



A computer vision for animal ecology

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A computer vision for animal ecology: Overview

- ▶ The goal of ecology is to observe other species in their natural state
- ▶ Data collection is one of the biggest limitations to ecologists' research
- ▶ Computer vision can aid in the processing of the data
- ▶ Using the content of the image, computer vision can infer image content accurately

A computer vision for animal ecology: Methods

- ▶ Counting
 - ▶ Used to detect motion
 - ▶ Compare all frames of a video to a single frame to detect motion object
- ▶ Identity
 - ▶ Standard Computer Vision Classification
 - ▶ Uses pre-existing data to predict the target image
 - ▶ Supervised Learning

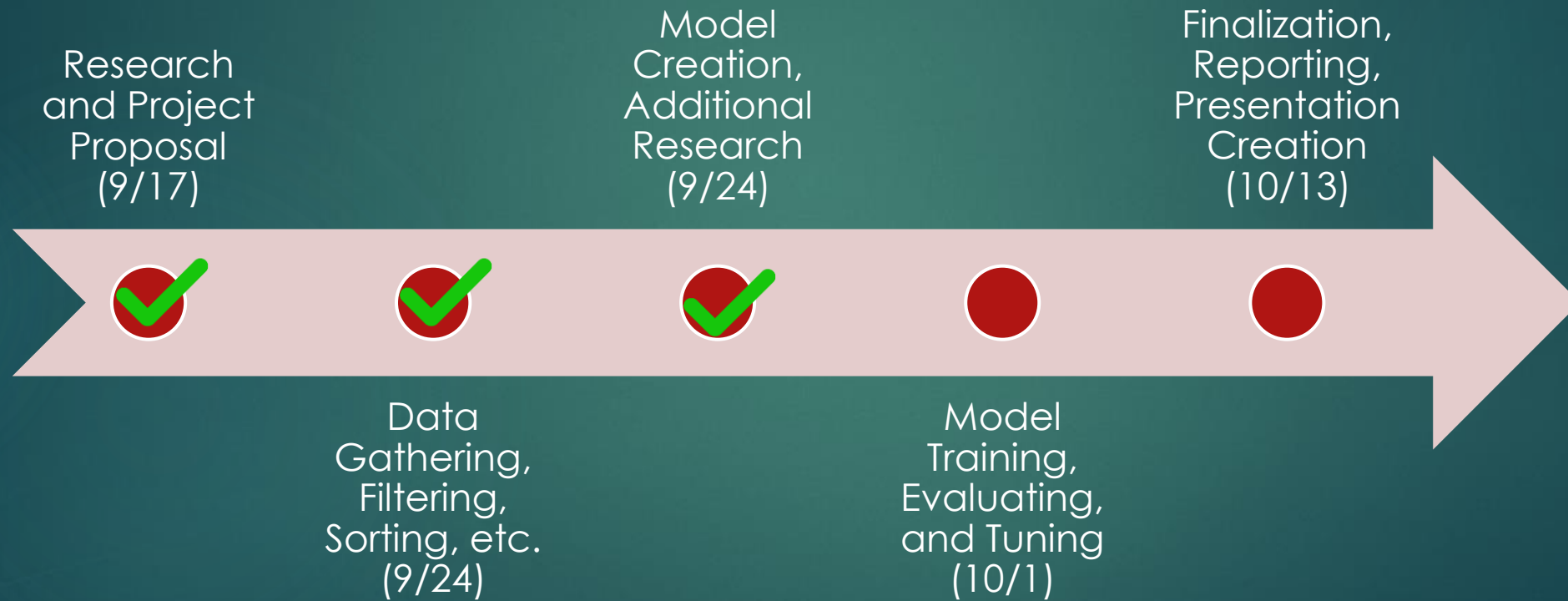
A review of deep learning algorithms for computer vision systems in livestock

- ▶ Computer vision is a great choice for live-stock operations since it can generate accurate real-time and non-invasive animal information
- ▶ Algorithms Covered:
 - ▶ VGG-16
 - ▶ Inception Modules
 - ▶ Residual Learning Modules
 - ▶ Faster R-CNN
 - ▶ YOLO
 - ▶ CNN + CRF
 - ▶ UNET
 - ▶ PSPNet
 - ▶ DeepLab v3+

Animal classification using facial images with score-level fusion

- ▶ Computer Vision is being used to identify and infer other information about animals
- ▶ Animal Face classification is becoming popular and combines two different approaches:
 - ▶ Convolutional Neural Networks (CNN) to automatically extract features
 - ▶ Kernel Fisher Analysis (KFA) for feature extraction
- ▶ Applying CNN and simple feature extraction was better than just CNN
- ▶ Combining CNN and KFA gave the best results with 95.31% accuracy on classification of animal faces

Timeline



Model

- ▶ Early Phase, this will change
- ▶ Simple CNN using TensorFlow

```
model = Sequential([
    layers.Rescaling(1./255, input_shape=(img_height, img_width, 3)),
    layers.Conv2D(16, 3, padding='same', activation='relu'),
    layers.MaxPooling2D(),
    layers.Conv2D(32, 3, padding='same', activation='relu'),
    layers.MaxPooling2D(),
    layers.Conv2D(64, 3, padding='same', activation='relu'),
    layers.MaxPooling2D(),
    layers.Dropout(0.2),
    layers.Flatten(),
    layers.Dense(128, activation='relu'),
    layers.Dense(num_classes, name="outputs")
])
```

Citations

- ▶ Weinstein, Ben G.. "A computer vision for animal ecology". Journal of Animal Ecology 87. 3(2018): 533-545.
 - ▶ [Link](#)
- ▶ Dario Augusto Borges Oliveira, et al. "A review of deep learning algorithms for computer vision systems in livestock". Livestock Science 253. (2021): 104700.
 - ▶ [Link](#)
- ▶ Taheri, Shahram et al. "Animal classification using facial images with score-level fusion". IET Computer Vision 12. 5(2018): 679-685.
 - ▶ [Link](#)