AC 215 | *Presented by: Data Pets*

Data Pets: A closer  and Me

An End-to-End Approach leveraging Computer Vision, NLP to enable better Pet Adoption Matching

Part I

Context and Project Scope

I: Context and Project Scope

We focus on data science enablement for solution on matching dog lovers to dogs available for adoption

Market Status Quo

- According to *The List*, 60% of American households are dog lovers, accounting for >60M household as potential market
- Adoption on average takes 1-2 weeks, with majority of time spent on matching dogs

Our Business

- We aim to leverage big data and deep learning to create a user-friendly tool to match potential dog loving adopters/owners

Industry Challenge

- Not enough propagandization and information
- Not transparent communication and impersonal adoption experience
- Poor User Browsing/Searching Experience
- Time Consuming Process in Double Matching (dog-adopter) Process

Technical Approach

- Data Handling: Big Data Stored on GCP
- Computer Vision for enhancing picture quality
- NLP for dog persona creation and Chatbot for Question-Answering Task
- Docker/Kubernetes for App Depolyment

Source: The List & Rover.com

Part II

Data Science Technicalities

II: Data Science Technicalities

Proposed Solution: Computer Vision

> Fig 1: Remove old and add new backgrounds with different effects

> Fig 2: Example Matched Images by using EfficientNet and FAISS embedding search

> Fig 3: Example Input Images that contains Dog-Irrelevant Features

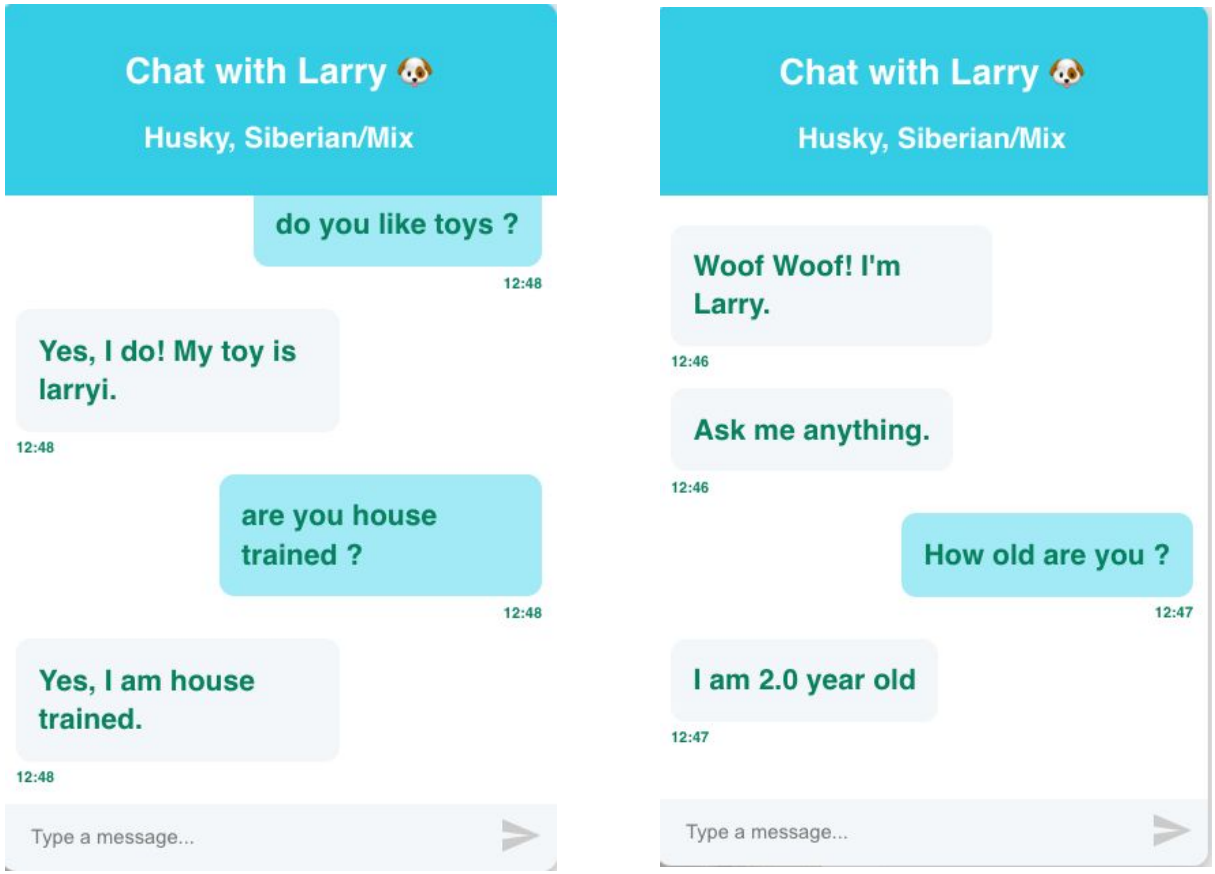
Computer Vision serves for following purposes:

- Remove Noisy Background from uploaded dog pictures using DeepLabv3+
- Allow users to choose and add new background/effects
- EfficientNet B0 model to create embeddings for new images
- Embedding search for similar dog images using Facebook AI Similarity Search (FAISS).

II: Data Science Technicalities

Proposed Solution: Natural Language Processing

> Fig 1: GPT2 Double Heads Q&A example



NLP serves for following purposes:

- Enhancing the Creation of the Persona of the dog for better User Adoption Experience
- Enabling Chatbot Functionality for User to direct communicate
- Fulfilling Question-Answering Functionality

Part III

Product Demo

Link to GCP Cluster, Link of App

Part IV

Future Work

IV: Future Work

3 Potential Improvements

1. **Additional Features**
   Allow users to upload images in Rehome, and to change background of uploaded images

2. **User Interface & Experience**
   Improve the product aesthetics, including color and app structure. Speed up loading of filtered photos

3. **Action Feedback**
   Add loading animation, error messages, etc.

Thank you for listening!

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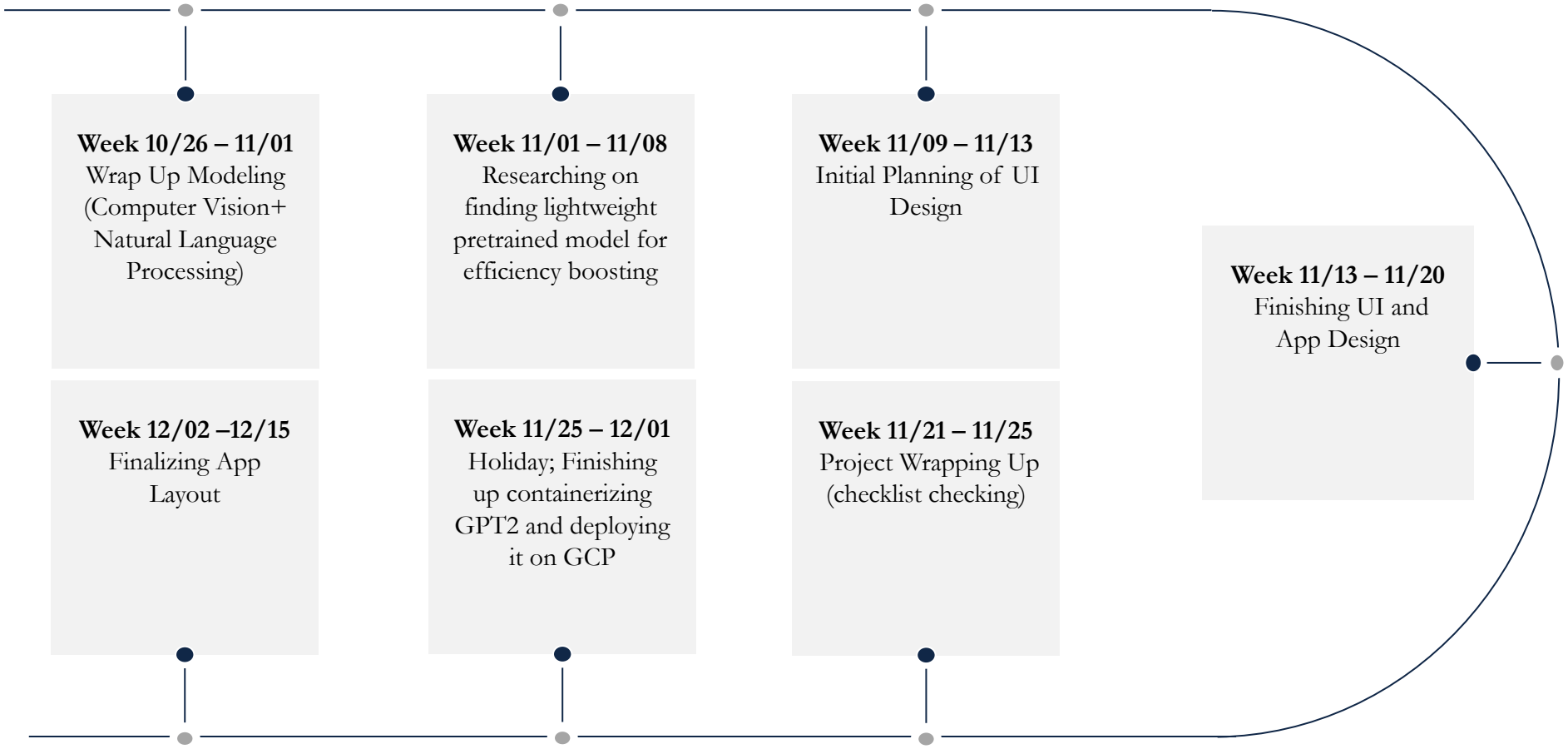
Reference

Project Timeline, Appendix, Contact List

Complete Project Timeline

Project Checklist



Appendix:

1. EfficientNet: Rethinking Model Scaling for Convolutional Neural Networks, Mingxing Tan et al.
2. FAISS, Facebook AI Similarity Search.
3. DeepLab: Semantic Image Segmentation with Deep Convolutional Nets, Atrous Convolution, and Fully Connected CRFs, Liang-Chieh Chen et al.
4. SQuAD, Stanford Question Answering Dataset.
5. 2021 Harvard IACS ComputeFest Computer Vision Task Notebook.
6. Question Answering with a Fine-Tuned BERT, Chris McCormick.
7. 2021 Harvard IACS ComputeFest GitHub Repository.
8. Personalizing Dialogue Agents: I have a dog, do you have pets too?, Saizheng Zhang et al.

Reference: Contact Page

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