

# Deep Learning Model for Identifying Snakes by using Snakes' Bite Marks

Dr. R. Kamalraj

Associate Professor, CSE Department,  
Sree Vidyanikethan Engineering College,  
Tirupathi, Andhra Pradesh, India  
profdrkamalraj@gmail.com

**Abstract** - Identifying snakes by using their bite marks may help the doctors to diagnose the victim with proper anti venoms for saving patients. It is very important step for doctors to help the patients who suffered by snakes bites. Hence here a study was done on processing images to classify them as different family of snakes using CNN (Convolution Neural Network) model in Deep Learning techniques. The CNN model needs different snakes and their bite marks images to classify them as venomous and non-venomous snakes and by processing venomous snakes bite marks images it can able to find the venomous snakes family. To give accurate results the proposed Deep learning model has to be trained periodically with all possible different images of same snake's family and different snakes' families. The performance of the CNN model is on its knowledge and finding patterns on the input images to find the family of the snakes. If the input images are huge in numbers and size then the system may take time to give results. That has to be considered to give results in less duration execution time.

**Keywords** – *Venom Snakes, Snake Bites, Deep Learning, CNN Model, Snakes Classification*

## I. INTRODUCTION

India and around the world a very big problem to human life is snakes attacks and treating the patients to get cure from the snakes poisons. More over many families of snakes are in different places of this world. They have the rights to live in this beautiful world and people should not attack them unnecessarily. A big problem of farmers is snakes in agricultural area. They are more and more in the side of the agricultural land to catch the rats. But unfortunately when farmers are attacked by the snakes it is a tough problem to doctors because of which kind of snakes bite the formers at the moment has to be noted for treating the patients by doctor.

### A. Non-Venomous Snakes and Venomous Snakes

Many researches were done about snakes and their life style and their role in this beautiful world. Snakes are in two groups according to their effect of bite. As per that snakes are classified as 'Non-Venomous Snakes' and 'Venomous Snakes'.

### Non-Venomous Snakes:

They are harmless to humans and it may not cause any loss of human lives. Many non-venomous snakes are in India and the list is given below [6].

Table I – Non-Venomous Snakes in India

S.No.	Non-Venomous Snakes	Living Places
1	Indian Rat Snake	Urban Areas
2	Common Cat Snake	In Gardens, Rocky hills and in scrubs
3	Checkered Keelback	Near to fresh water lakes and rivers
4	Indian Rock Python	Grasslands and Rocky places
5	Common wolf snakes	Andaman Islands
6	Dog-faced water snake	forests, marine coastlines
7	Banded racer	between bushes, tall grass and foliage
8	Banded Kukri	Himalayan Region
9	Common Trinket	Vishakapatnam areas
10	Black-headed Royal Snake	deserts and semi-deserts in India
11	Common Bronzeback Tree snakes	Southern India and Himalayan foothills
12	Sand Boa	Agricultural Lands, Garden, Rat Holes, Brick Piles and Rock Piles

### Venomous Snakes:

Venomous snakes are very highly dangerous and may lead to loss of human lives. The different families of venomous snakes are given in the following table [8].

Table II – Venomous Snakes in India

S.No.	Venomous Snakes	Living Places
1	King Cobra	across the Indian subcontinent
2	Indian Krait	jungles of the Indian subcontinent
3	Russell's viper	Indian subcontinent
4	Indian Saw Scaled Viper	dry regions of India
5	Indian Cobra	across the Indian subcontinent
6	Malabar Pit Viper	western Ghats of India
7	Bamboo Pit Vipers	near water streams
8	Banded Sea Krait	coral reefs of India
9	Hump Nosed Pit Viper	Jungle, Hilly Areas And Coffee Plantations Of South India

### Venomous and Non-Venomous Snakes Body Characteristics:

Mostly snakes are having many common features or body characteristics. But they will be differed when their appearance was clearly observed and noted [5].

### Venomous Snakes Characteristics are

- They are in Rough Triangle Shaped Head
- Their Pupils look like slits during day time

- They may have heat sensing pit on their head

#### Non-Venomous Snakes Characteristics are

- May have Rounded head
- Circular Pupils
- No heat sensing pit on their head

#### B. Snakes Bite Marks

Snakes will attack any prey or human and they may bite them also. Venomous Snakes will bite their prey and those may inject the venom from the gland to the prey. That venom will be the poison to the prey and within less time the prey will be paralyzed or dead. Whenever a snake bites, people have to see the bite marks of the snake. Through the bite marks people can able to identify that 'Venomous' or 'Non-Venomous' snakes.

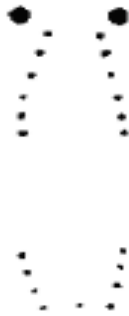


Fig. 1 – (a) Venomous Snake Bite Marks

In the above fig 1, the top two black dark dots are made by the fangs of the venomous snakes. The remaining small dots are from the tooth marks of the venomous snakes.



Fig. 1 – (b) Non-Venomous Snake Bite Marks

The above shown bite marks are very common bite marks of non-venomous snakes. But some non-venomous snakes also may have fang marks. Their bite marks like an 'Arc' structure with much closed set of dots. These marks will be easily visible to survivors to identify whether venomous or non-venomous attacked him.

#### II. EXISTING SYSTEM

The snakes' identification from bite marks is a very big problem to the human society for helping the victims. In this

regard existing approaches are the clues collected from victims or eyewitness when snakes bite was happened, suggestion from experts who know the different snakes and snakes' bite marks. The clinical test is about analyzing the signs happening in the victim's body to trace the kind of snake attacked him. The Laboratory test is about doing blood test on collected blood from the victims' body [11]. It may be possible to find the venomous snakes but it takes time to start treatment. It may give accurate results about the kind of snake which attacked the victims. The Deep learning model is used on finding animals and counting the animals by measuring their body features. This model works based on 'Deep Neural Networks' to process the captured pictures for deriving the results about animals in a place or forest [12] and [13].

#### III. PROPOSED WORK

The main problem in snake's bites is identifying the family of the snake which attacked the prey. If survivors know the family of the snakes then easily doctors will take perfect anti-venom and clinical procedures to cure the patient. But if the family of the snake is unknown then it will be a problem to doctors to give treatment to the survivor. Research works are going on in this area to find the snake is attacked the patient and what is the anti-venom have to be injected to the patient. Here, a Deep Learning based approach is proposed to find the family of the snake by using 'Convolution Neural Network (CNN)' model.

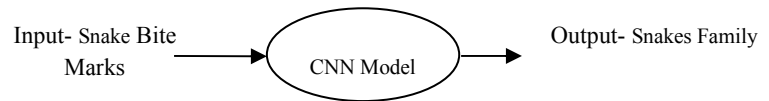


Fig. 2 – Context Flow Model of CNN on Snake Identification

The input to the CNN model is snake bite marks photos or images. The output of the model will be the family of the snake. The following fig.3 shows that the fang marks of the different venomous snakes. The fang marks of those snakes are looking differently and the bite marks or patterns also different. This kind of bite marks pictures or data set are essential to train the CNN model to detect the family of the supplied snakes' bites photos.

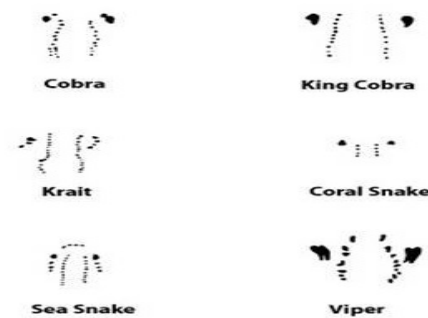


Fig. 3 –Few Venomous Snakes' fang marks

#### A. Flow of the CNN Model

The Convolution Neural Network is like a neural network as in human brain and it is the best model to process the images in 'Deep Learning'. The CNN model is in different phases or layers to provide the result. Those are

- Convolution Layer
- ReLu Layer
- Pooling Layer
- Fully Connected Layer

The steps of the proposed CNN model for snake identification are given below.

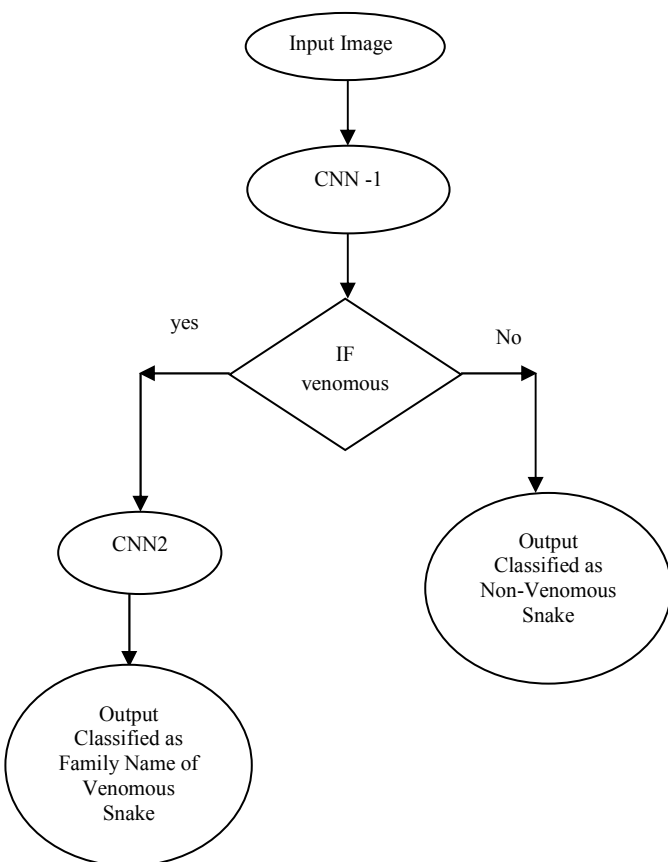


Fig. 4 – Actions flow the Proposed Model

#### CNN-1:

The CNN-1 takes the input image and it will identify whether the supplied snakes bites marks is venomous or non-venomous one. It is very easy to people to identify about it if they are familiar about snakes bites of non-venomous snakes. But the system has to identify the same to stop in CNN-1 level itself. This may help the system to avoid further process on the input image and save the system resources and energy. The

output of the CNN-1 will be processed if it is venomous snakes bite marks and it will be given to next CNN-2.

#### CNN-2:

This one takes the input from CNN-1 about venomous snakes bites marks but it has to identify the family of that particular snakes bite marks. It will process the all different patterns of different families of snakes bite marks to match the input venomous snakes bite marks. Then it will send the result such as the identified family name of the input image to take further steps in helping the patient.

#### IV. RESULTS AND DISCUSSIONS

The Deep Learning with CNN model can help to identify the objects in the supplied images very easily. But time to time the model has to be trained with the help of new patterns of the same objects and colors. The same is required in identifying the snakes also by processing their bite marks. Already some apps are available about the snakes to identify them by supplying their body features one by one. For that snakes should be in people hand or it has to stay for a while with people to trace everything. But in villages or agriculture fields it is not possible to stop the snakes once they bitten the people. Those may want to escape from the field. In such situations the family of the snake can be identified using smart phone with the app to be designed to get the input image then find the family of the snake to help the victims. The app it has to be developed with sufficient user interactive features with filters in first level itself to get proper set of input images to be given to the CNN system for screening the object in the input image. The merits of the proposed idea is trying to reduce the time on helping the victims by helping the doctors to give proper treatment and care to cure the victims.

The requirements for implementing the proposed idea are listed below.

- Huge memory space or database to keep all different families of snakes and their bite marks patterns
- Higher end processor is required to execute the model on the given input image to avoid delays in providing response
- All different patterns of snakes bites marks images are required period by period to train the system for improving the accuracy of the system

#### A. Merits

- Proposed method may give result by processing the available snakes' bite images
- It may help the doctor to provide perfect treatment according to the snake
- Idea may help the public to stop about afraid of snakes bites

#### B. Demerits

- \* The proposed idea is based on the intelligence of the system from the collected sample images to train the system for finding the patterns of fang marks of the snakes on victim's body to start investigation. Whenever any new patterns identified for the

existing family of snakes then the system it has to update its knowledge to trace the similar patterns in the given new inputs. Hence it requires a big or huge collection of snakes bite or fang photos to provide accurate results from the supplied input image.

\* The another important requirement for the proposed idea is higher end processor like GPU (Graphics Processing Unit) for increasing the speed on processing the input image against to the knowledge collection. It is more speedier than CPU (Central Processing Unit) on processing all instructions and generates responses. Due to that it may huge cost investment to have such higher end processor on deploying the system.

## V. CONCLUSION

The idea proposed here is based on 'Deep Learning' model to train the system periodically for processing the new input image to identify the kind of snake family to initiate proper treatment to the victim. The CNN model is specifically for processing images to find objects present in the input images. This model can help to find the appropriate snakes bites patterns when the system is trained already by providing sufficient set of input images about the snakes bite marks.

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