DESIGN AND DEVLOPMENT OF SNAKE RECOGNITION SYSTEM

MINOR PROJECT-I REPORT

Submitted in partial fulfillment of the requirements

for the degree of

BACHELOR OF TECHNOLOGY

in

ARTIFICIAL INTELLIGENCE & DATA SCIENCE

By

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CERTIFICATE

We hereby certify that the work which is being presented in the B.Tech. Minor Project-I Report entitled **Design and Development Of Snake Recognition System,** in partial fulfillment of the requirements for the award of the degree of ***Bachelor of Technology*** in ***Artificial Intelligence & Data Science*** and submitted to the Department of Computer Science & Engineering, *Sagar Institute of Science & Technology (SISTec)***,** Bhopal (M.P.) is an authentic record of my own work carried out during the period from Jul-2023 to Dec-2023 under the supervision of **Prof. Ruchi Jain (Assistant Professor)** The content presented in this project has not been submitted by me for the award of any other degree elsewhere.

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Date:

Prof. Ruchi Jain	**Dr. Vasima Khan**	**Dr. D.K. Rajoriya**
Project Guide	**HOD**	**Principal**

ACKNOWLEGMENT

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ABSTRACT

Snakebite envenoming is a neglected tropical disease that kills an estimated 81,000 to 138,000 people and disables another 400,000 globally every year. The World Health Organization aims to halve this burden by 2030. To achieve this ambitious goal, we need to close the data gap in snake ecology and snakebite epidemiology and give healthcare providers up-to-date knowledge and access to better diagnostic tools. An essential first step is to improve the capacity to identify biting snakes taxonomically. The existence of AI-based identification tools for other animals offers an innovative opportunity to apply machine learning to snake identification and snakebite envenoming, a life-threatening situation.

In response to the global threat posed by snakebite envenoming, our project, the 'Snake Recognition System,' leverages advanced machine learning techniques, including Convolutional Neural Networks (CNNs), to identify whether a snake is venomous or non-venomous based on the images of that snake. By utilizing a dataset of venomous and non-venomous snake images, our system employs state-of-the-art algorithms to accurately differentiate between the two categories. Utilizing Python, Django, and AI technologies, we have developed a user-friendly web interface that enables individuals to upload snake images and receive predictions. This innovative solution harnesses the power of technology to enhance snake safety, prevention, and awareness, making a significant impact on public health.

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LIST OF ABBREVIATIONS

ACRONYM	FULL FORM
SDLC	Software Development Life Cycle
IDE	Integrated Development Environment
DL	Deep Learning
CNN	Convocational Neural Network
OOP	Object Oriented Programming
MTV	Model Template View

Chapter 1
Introduction

CHAPTER-1

INTRODUCTION

1.1 ABOUT PROJECT

The idea of a creature with creeping zig-zag motion shining, agile cold body immediately puts a wave of fear and repulsion" in our mind. This is nothing except an animal generally known as Snake. Snake encounters have the potential for both wonder and danger. In regions where various snake species coexist, it becomes increasingly crucial to address the knowledge gap that often exists among the general public. Accurate identification of a snake's toxicity is not only vital for human safety but also crucial for the conservation of these enigmatic creatures. Our project takes on the challenge of providing a user-friendly web interface that allows individuals to upload snake images. These images, containing the vital visual information needed for identification, are processed by our machine learning model. Through the integration of cutting-edge technology, we aim to offer rapid and reliable toxicity predictions. Users are provided with the insight they need to make informed decisions and take the appropriate steps when encountering snakes. By democratizing access to critical information about snake toxicity, we aim to reduce unnecessary fear, panic, and harm to both humans and snakes.

In a world where technology continuously empowers us to confront complex challenges, our project, the "Snake Recognition System," stands as an innovative and practical response to a pressing concern. At the core of this endeavor lies the critical need to accurately identify the toxicity of snakes, a matter of paramount importance when faced with snake encounters. The Snake Recognition System is a pioneering solution that harnesses the capabilities of machine learning, specifically Convolutional Neural Networks (CNNs), to empower individuals with the knowledge to distinguish between poisonous and non-poisonous snakes based on images.

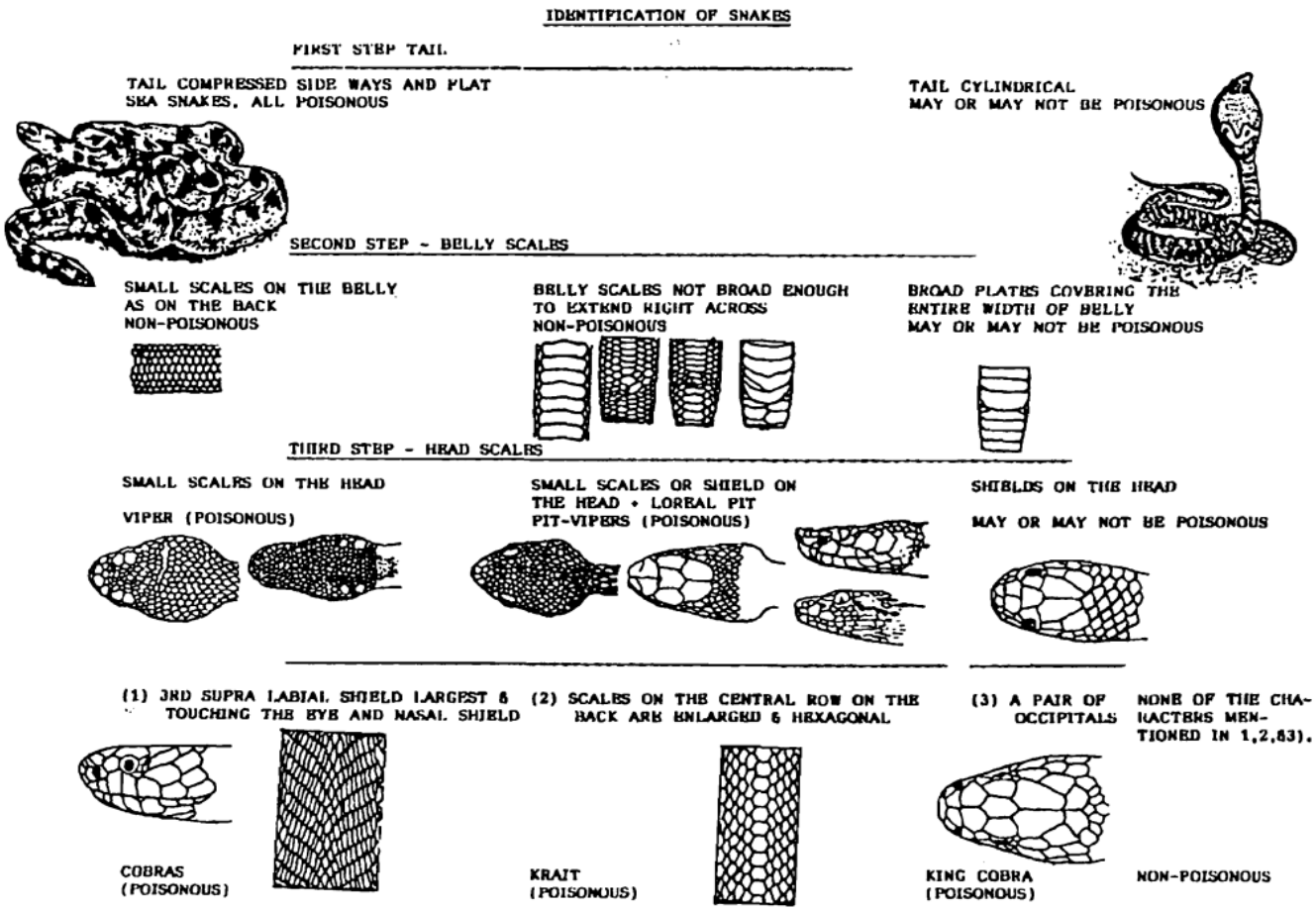


Figure 1.1 Identification of Snakes

1.2 PROJECT OBJECTIVES

The central objectives of this project encompass the following:

- **To Develop a Convolutional Neural Network (CNN):** Construct a CNN-based model capable of accurately recognizing and categorizing snake species, particularly focusing on venomous snakes.
- **Data Collection and Preprocessing:** Curate and preprocess an extensive dataset comprising detailed images of snakes, ensuring the model receives high-quality inputs for effective training.
- **Model Evaluation and Validation:** Employ rigorous evaluation metrics to assess the performance and accuracy of the snake recognition model, ensuring reliability in real-world scenarios.

- **User-Friendly Interface:** Create an intuitive web interface allowing users to upload snake images for instant toxicity predictions, ensuring accessibility for individuals and professionals alike.
- **Empower Users in Snake Encounters:** Provide a valuable tool for individuals facing snake encounters, wildlife enthusiasts, and professionals involved in snake management, enabling them to make informed decisions swiftly.
- **Skill Development:** Facilitate practical learning for the project team in areas such as image preprocessing, CNN model development, and evaluation, fostering growth in the field of computer vision and deep learning.

1.3 SIGNIFICANCE OF SNAKE RECOGNITION SYSTEM

The importance of a dependable snake recognition system in today's environmental landscape cannot be overstated. For individuals encountering snakes, having access to an accurate recognition tool can offer a crucial layer of safety and decision-making. It empowers users to identify whether a encountered snake is venomous or not, facilitating informed actions and responses. This system holds particular significance for wildlife enthusiasts, researchers, and professionals in wildlife management. By accurately identifying snake species, it aids in ecological research, conservation efforts, and the effective management of snake populations in various environments.

Moreover, the system has broader applications in education, providing a valuable tool for learning and understanding snake biodiversity. It contributes to public awareness and safety, especially in regions where snake encounters are common.

The project aspires to address these diverse needs, delivering a practical solution that enhances safety, knowledge, and decision-making in the context of snake encounters.

Chapter 2
Problemn Definition and Algorithm

CHAPTER - 2
PROBLEM DEFINITION AND ALGORITHM

2.1 TASK DEFINITION

The central challenge addressed by this project is articulated as follows: When presented with a set of snake attributes, including species, colour patterns, and other pertinent features, the objective is to devise a machine learning model capable of precisely recognizing and categorizing the snake. The model's task is to offer dependable toxicity predictions, aligning with the actual venomous nature of the snake in real-world scenarios. The resolution of this problem holds immense potential to benefit various stakeholders, encompassing individuals encountering snakes, wildlife enthusiasts, professionals in wildlife management, and researchers in the field of herpetology. The proposed snake recognition system aims to provide a practical and accurate solution for enhancing safety and knowledge in snake encounters.

2.2 ALGORITHM DEFINITION

The Snake Recognition System employs a machine learning algorithm, specifically a Convolutional Neural Network (CNN), to address the problem. Here's a high-level overview of the algorithm:

- **Data Collection**: Gather a diverse dataset of snake images, meticulously labelled as "poisonous" or "non-poisonous". In this case, we acquired the dataset from - "*https://www.kaggle.com/datasets/adityasharma01/snake-dataset-india"*.
- **Data Preprocessing**: Prepare the dataset by resizing and normalizing images to ensure consistency in model input. Also apply image augmentation to ensure that the images in dataset are random and diverse.
- **Convolutional Neural Network (CNN)**: Train a pre-trained CNN model (EfficientNetB0) on the pre-processed dataset. The CNN, with time learns to extract distinctive features from snake images.
- **Prediction:** When a user uploads a snake image, the system passes it through the trained CNN. The model provides a prediction of its venomous nature (e.g., "poisonous" or "non-poisonous").

```
Model: "model"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 input_1 (InputLayer)        [(None, 224, 224, 3)]     0

 efficientnetb1 (Functional)  (None, 7, 7, 1280)       6575239

 global_average_pooling2d (G  (None, 1280)             0
 lobalAveragePooling2D)

 dense (Dense)               (None, 56)                71736

 dropout (Dropout)           (None, 56)                0

 dense_1 (Dense)             (None, 2)                 114

=================================================================
Total params: 6,647,089
Trainable params: 6,585,034
Non-trainable params: 62,055
```

Table 2.1 Model Architecture

2.3 CHALLENGES AND CONSIDERATIONS

Developing a snake recognition system introduces several challenges and considerations, given the intricacies of snake identification in diverse environments. Some key challenges and factors include:

- Image Data Quality The effectiveness of the snake recognition system heavily relies on the quality of the input image data. Ensuring that the dataset is well-curated, representative of various snake species, and free from noise is crucial for accurate model training.
- Model Architecture Selection Choosing the appropriate neural network architecture and techniques for image recognition is paramount. Experimentation is vital to identify the most effective and suitable approach for accurately recognizing diverse snake species.
- Model Training and Evaluation Establishing a robust training process and evaluation framework is essential to measure the system's performance accurately. Metrics such as

precision, recall, and F1-score will be employed to assess the model's ability to identify venomous snakes with reliability.

2.4 SCOPE OF THE PROBLEM

The challenge of snake recognition is both intricate and pertinent, particularly in environments where snake encounters pose potential risks. The "Design and Development of Snake Recognition System" project seeks to offer a practical and effective solution to this challenge, catering to the needs of individuals, wildlife enthusiasts, and professionals engaged in snake management.In the upcoming sections, we will delve into the existing research on snake recognition, define the data requirements for training the model, and provide an in-depth exploration of the software design and development process for creating the snake recognition system. The scope of the project encompasses enhancing safety, awareness, and knowledge in the context of snake encounters.

Chapter 3
Experimental Evaluation

CHAPTER - 3
EXPERIMENTAL EVALUATION

3.1 METHODOLOGY

- **Evaluation Criteria**: The evaluation criteria for the Snake Recognition System are primarily centered around classification accuracy, precision, recall, and F1-score. These metrics are essential for assessing the system's ability to correctly identify snake toxicity based on images.
- **Hypotheses**: Our experiments test the hypothesis that the Snake Recognition System can accurately and reliably distinguish between poisonous and non-poisonous snakes through image analysis.
- **Data and Training**: We curated a dataset of a total of 2024 snake images, meticulously labeled as "poisonous" or "non-poisonous". This dataset is diverse and reflective of real-world snake species.

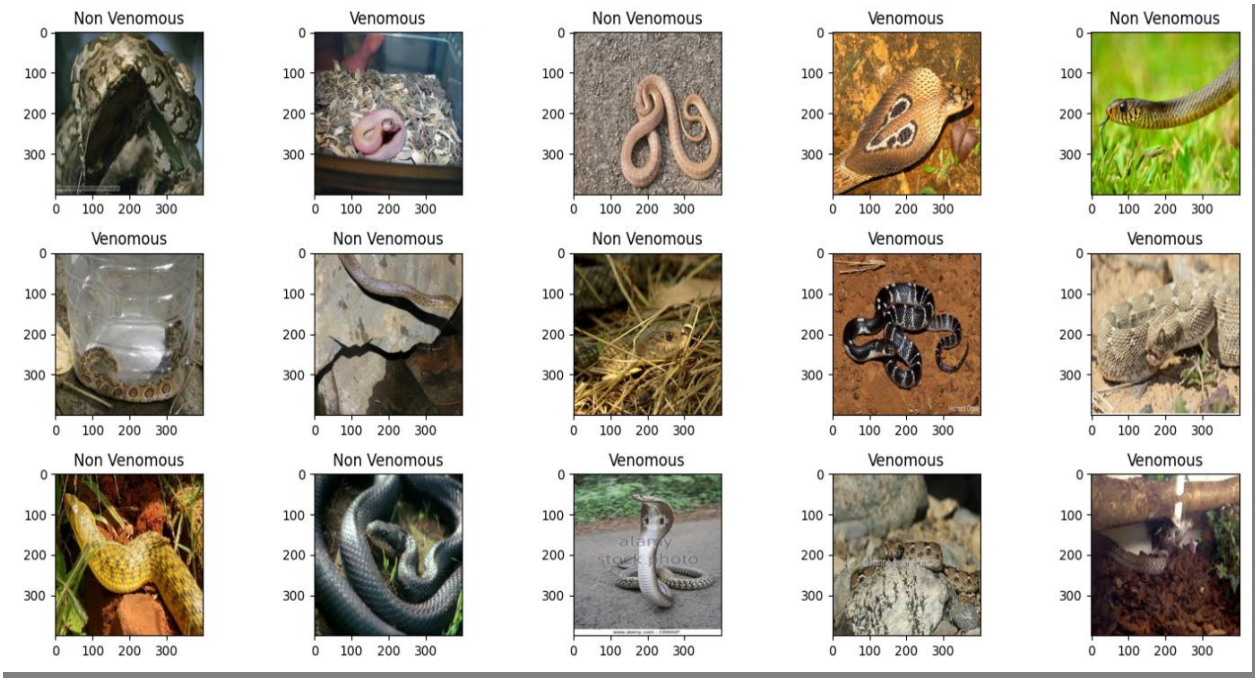


Figure 3.1 Dataset Images - I

- **Data Split**: The dataset is divided into training, testing and validation sets, containing 1406, 267, and 351 images respectively, ensuring the model is evaluated on a random and unseen data of snake images.
- **Performance Metrics**: We employ accuracy, precision (the ratio of true positive predictions to the total predicted positives), recall (the ratio of true positive predictions to the total actual positives), and F1-score (the harmonic means of precision and recall) to measure the system's performance.
- **Comparison Methods**: We compare the performance of different deep learning models containing different architectures and pre trained models with each other.

3.2 RESULTS

- **Quantitative Results**: The experiments yield highly promising quantitative results. Our system achieves an accuracy of over 72%, indicating its ability to predict snake toxicity.

Table 3.1 F1 Score and other Matrices

	precision	recall	f1-score	support
Non Venomous	0.72	0.70	0.71	128
Venomous	0.73	0.75	0.74	139
accuracy			0.72	267
macro avg	0.72	0.72	0.72	267
weighted avg	0.72	0.72	0.72	267

- **Graphical Data Presentation**: The results are visually presented through graphs showcasing the clear distinctions in performance metrics.

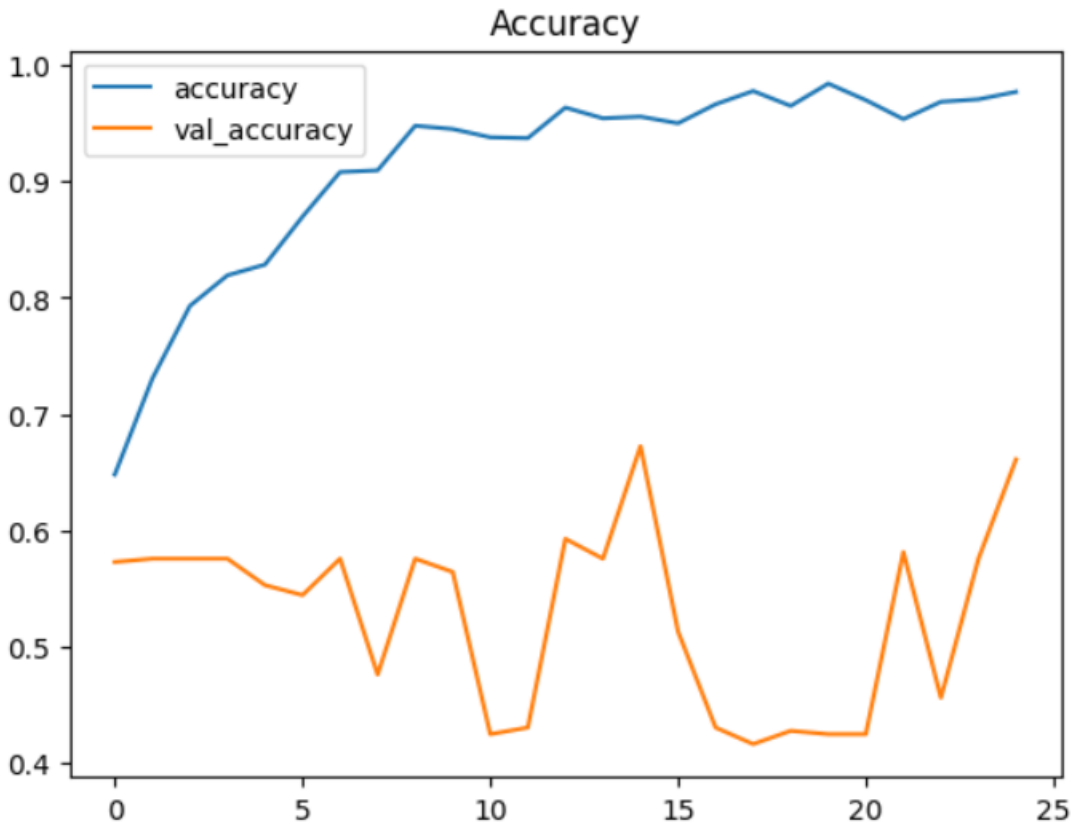
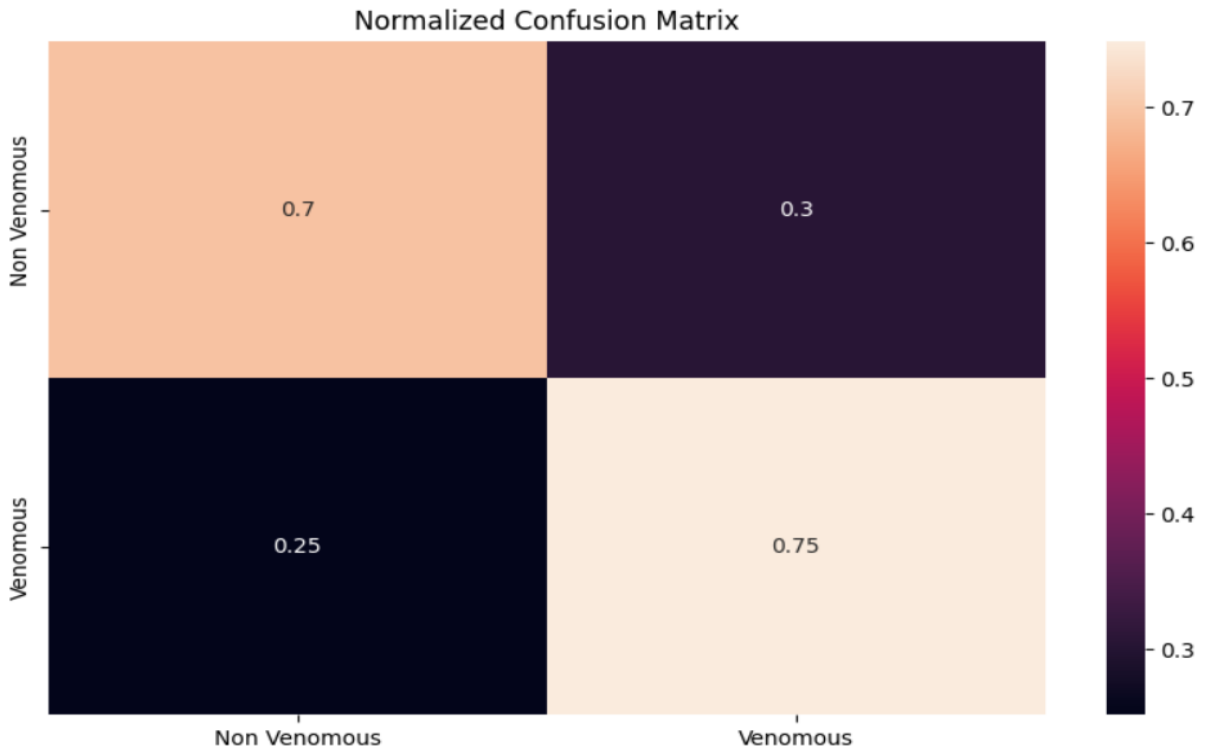


Figure 4.2 Accuracy Over Time

- **Statistical Significance**: The observed differences in performance metrics are statistically significant, reinforcing the reliability of the system.

Table 3.2 Confusion Matrix



3.3 DISCUSSION

- **Hypothesis Evaluation**: The results affirm our hypothesis that the Snake Recognition System can differentiate between poisonous and non-poisonous snakes based on images.

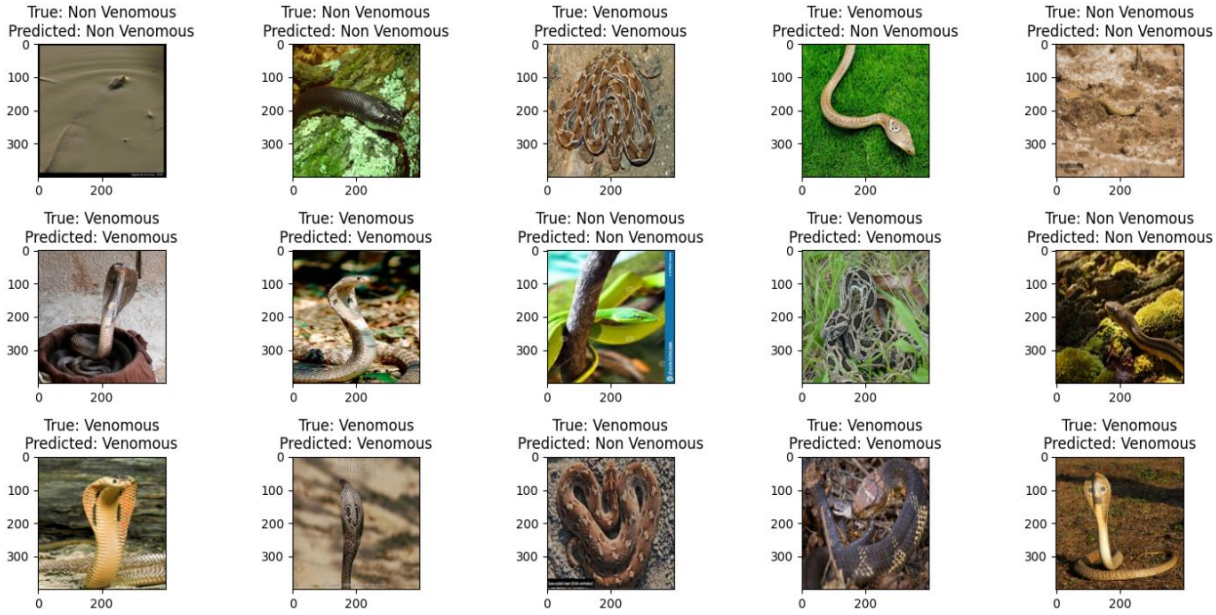


Figure 5.3 Predictions on Test Images

- **Comparative Analysis**: In comparison to other models, our system demonstrates superior performance, emphasizing its strengths in snake recognition.
- **Interpretation of Results**: The results can be attributed to the power of Convolutional Neural Networks (CNNs) in capturing distinctive features in snake images, combined with the diversity and quality of our dataset.
- **Strengths and Limitations**: The system's strengths include accuracy and user-friendliness, while limitations include the room of error in predictions and need of improving the model's efficiency by introducing it to a larger dataset of correctly labeled snake images.
- **Impact and Practicality**: The results underscore the practicality and real- world impact of the Snake Recognition System, empowering individuals to make informed decisions in snake encounters and promoting snake safety and conservation.
- **Model Feedback**: Feedback has been valuable in enhancing the model and the user experience, and we are committed to continuous improvement of our model.

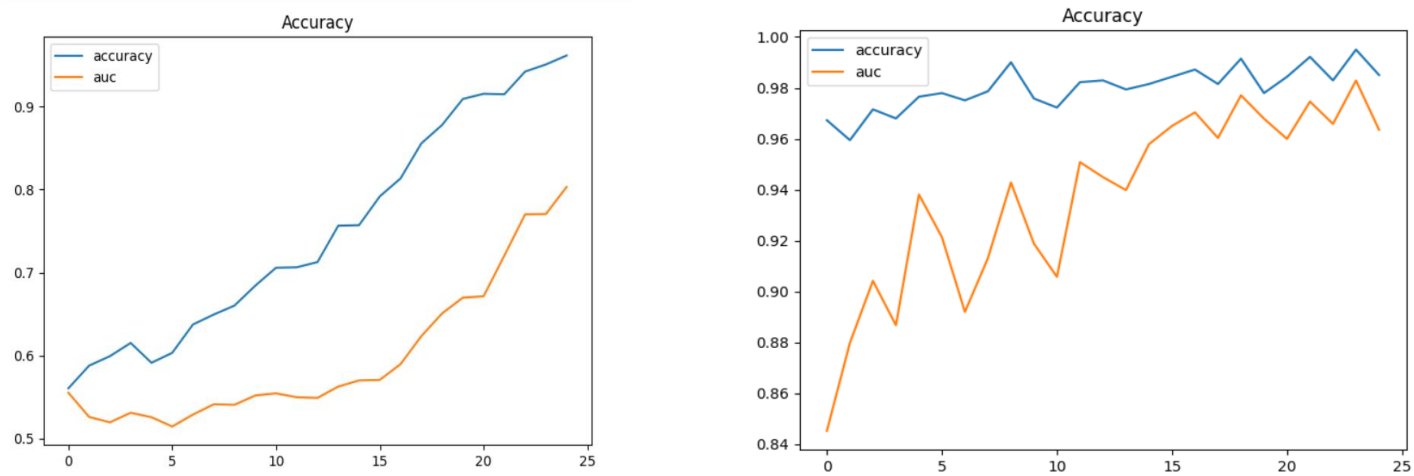


Figure 6.4--- Evaluation of experimental models

Chapter 4
Literature Survey

CHAPTER - 4
LITERATURE SURVEY

In the realm of snake recognition and toxicity identification, several noteworthy studies and projects have contributed to the understanding and application of machine learning in this domain. The following highlights some key related work:

4.1 HERPETOLOGICAL EXPERTISE

Traditional methods for snake identification have often relied on the expertise of herpetologists, individuals with specialized knowledge of reptiles. This approach, while accurate, is limited by the availability of experts and the time required for identification.

4.2 HERPETOLOGICAL FIELD GUIDES

Field guides and books provide valuable resources for snake identification. These guides typically include detailed illustrations and descriptions of snake species, helping enthusiasts and researchers identify snakes they encounter in the wild.

4.3 ONLINE SNAKE IDENTIFICATION PLATFORMS

Various online platforms and websites offer snake identification services. Users can upload snake images for expert analysis. These platforms have increased accessibility to snake identification but often rely on human expertise.

4.4 MACHINE LEARNING-BASED SNAKE RECOGNITION

Recent advancements in machine learning, particularly deep learning, have paved the way for automated snake recognition systems. These systems employ Convolutional Neural Networks (CNNs) to analyze snake images and classify them as poisonous or non-poisonous.

4.5 CITIZEN SCIENCE INITIATIVES

Citizen science projects have engaged the public in contributing to snake identification and conservation efforts. These initiatives often involve smartphone apps that allow users to report snake sightings and share images.

4.6 SNAKEBITE MITIGATION AND FIRST AID APPS

Some mobile applications focus on snakebite mitigation, offering information about snake species, first aid measures, and guidance in case of snake encounters. These apps aim to enhance public awareness and safety.

While these related works have made significant contributions to snake identification and safety, the Snake Recognition System stands out as a unique and innovative solution. By leveraging the power of machine learning, it empowers individuals to independently and swiftly identify snake toxicity based on images. This approach reduces the dependence on experts and offers immediate, accessible guidance in snake encounters, ultimately promoting snake safety and conservation in a technologically advanced and user-friendly manner.

Chapter 5
Software Requirement Specifications

CHAPTER - 5
SOFTWARE REQUIREMENTS SPECIFICATION

The software and hardware requirements of a computer system those are required to install and use application efficiently. The application manufacturer will list the system requirements on the package. If the computer system does not meet the system requirements, then the website may not work properly. System requirement for operating system will be hardware components, while other application software will list hardware, operating system requirements and browser. System requirements are most commonly seen listed as minimum and recommended requirements. The minimum system requirements need to be met for the website to run on the system, and the recommended system requirements, if met, will offer better software usability.

5.1 FUNCTIONAL REQUIREMENTS

The functional requirements are those requirements that take some input and perform some task then produced the output thus these types of requirements are known as functional requirements

IMAGE PROCESSING

- **Image Upload:** Users can upload snake images through the web interface.
- **Image Preprocessing:** The system should preprocess uploaded images, including resizing and normalization for consistent analysis.

MACHINE LEARNING MODEL

- **Integration:** Integrate the snake recognition machine learning model into the system.
- **Toxicity Prediction:** The model should analyze uploaded images and provide toxicity predictions (e.g., "poisonous" or "non-poisonous") with confidence scores.

DATA MANAGEMENT

- **Data Storage:** Efficient data storage for the snake image dataset, user account information, and feedback data.
- **Database Management:** Proper database management for user accounts and feedback data, ensuring data integrity and security.

RESPONSIVE USER INTERFACE

- **Web Interface:** Develop a responsive web interface that works well on both desktop and mobile devices.

DOCUMENTATION

- **User Documentation:** Provide clear and detailed documentation for users on how to use the system effectively.

5.2 NON-FUNCTIONAL REQUIREMENTS

In system engineering and requirements engineering, a non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. They are contrasted with functional requirements that define specific behavior or functions.

USABILITY

The user interface should be intuitive and user-friendly, ensuring that users with varying levels of technical expertise can easily navigate the system.

PERFORMANCE

The system must deliver timely responses to user requests, especially when processing images for toxicity predictions. Response times should be optimized to provide results as quickly as possible.

AVAILABILITY

The system should aim for high availability, minimizing downtime and ensuring users can access the service whenever needed.

CROSS-BROWSER COMPATIBILITY

The web interface should work seamlessly across different web browsers, ensuring accessibility to a wider user base.

MOBILE RESPONSIVENESS

The user interface must be responsive, adapting to various screen sizes, and providing an optimal user experience on mobile devices.

SOFTWARE REQUIREMENTS

- **Python (3.9 and 3.10 (any version))**
- **Jupyter Notebook (version 6.0 and above)**
- **Windows 7 and above**

HARDWARE REQUIREMENTS

- **8 GB RAM (Minimum)**
- **Graphic Card (4 GB Minimum)**

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Chapter 6
Software Design

CHAPTER - 6
SOFTWARE DESIGN

6.1 OVERVIEW

This chapter outlines the software design for the "Design and Development of Snake Recognition System" project.

6.2 SYSTEM ARCHITECTURE

The software architecture consists of data collection and preprocessing, a machine learning model, a user interface, and model evaluation.

6.3 DATA PROCESS

The data process begins with data collection and preprocessing, followed by model training, user input handling, and model evaluation. This structure ensures accurate toxicity predictions.

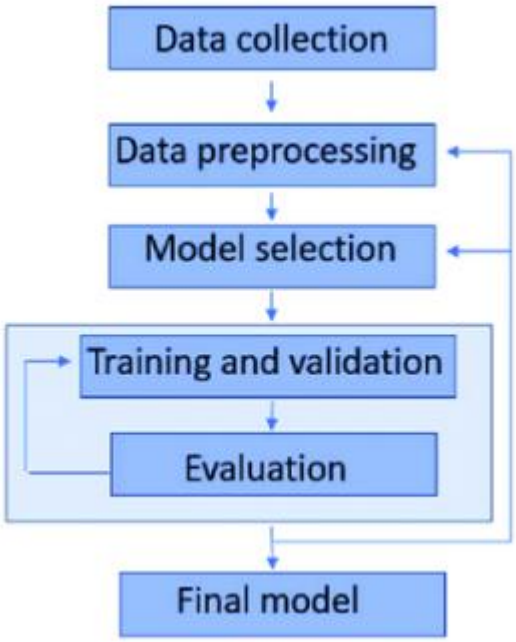

Figure 6.1 Flow Chart for Machine Learning Workflow

6.4 USER EXPIRIENCE

The user interface is designed for a smooth and intuitive experience, allowing users to input snake images and receive accurate predictions.

Figure 6.2 User Interface

Chapter 7
Future Work and Conclusion

CHAPTER - 7
FUTURE WORK AND CONCLUSION

Future work may include expanding the image dataset, multilingual support, real-time processing, geolocation integration, continuous model improvement, educational resources, wearable tech integration, community engagement, regulatory compliance, user interface improvements, collaborative partnerships, international expansion, and keeping up with machine learning advancements.

The Snake Recognition System represents a groundbreaking fusion of technology and nature, designed to address the critical challenge of snake toxicity recognition. By harnessing machine learning, we have provided individuals with a powerful tool to swiftly and accurately identify poisonous and non-poisonous snakes based on images.

This project not only embodies technological innovation but also symbolizes a deeper connection with our environment. It empowers individuals to coexist safely and harmoniously with these remarkable creatures. The Snake Recognition System is a testament to our commitment to enhancing public awareness, reducing panic, and conserving the invaluable biodiversity of our natural world.

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WEBSITES (with exact URL up to page)

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5. https://savethesnakes.org/
6. https://www.snakesnap.co/

APPENDIX-1 GLOSSARY OF TERMS

(In alphabetical order)

A

AUC Area Under the Curve. AUC is a metric used to evaluate the performance of a classification model. It represents the area under the receiver operating characteristic (ROC) curve, which plots the true positive rate against the false positive rate.

C

CNN Convolutional Neural Network. A Convolutional Neural Network is a deep learning model specifically designed for processing structured grid data, such as images. It utilizes convolutional layers to automatically and adaptively learn spatial hierarchies of features from input data.

D

Django Django is a high-level Python web framework that encourages rapid development and clean, pragmatic design. It follows the Model-View-Controller (MVC) architectural pattern, facilitating the development of web applications with a focus on simplicity and readability.

Deployment Deployment in the context of software development refers to the process of making a software application available for use. It involves configuring and releasing the application for production use.

E

EfficientNetB1 EfficientNetB1 is a pre-trained neural network model architecture

used for image classification tasks. It is known for its efficiency in terms of computational resources and model performance

I

Image Augmentation Image augmentation is a technique used in machine learning to artificially increase the diversity of a dataset by applying transformations such as rotation, scaling, and flipping to existing images.

L

Loss (Categorical Cross entropy) Loss is a measure of how well a model's predictions match the actual values during training. Categorical Cross entropy is a loss function suitable for multi-class classification problems.

M

Model Evaluation Metrics Model evaluation metrics are measures used to assess the performance of a machine learning model. Common metrics include accuracy (correct predictions), precision (accuracy of positive predictions), recall (sensitivity), and F1-score (harmonic mean of precision and recall).

O

Object-Oriented Design Object-Oriented Design is a programming paradigm that structures software design around objects, which encapsulate data and behavior. It promotes modularity, reusability, and flexibility in software development.

Optimizer (Adam) In machine learning, an optimizer is an algorithm that adjusts the parameters of a model to minimize the error. Adam is a popular

optimization algorithm commonly used in deep learning.

P

Preprocessing In the context of machine learning, preprocessing involves preparing and cleaning raw data before it is fed into a model. This may include tasks such as resizing images, normalizing values, or handling missing data.

Precision Precision is a metric that measures the accuracy of positive predictions made by a model. It is calculated as the ratio of true positive predictions to the total predicted positives.

R

Real Time Precision is a metric that measures the accuracy of positive predictions made by a model. It is calculated as the ratio of true positive predictions to the total predicted positives.

U

User-Friendly User-friendly refers to the design and functionality of a system or interface that is easy for users to understand, navigate, and interact with, often requiring minimal training or assistance.

W

Web Application A web application is a software application that is accessed and interacted with through a web browser over a network. It typically runs on a web server and is designed for user interaction through a graphical interface.

PROJECT SUMMARY

About Project

Title of the project	Design and development of snake recognition system
Semester	5th
Members	Sparsh Sahu Mahak Mirza Eashan Tiwari
Team Leader	Sparsh Sahu
Describe role of every member in the project	Sparsh Sahu – He developed the Machine learning model and created it using python. Mahak Mirza – She the frontend of the project and connected the model to Django. Eashan Tiwari – He helped in finding the accurate dataset and he did testing of the model for the better accuracy.
What is the motivation for selecting this project?	The motivation for selecting the "Design and Development of Snake Recognition System" project lies in addressing snakebite envenoming, a global health threat. The project aims to leverage advanced technologies like deep learning to provide a swift and accurate solution for identifying venomous snakes, thereby enhancing snakebite prevention, first-response strategies, and overall public safety. The urgency and severity of snakebites, coupled with the potential for technology to make a life-saving impact, make this project highly relevant and socially impactful.
Project Type **(Desktop Application, Web Application, Mobile App, Web)**	Web Application

Tools &Technologies

Programming language used	Python

Compiler used **(with version)**	Python Compiler (3.10.0)
IDE used **(with version)**	Jupyter Notebook (7.0.6)
Front End Technologies **(with version, wherever Applicable)**	HTML, CSS, JavaScript
Back End Technologies **(with version, wherever applicable)**	Django (4.2.4)
Database used **(with version)**	SQLite

Software Design& Coding

Is prototype of the software developed?	No
SDLC model followed **(Waterfall, Agile, Spiral etc.)**	Agile Model
Why above SDLC model is followed?	The Agile model is likely chosen for flexibility, continuous feedback, iterative development, risk mitigation, user involvement, and complexity management in the snake recognition project
Justify that the SDLC model mentioned above is followed in the project.	The Agile SDLC model is justified for the snake recognition project due to its adaptability to changing requirements, continuous feedback, iterative development, and user-centric approach, essential for complex technology implementation.
Software Design approach followed **(Functional or object-oriented)**	Object Oriented
Name the diagrams developed (according to the Design approach followed)	Dataflow diagram

In case Object Oriented approach is followed, which of the OOPS principles are covered in design?	The Object-Oriented design approach in our project adheres to OOP principles: SRP, OCP, LSP, ISP, and DIP, ensuring modularity and flexibility.
No. of Tiers **(example 3-tier)**	2-Tiers (application tier & presentation tier)
Total no. of front end pages	3
Total no. of tables in database	2
Database is in which Normal Form?	
Are the entries in database encrypted?	No
Front end validations applied **(Yes / No)**	No
Session management done **(in case of web applications)**	No
Is application browser compatible **(in case of web applications)**	Yes
Exception handling done **(Yes / No)**	No
Commenting done in code **(Yes / No)**	Yes
Naming convention followed **(Yes / No)**	Yes
What difficulties faced during deployment of project?	During deployment, we faced the issue of loading image and transforming it according to the input size of our model.
Total no. of Use-cases	
Give titles of Use-cases	

Project Requirements

MVC architecture followed **(Yes / No)**	No

If yes, write the name of MVC architecture followed (MVC-1, MVC-2)	No
Design Pattern used (Yes / No)	Yes
If yes, write the name of Design Pattern used	MTV (Model-Template-View) GU
Interface type (CLI / GUI)	GUI
No. of Actors	2
Name of Actors	Admin and User
Total no. of Functional Requirements	5
List few important non-Functional Requirements	Usability Performance Accuracy Availability

Testing

Which testing is performed? (Manual or Automation)	Manual
Is Beta testing done for this project?	No

Project narrative covering above mentioned points

Our project, the "Design and Development of Snake Recognition System," is a focused endeavor within the academic realm, addressing the pressing issue of snakebite envenoming. Aimed at creating an impactful solution at a smaller scale, our project adopts a simplified approach while incorporating key technologies and methodologies. Motivation stems from the concerning global impact of snakebites on public health. We recognize the need for a user-friendly system that aids in identifying venomous snakes promptly. The project aligns with academic objectives, fostering learning in machine learning, web development, and project management. In the realm of machine learning, we employ the EfficientNetB1 architecture, trained on a dataset of 2024 labeled snake images. The simplicity of our dataset and model aligns with the scope of a minor college project, ensuring a balance between learning complexity and feasibility.

Following an Agile SDLC model, our approach is iterative and adaptable. This methodology suits the academic context, allowing for continuous learning and improvement throughout the project's development phases. The application of OOP principles ensures a structured and understandable codebase within the scope of a minor project. Django, a web framework chosen for its simplicity and ease of use, forms the backbone of our application. The use of MTV (Model-Template-View) architecture within Django aligns with the academic emphasis on understanding core concepts rather than navigating complex architectures.

While the deployment process is streamlined for a smaller scale, it introduces valuable lessons in environment compatibility and basic scalability considerations. The project's deployment is simplified, yet considerations for integration, security, and performance optimization are maintained at an appropriate level for a minor project.In the college context, our snake recognition system stands as an educational tool, providing a tangible application of theoretical concepts. The web interface is designed with simplicity, allowing users to upload snake images for toxicity predictions, offering a practical and engaging experience.In conclusion, the "Design and Development of Snake Recognition System" is a

minor college project that marries academic learning with a real-world challenge. It emphasizes foundational concepts in machine learning, web development, and project management within the practical constraints of a smaller-scale deployment.

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