylight (clear or cloudy), or various shadows falling upon it. We are involved with unmarried pixel: snapshots, if you want, of a visual scene. Although image processing can cope

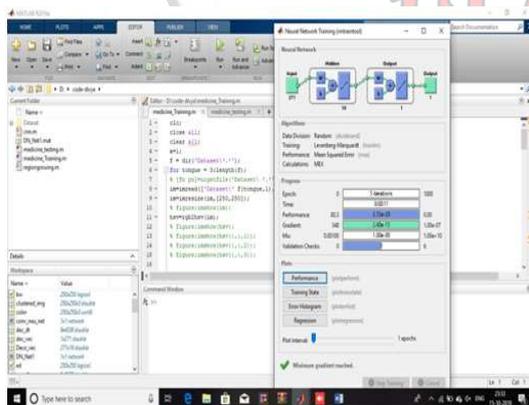


with converting scenes, we shall no longer speak it in any detail in this newsletter. For our purposes, an photograph is a unmarried image which represents some thing. It can be a photograph of someone, of humans or animals, or of an outdoor scene, or a microphotograph of an electronic factor, or the end result of scientific imaging. Even if the image isn't without delay recognizable, it's going to not be just a random blur. Image processing entails changing the nature of an picture so that you can either

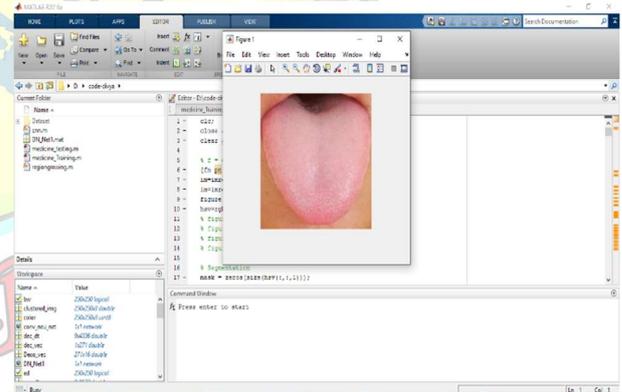
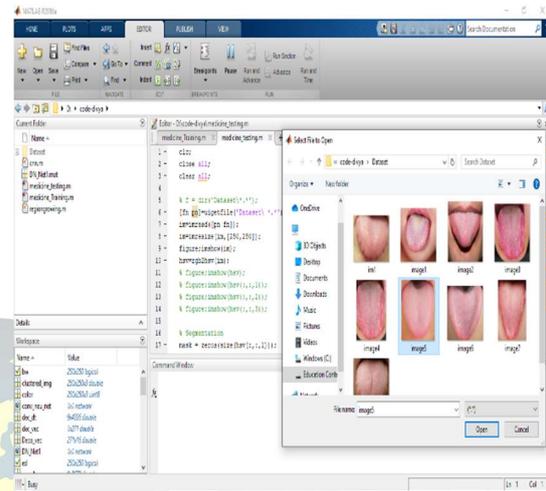
- i. Improve its pictorial information for human interpretation,
- ii. Render it extra suitable for autonomous machine perception.

**RESULTS:**

**Training dataset**

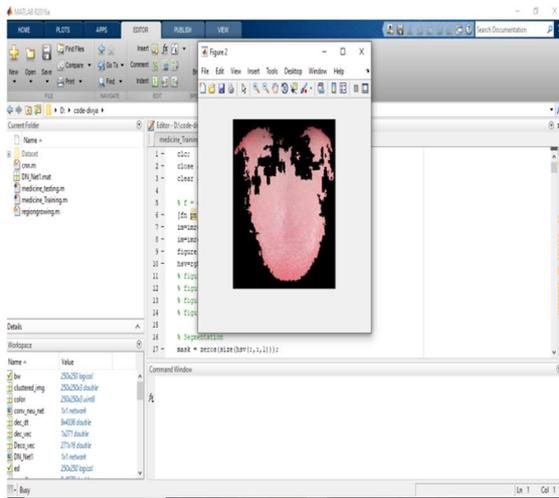


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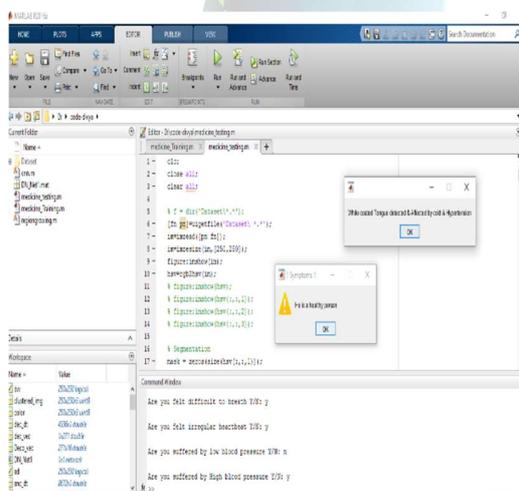




### Filtering images



### Queries based on final result



### 5. Conclusion

The proposed framework is to offer laptop-aided syndrome differentiation and prescription recommendation in remedy. Specially, the superior machine learning fashions

are used to offer the personalized and patient-centralized healthcare to patients concerning syndrome differentiation and prescription advice, whilst the CNN is designed to improve the efficiency of machine studying models used inside the framework and to offer the pervasive healthcare services to sufferers. Furthermore, we've speak the potential fashions relevant to each venture in the supplied framework. Finally, we've got present a staked auto-encoder and multi-modal deep computation model for syndrome popularity in remedy.

### Future enhancement

These work further can be enlarge aims to gain high accuracy that results in identifying and classifying the high blood pressure and cold the usage of Artificial Neural Network .

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