

AIMS Penguin Project Extensions

Assignment:

- We encourage you to group up in *pairs*
- Choose one or more projects to work on, and pick at least one project requiring you to collect data (images / video) during the field trip.
- Create **4-5 slides** containing at least two of:
 - Some exploration
 - Some qualitative or quantitative analysis
 - Some ecological analysis
- Submit your slides (1 per project pair/individual) by Thursday at 11:59 pm [here](https://drive.google.com/drive/folders/18kPLC9NylbVFBIzT13boaDNyGDBWYk7A?usp=share_link). (Explicit link:
https://drive.google.com/drive/folders/18kPLC9NylbVFBIzT13boaDNyGDBWYk7A?usp=share_link)

Resources:

Slides:

 AIMS Penguin Project Extensions

Colab Notebooks:

 Phase 1: Data Processing - Assignment.ipynb

 PenguinDetector.ipynb

 Phase 3: Heat-map Generation - Assignment.ipynb

Office Hours:

Rupa Kurinchi-Vendhan (rupak272@mit.edu): 9:00 am - 1:00 pm Thursday @ Research Hall
(email me if you need to be let in)

Timm Haucke (haucke@mit.edu): 5:30 pm - 7:30 pm & 8:00 pm - 10:00 pm Thursday via [Zoom](#)

Project Outcomes:

Project	Targeted Outcomes
Behavior Classification	• Collect Penguin videos showing different behavior

	• Create small dataset based on those videos, labeled with behaviors • Train a model on this dataset • Evaluation of how well the model is performing
3D Reconstruction and Heatmapping	• 3D Reconstruction of the penguin enclosure using Structure from Motion or Monocular Depth Estimation (Screenshot / Video) • Generation of 3D activity heatmaps based on the reconstruction
Domain Shift Experiments	• Collect your own data that shows domain shift relative to the existing dataset in various ways (perspective, lighting, ...) • Evaluate your previously trained object detector on your new data (e.g. qualitatively by inspecting results on new images) • Re-train your model on the original, labeled dataset but include different strategies to reduce impact of domain shift (e.g. augmentations). Record how effective those strategies are
Interactive Visualization Tool	• Prototype a visualization tool using a toolkit of your choice (e.g. Python, HTML/Javascript, ...) • Your tool should take in some kind of results from your previous experiments (e.g. heatmaps or bounding boxes) and visualize them in some interesting way
Time-Series Analysis	• Think of a way to aggregate a heatmap into an overall activity level (single number) • Plot activity levels over time for different timeframes (24h, weeks, months) • Investigate what you might be able to infer about (caged) Penguin ecology from those plots
Disturbance Impact Study	• Find out what external disturbances there might be • Find out how you might be able to detect those disturbances, e.g. using

	images or time of day • Find out how those disturbances affect penguin behavior (you might want to combine this with the Time-Series Analysis project)
Habitat Usage Analysis	• Investigate whether specific areas of the Penguin enclosure are used for specific activities (you might want to combine this with the Behavior Classification project) • Mark those areas visually, e.g. by coloring heatmaps differently according to different activities
Social Network Analysis	• Investigate whether you can detect social interactions using the structure of the heatmaps in space and over time • Find instances of social behavior and plot the corresponding heatmaps