Milestone1 Team Data Pets Document Submission

Yuxin Xu, Ivan Shu, Sean Bai, Sean Gao

Problem definition

Austin Pets Alive (APA) is an association of pet owners for pet owners. APA dog data is roughly ~17k dog records. Close to 40k if you include cats. For those ~40k animals there looks to be ~140k photos. For those photos, we have a list of publicly accessible URLs such as this (example) so a part of the project would be some data wrangling to go grab and persist the photos somewhere. Adopt-a-pet can also be a platform that could potentially take the work and move it to production. The goal will be to build a reusable application, design, and framework that can be used in any animal welfare nonprofits to connect future pet owners with pets. The outcome of the project will be to build a full featured application for the APA.

Project scope

For this Pets project, our group's focus will be to create a user friendly tool to match potential dog loving adopters/owners to their pet. As stated above, the end goal is developing a nice web application that can harness the data and be used with features/deliverables that will be helpful for the matching process.

Proposed solution

In order to achieve this goal, we proposed the following solutions:

- Help the user search based on the dog's characteristics, such as age, size, color, breed.
- Find similar dogs by uploading a picture of a dog the user is interested in.
- Connect the dog with the user by allowing the user to chat with a persona of the dog. For example, the user can ask this virtual dog any question about it, its breed characteristics, or any general questions about puppies and dogs.
- As an adoption center, when new images are available for dogs. An function to upload images of the dog:
    - Remove background from the picture.
    - Add a preset background color.
    - Enhance the image if the resolution of the uploaded picture is not good.

Datasets being considered

Our dataset consists of three csv files [Dataset Link]. Please see appendix for dataset details.

Model Techniques Under Consideration

Each of the solution feature corresponds to different field of tasks: (* means optional)

1. Help the user search for dogs based on certain features such as size and color
   Basic filtering (*+ Embeddings for search ranking)
2. Find similar dogs by uploading a picture of a dog the user is interested
   Image classification with transfer learning (*+ Embeddings for search ranking)
3. Connect the dog with the user by allowing the user to chat with a persona of the dog. The user can ask this virtual dog any question about it, its breed characteristics, or any general questions about puppies and dogs.
   Chatbot capable of **Q&A** and **Dialog/ Conversational tasks**
4. Upload images of the dog; remove background from the picture; add a preset background color; enhance the image.
   Semantic segmentation, **Image enhancement**
5. *Extract dog features from pictures
   *** Feature extractor**

In summary, we have the following tasks:

1. Computer Vision:
    a. Background removal using segmentation: CNN(Autoencoder-type structure)
    b. Image resolution enhancement: GANs
    c. Image classification with transfer learning: CNN
    d. * Embeddings for search ranking: RankNet, etc
    e. * Feature extractor
2. NLP
    a. Question-answering task using any transformer-based model: QANet
    b. Dialog/Conversational task using any transformer based model: GPT2 double-headed

A rough timeline and components

- Week 9/16 - 9/23:
    - Literature/Open Source Code Review
    - Initial Implementation of ML/DL codes
- Week 9/24 - 10/10:
    - Implementation of Computer Vision Section (Main Focus)
    - Implementation of NLP Section (Secondary Focus)
- Week 10/11 - 11/2:
    - Wrap up Modeling (NLP+Computer Vision)
    -
- Week 11/3 - 11/11
    - Focus on UI and App Design
- Week 11/12 - 11/31
    - Buffer Time and Project Wrap Up

Reference:

https://docs.google.com/document/d/1tC1k8XX1RjxxH7Ojay1lqSBTx-oYtMM67oOMyNsA4bU/edit#heading=h.xnnvab4hf5h8

Appendix:

1. dogs.csv

Field	Description
AnimalID	public facing unique id
AnimalInternal-ID	internal unique id - USE THIS to link to the other tables (dogs_photos.csv and dogs_website_memos.csv)
AnimalName	Name of dog
AnimalType	always "Dog"
AnimalSex	Male, Female or Unknown
AnimalCurrentWeightPounds	decimal weight in pounds. NOTE: data quality of this field is mediocre at best. Staff are good about recording at least one weight around the time of intake but not as diligent about recording a weight prior to outcome.
AnimalDOB	DOB formatted as YYYYMMDD
AnimalBreed	concatenation of primary and secondary breed fields delimited by " /".
AnimalColor	concatenation of primary and secondary colors fields delimited by " /".
AnimalPattern	animal pattern NOTE: not often populated for dogs. More often used for cats

2. dogs_photos.csv

Field	Description
AnimalInternal-ID	internal unique id for dog. USE THIS to link to dogs.csv
PhotoUrl	URL to photo

3. dogs_website_memos.csv

Field	Description
AnimalInternal-ID	internal unique id for dog. USE THIS to link to dogs.csv
MemoText	contains public bio text that displays for each animal on their adoption page.

All together the dataset makes up a zipped folder with size 23.4GB.