SOUTHERN COLORADO INSTITUTE OF TRANSPORTATION TECHNOLOGY

CSU PUEBLO

Framework for Evaluating Wildlife Responses to Highway Infrastructure

Mahesh Sharma[1,2], Dr. Saqib Gulzar[2], Dr. Trung Duong[1], Dr. Md Rashad Islam P.E. [1,2], Dr. Hasan Faisal[1]

[1]School of Engineering, [2]Southern Colorado Institute of Transportation Technology, Colorado State University Pueblo, Colorado

Introduction

- **I-25 Interstate**: Key transportation link for Colorado and its neighboring states
- **Wildlife Vehicle Collisions (WVCs)**: Major issue at Raton Pass from habitat disruption and highway traffic after NMDOT's wildlife exclusion fence which may alter animal movements
- **Project:** CDOT funded this project to study and develop a mitigation strategies for increased WVCs
- **Focal Species:** Focal species include black bear, mountain lion, coyote, bobcat, mule deer, elk, and pronghorn (see Figure 1)

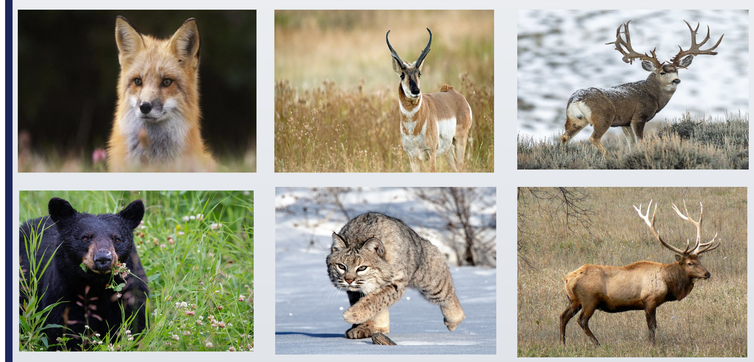


Figure 1. Few research focal species

Objectives

- Assess the need to modify the culvert structure
- Install motion tracking cameras and sound tracking devices to study the behavioral effects of vehicular noise on wildlife
- Build an efficient AI model for the wildlife detection

Data Collection and Analysis

Figure 2 shows the data collection and analysis steps. Figure 3(a) and 3(b) show a bear crossing a culvert to pass underneath I-25 and a mule deer female captured by trail camera near Raton Pass resp.

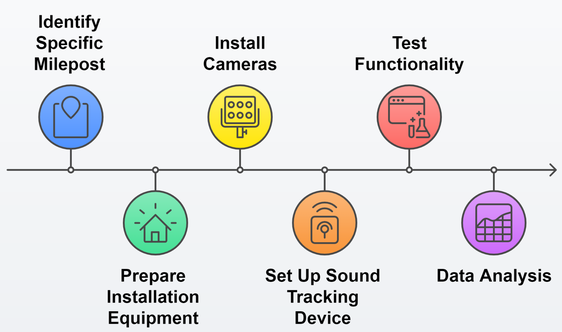
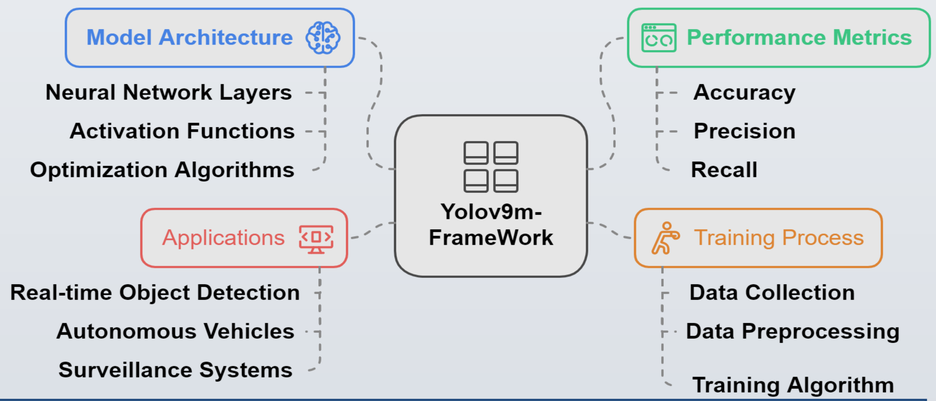


Figure 2. Installation and setup process for data collection

Figure 3. Wildlife at Raton Pass

AI Model Development

In this study, an Improved AI Model using the Yolo-v9m framework has been developed



Research Hypothesis

- **Hypothesis 1:** Wildlife uses existing culvert
- **Hypothesis 2:** Modifying culvert design helps more wildlife to use culvert
- **Hypothesis 3:** Use of ecofriendly sound wave in existing structure can help more wildlife use the culvert

Test of Hypothesis

Figure 4 shows steps involved in testing hypotheses for wildlife detection and noise quantification models

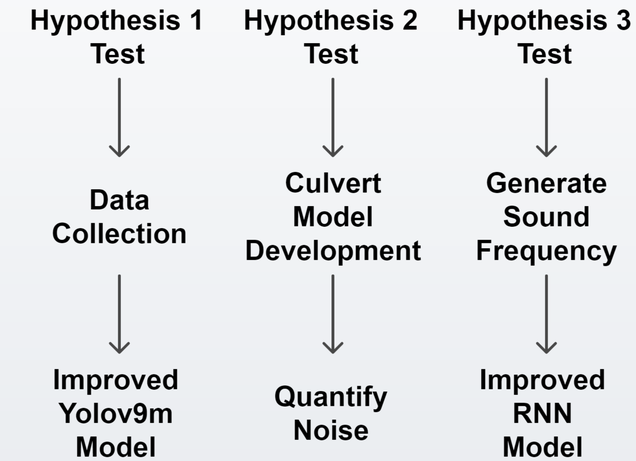


Figure 4. **Research Hypotheses for Wildlife Monitoring**

Summary and Future Work

- AI model identifies where animals attempt pr avoid road crossings
- Future work focuses on reducing or modifying vehicular noise within culverts to make them more appealing for wildlife, promoting safer crossings.
- Prototype study to identify specific sound frequencies that attract animals to culverts and may serve as a practical mitigation strategy.

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mahesh.sharma@csupueblo.edu