

Final Capstone Project Group 13 - Proposal

Idea Proposal : Snake Identification Safety Card

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1. Project Idea

Millions across snake-prone regions face risks from delayed identification and misinformation during encounters. Current emergency tools lack intelligent species recognition, increasing danger and response time.

This project aims to develop a machine learning system capable of classifying snake species from user-uploaded images and generating an instant safety response. Using a Convolutional Neural Network (CNN) trained on diverse local and regional datasets, the model will identify whether a snake is venomous or non-venomous and display a dynamic emergency safety card with species-specific first aid or avoidance instructions. By combining real-time image analysis with contextual safety guidance, the system will enhance public safety and empower faster, data-driven emergency responses.

Goals:

1. Optimize model performance to accurately classify different snake species across varied lighting and image quality conditions.
2. Predict and provide immediate safety guidance in near real-time based on identifying the venomous status of the snake in the uploaded image.
3. Recommend the appropriate emergency first-aid or avoidance strategy based on the specific type of snake species.

2. Relevance to Sustainable Development Goals (SDGs)

- SDG 3 - Good Health and Well-being: Reduces preventable snakebite mortality and morbidity through accurate, instant first-aid guidance.
- SDG 9 - Industry, Innovation, and Infrastructure: Leverages AI/ML for public safety, promoting resilient and accessible digital emergency tools.
- SDG 11 - Sustainable Cities and Communities: Improves community resilience and safety by providing rapid, informed threat identification for human-wildlife co-existence.

3. Literature Examples

- 1) "A Deep Learning Method for Visual Recognition of Snake Species" (CLEF, 2021)
- 2) "A comparative study on image-based snake identification using machine learning" (Scientific Reports, 2021)

4. Describe Your Data

- Image Data: High-resolution photographs of diverse snake species (local/regional focus), captured in various lighting and backgrounds.
- Metadata: Classification labels including Species Name, Venomous Status, and First-Aid Protocol details.
- Format & Size: JPEG/PNG files organized by species. Aim for a balanced dataset of >10,000 images for robust training.
- Preprocessing: Image resizing/cropping, pixel normalization, and data augmentation (rotation, flipping) for model robustness.

5. Approach (Machine Learning or Deep Learning)

- Approach: Deep Learning (Computer Vision) combined with a simple Database Lookup.
- Forecasting/Prediction: Convolutional Neural Networks (CNNs) for image-based species classification.
- Optimization & Fairness: Immediate Database Query to map the species result to the medically-verified first-aid protocol.
- Justification: CNNs provide high accuracy for complex image patterns, while the database ensures instant, reliable, and easily maintainable safety instruction delivery.