HUMAN VS AI DISTINGUISHMENT

Final Team Project Group 2
AAI-590: Capstone Project
University of San Diego
Applied Artificial Intelligence Program

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PRESENTATION OVERVIEW

- Problem Statement
- Live Web App Demo
- Datasets and Prep
- Methodology Approaches
- Training and Evaluation
- Selection and Results
- Production Readiness

PROBLEM STATEMENT

Problem Statement: Advancements in Artificial Intelligence (AI) is making it increasingly difficult to distinguish text as being human or AI-generated

Areas of Concern:

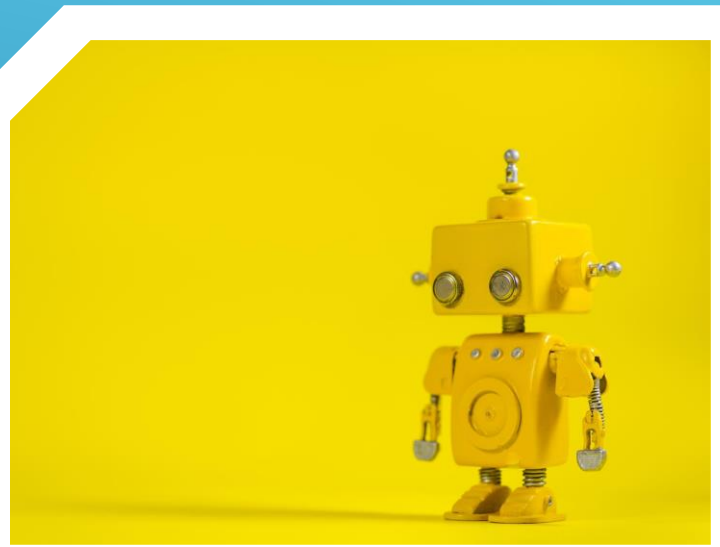
- News Feeds
- Academic Integrity

Primary Goal: Develop a Machine Learning (ML) model that can predict and provide the probability of text being human or AI-generated

Secondary Goal: Develop an interactive web app for users to interact with the model

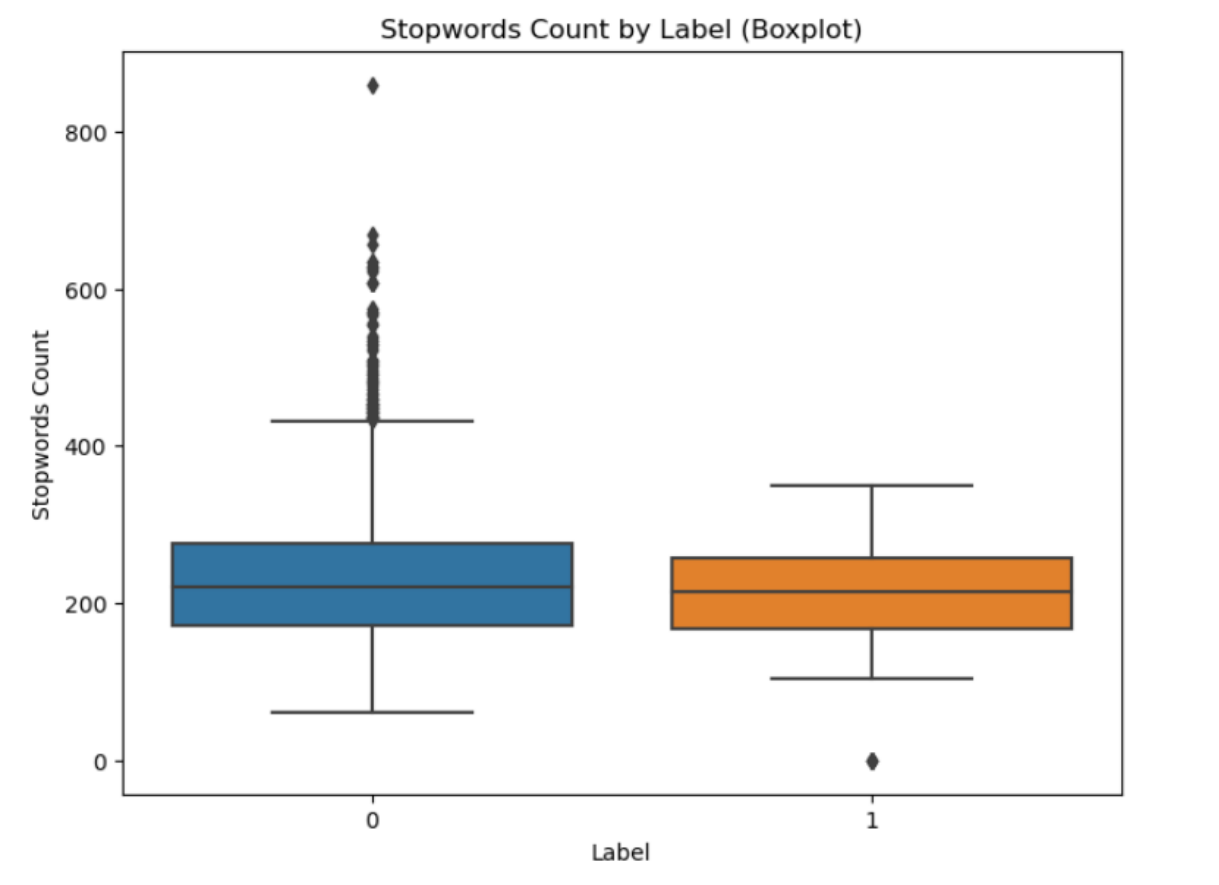
Concepts:

- Traditional ML Algorithms
- Transformer-based Models
- Containerization



LIVE WEB APP DEMO

DATASETS AND PREP



Datasets

- Training
  - AI vs Human Text
  - Nearly 500,000 Samples
- Inference
  - AI vs Student Text
  - 1,103 Samples

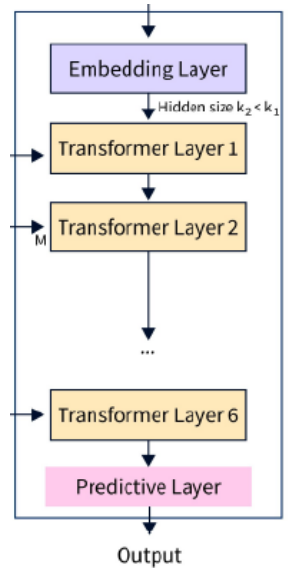
Prep

- Minimal Preprocessing
  - Remove samples missing data
  - Downsample majority class
- Tokenization, including:
  - Words/Subwords
  - Stop Words
  - Capitalization
  - Punctuation

METHODOLOGY APPROACHES

Pretrained Transformer

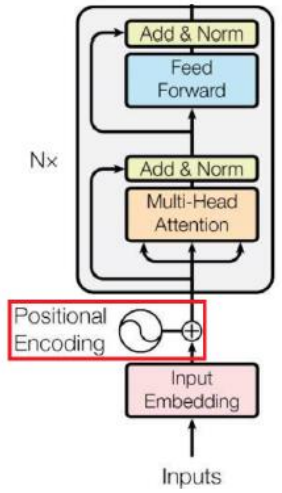
- DistilBERT
- Proven Solution
- Low Development



Adapted from *Distinguishing Human Generated Text From ChatGPT Generated Text Using Machine Learning* by Islam et al. (2023). [DistilBERT architecture] [Image]. arXiv. https://doi.org/10.48550/arXiv.2306.01761

Custom Transformer

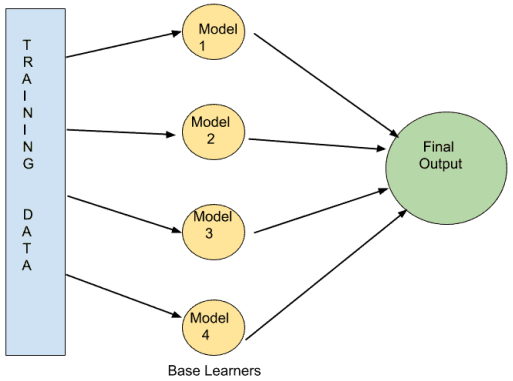
- PyTorch Framework
- Flexible Configuration
- High Development



Adapted from *Language modeling with nn.transformer and torchtext* (n.d.). [Transformer architecture] [Image]. PyTorch. https://pytorch.org/tutorials/beginner/transformer_tutorial.html

Traditional Algorithm

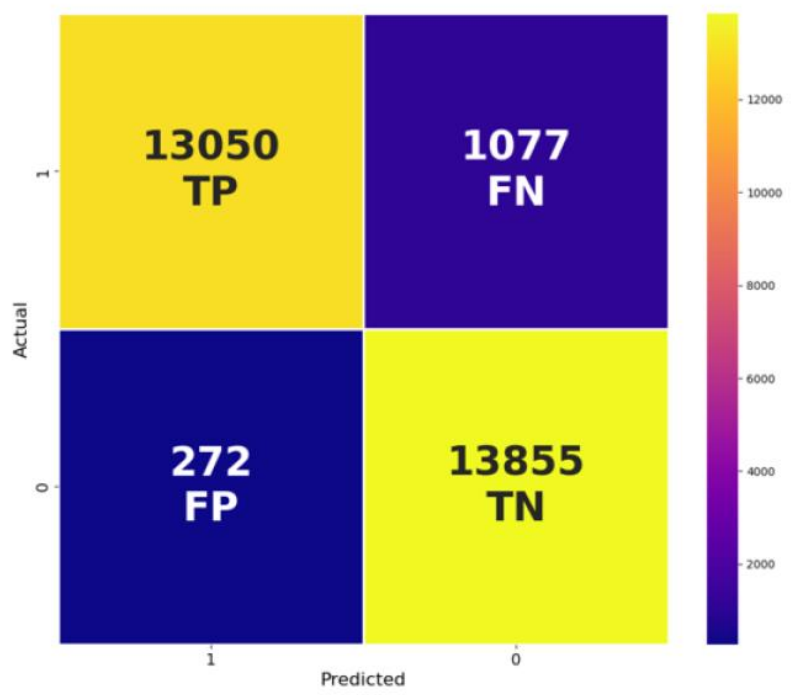
- Random Forest
- Lower Complexity
- Moderate Development



From *Random Forest algorithm, a complete and Super Easy Guide*, by Aqsazafar (n.d.). [Ensemble with Base Learners] [Image]. MLTut. https://www.mltut.com/random-forest-algorithm-a-complete-and-super-easy-guide/

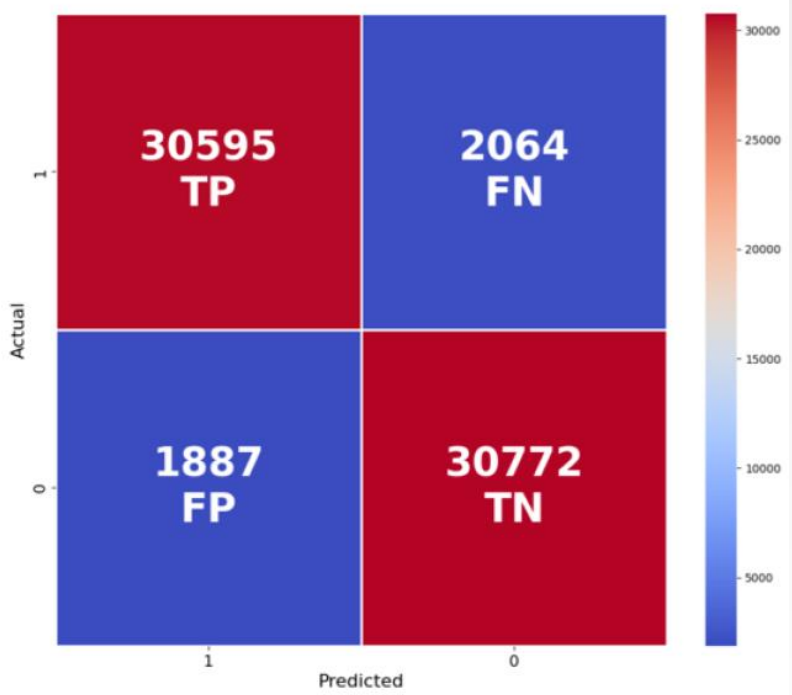
TRAINING AND EVALUATION

Pre-trained DistilBERT



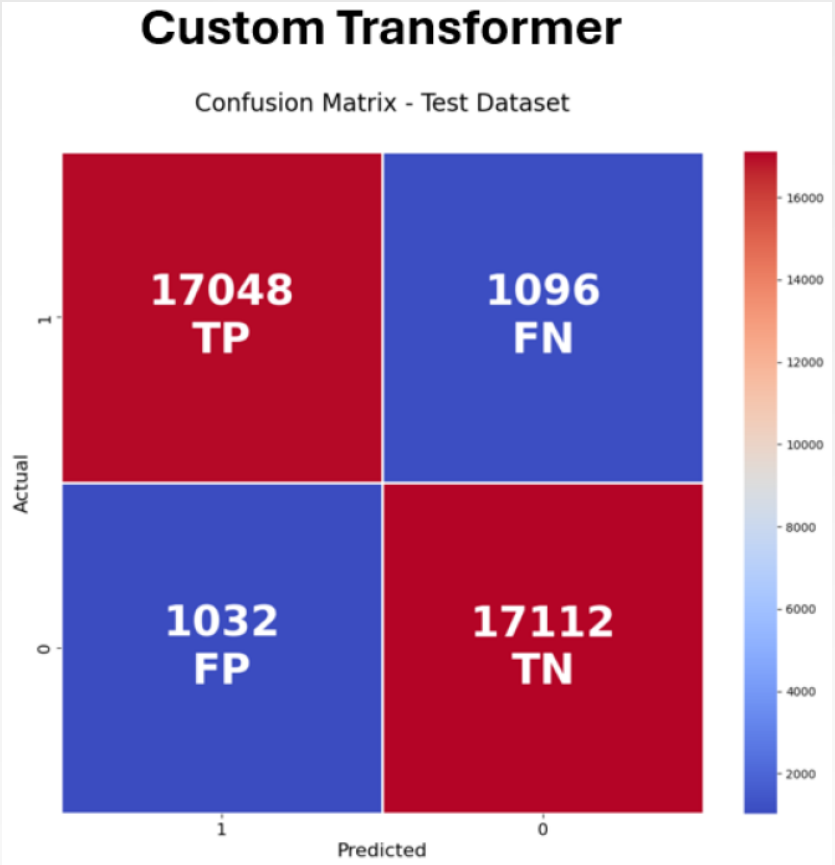
Binary Accuracy: 95.23%
Binary Precision: 92.79%
Binary Recall: 98.07%
Binary F1 Score: 95.36%

Custom Transformer



Binary Accuracy: 93.95%
Binary Precision: 93.71%
Binary Recall: 94.22%
Binary F1 Score: 93.97%

SELECTION AND RESULTS

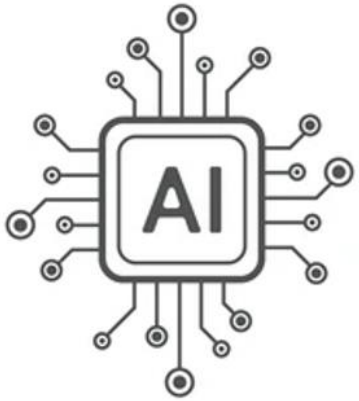


Binary Accuracy: 94.14%
Binary Precision: 93.98%
Binary Recall: 94.31%
Binary F1 Score: 94.15%

PRODUCTION READINESS

Model Robustness

- Increase training data size to > 1M samples
- Increase text diversity
  - Variable length
  - Writing styles
- Ensure AI source diversity
  - ChatGPT
  - Bard
  - Others



Compute Resources

- Utilize High-Performance Computing (HPC) resources
- Increase model training duration
  - High memory runtimes
  - Additional GPUs
- Increase web app scalability

THANK YOU!

Please contact us with any questions.

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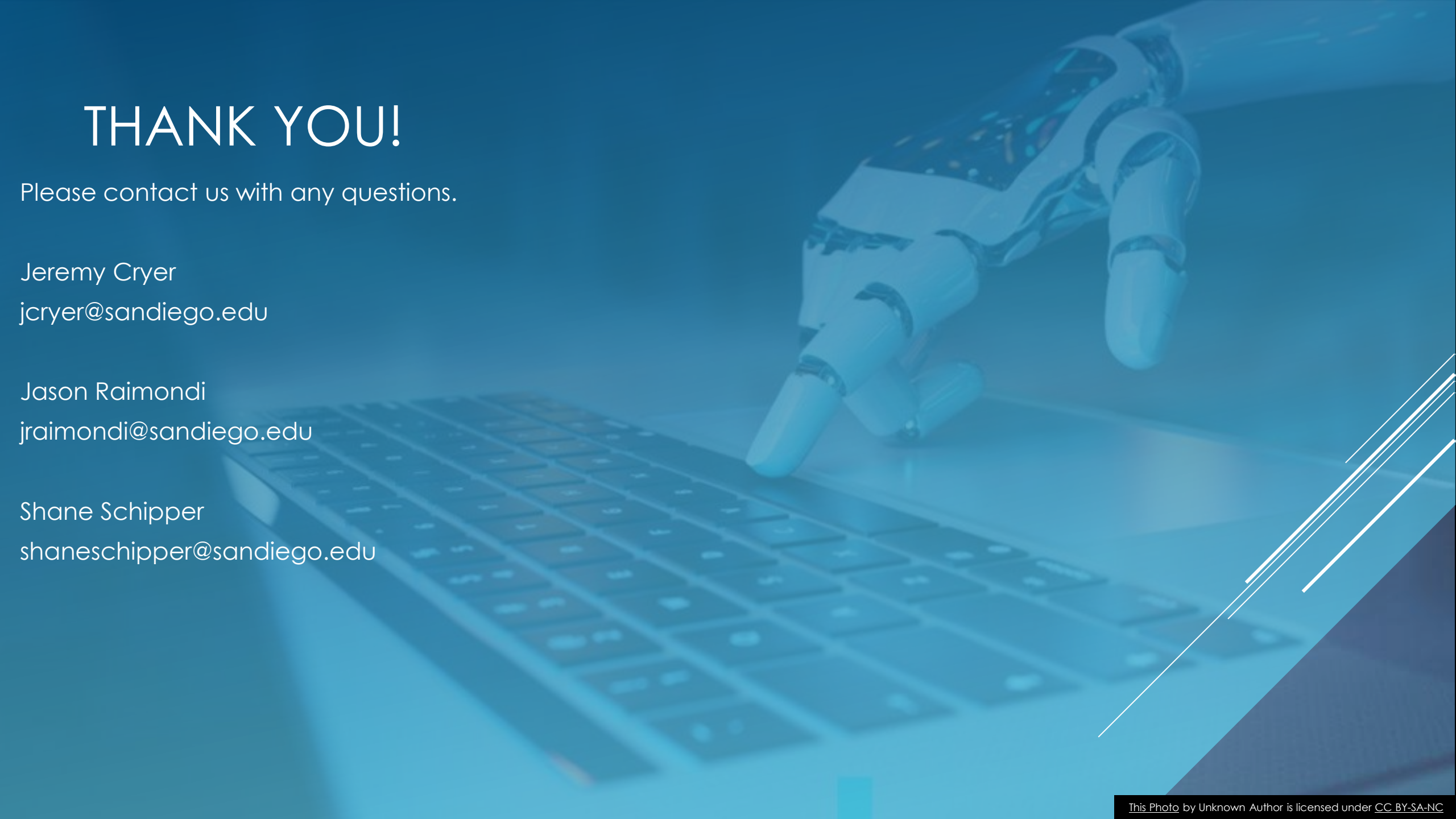

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