Predicting User Engagement in YouTube Videos

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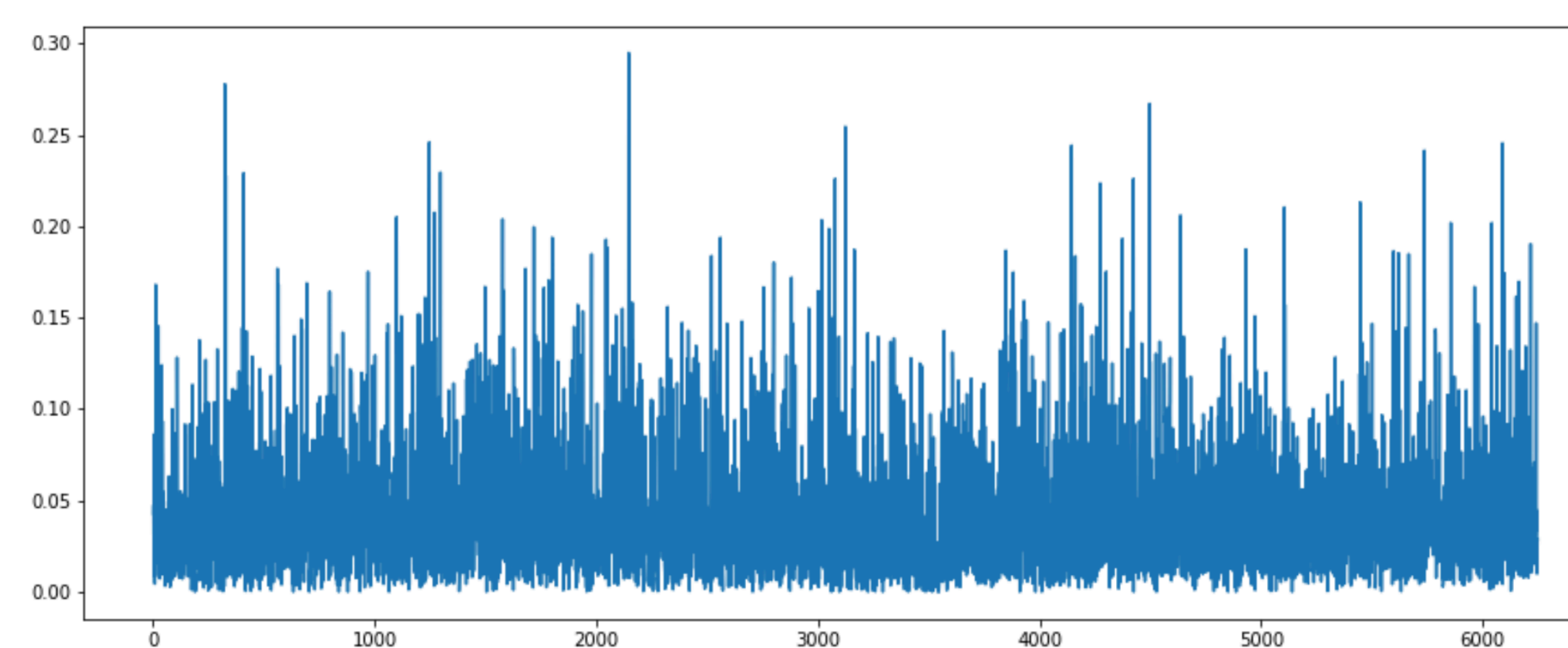Katherine Xiao (kx2@princeton.edu)

Motivation

- YouTube is the world's largest video sharing platform, with over **1 billion** views per day.

- Creators and advertisers want to increase engagement (**ratio of likes/dislikes to views**), and the text/thumbnails contribute to this.

- Information about popularity can also inform future research on interests and trends.

Previous Work

- **HIPie**: Interactive Visualization System based on exogenous (public social media platforms) and endogenous inputs within the YouTube platforms.

- **YouTube Views Predictor**: Model based on "Clickbaitness" Score, Previous View Count, among other features.

Textual Data Pre-Processing

- Kaggle dataset, "**Trending Youtube Video Statistics**," with 40949 entries for 6351 videos

- Isolated **5958 unique videos** with both descriptions and tags and created Bag-of-Words models for titles, descriptions, and tags

- Processed titles and descriptions: **removed special characters** and **URLS**, then **tokenized** and **lemmatized** all words

- Removed words that occurred fewer than 5 times, resulting in **9333 description features**, **1738 title features**, and **4143 tags**.

Video Engagement

$$Engagement = \frac{Likes + Dislikes}{Views}$$

Our Model: ElasticNet
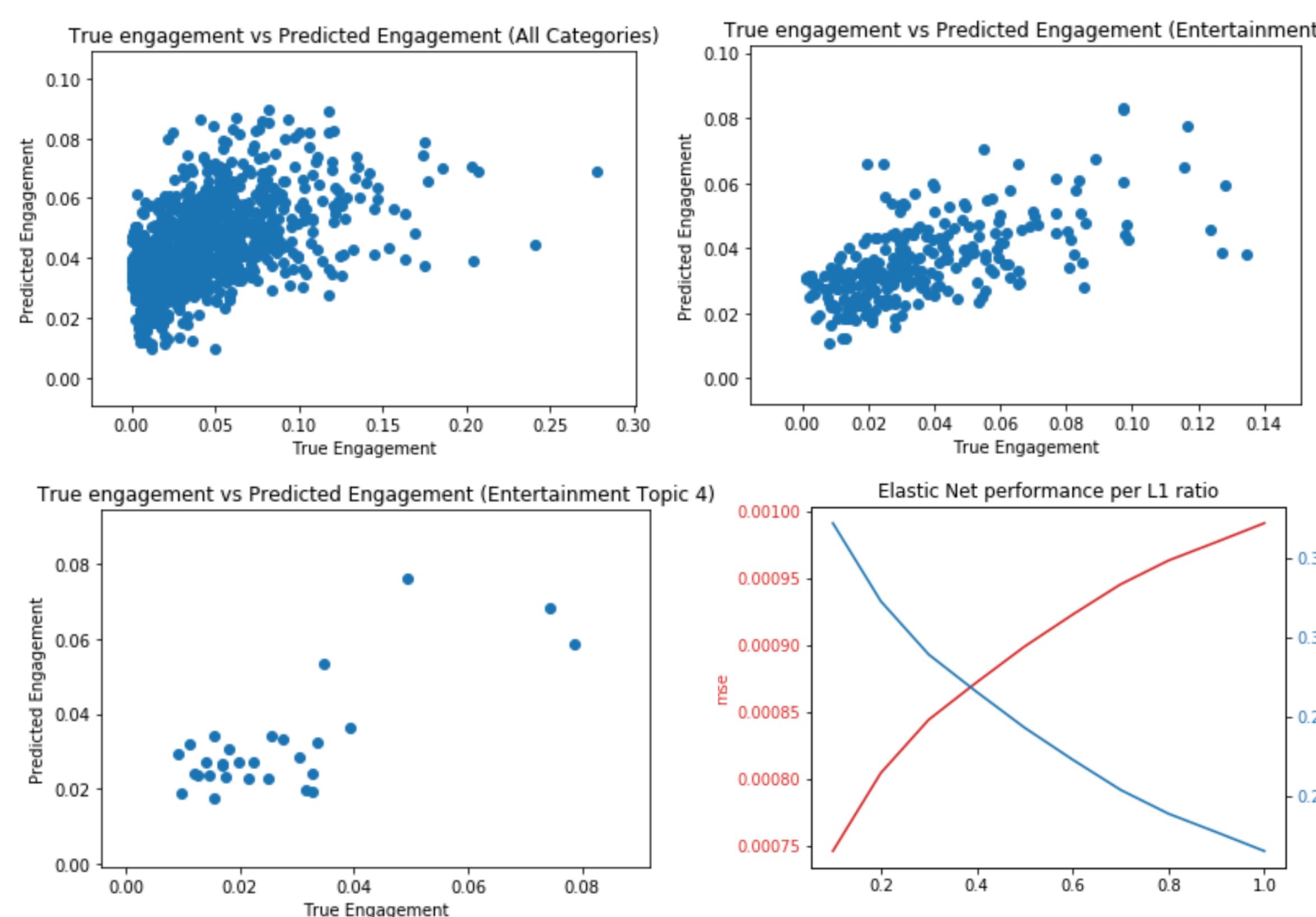
	All Categories	Entertainment	Entertainment: Topic 4
MSE	0.000872	0.000417	0.000147
R2	0.265433	0.346557	0.473951

Selected Topic: Ellen Degeneres

- Selected the topic that was best clustered based on tags, descriptions, titles, and photos.

```
topic 4
           Component       Weight
101         p_person    129.962020
123          ta_funny    77.164694
117   ta_ellen degeneres  74.099985
115          ta_ellen    73.945697
144   ta_the ellen show   72.099986
```

	number_of_videos
TheEllenShow	42
WOWPresents	9
Warner Bros. Pictures	8
LIVEKellyandRyan	5
todrickhall	3
Universal Pictures	3
Daily Davidsons	1
The Real Daytime	1
WaterTower Music	1
This Might Get	1

OpenCV and Yolo
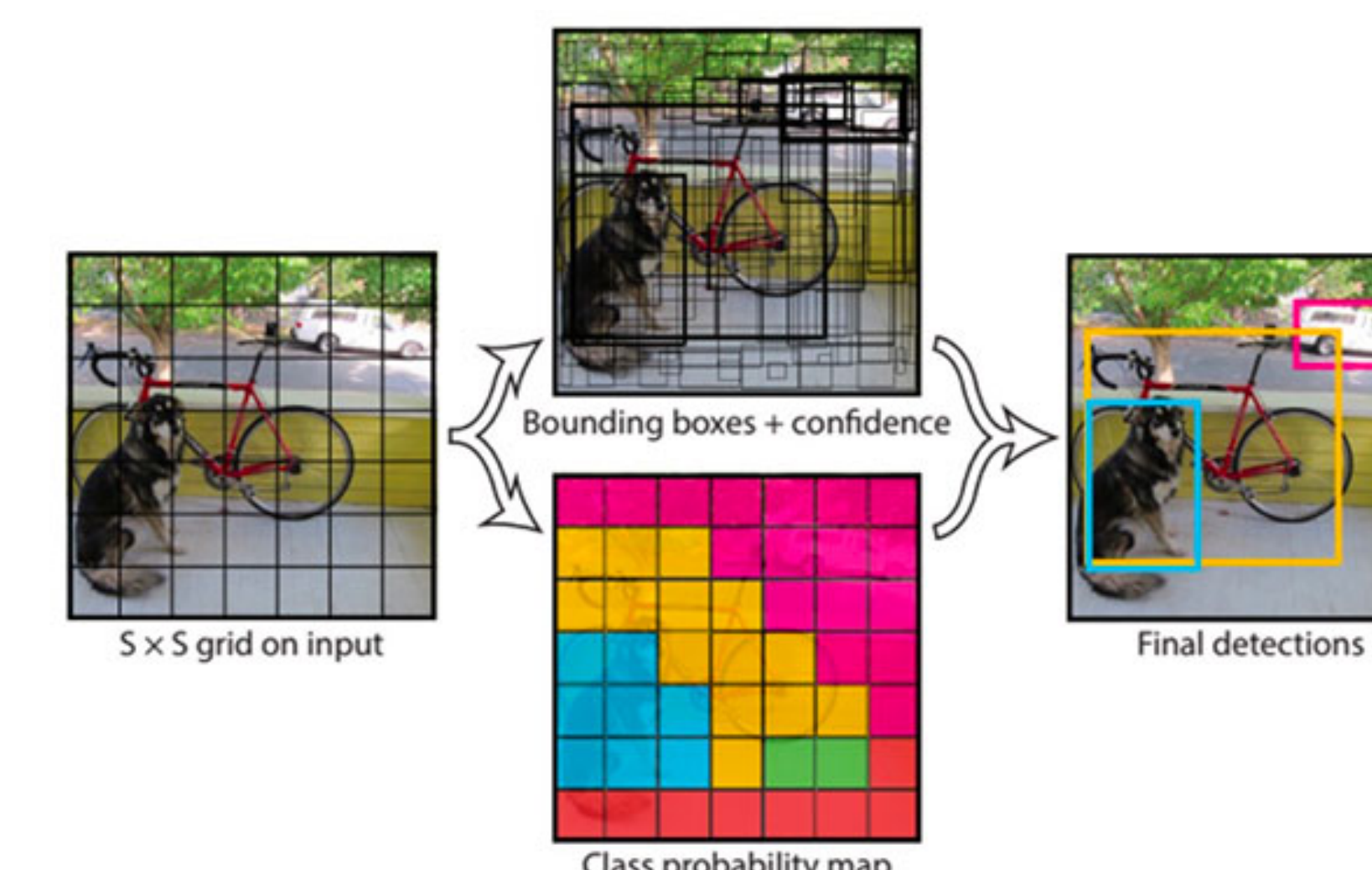
Yolo Object Detector Pipeline
Source: Redmon et al. https://arxiv.org/abs/1506.02640
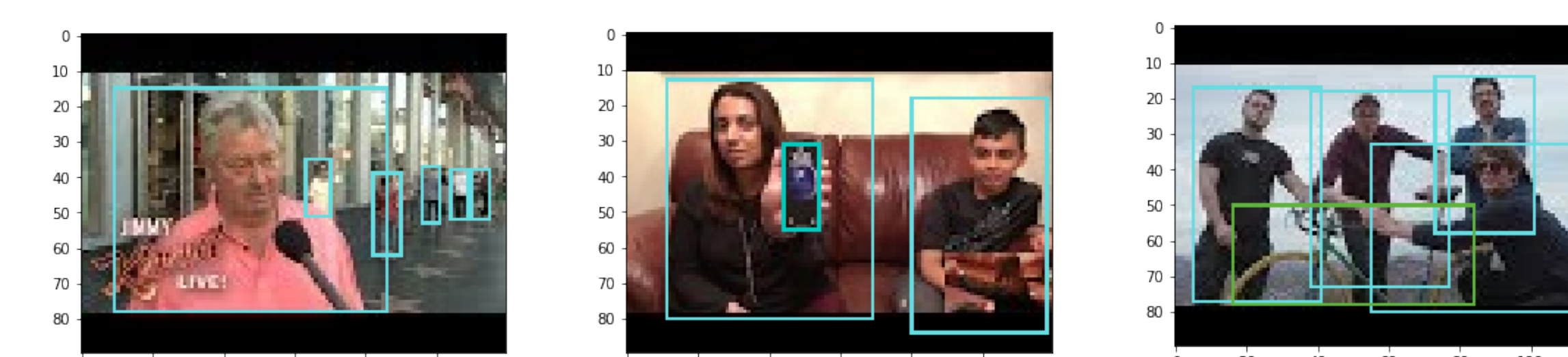
Examples of YouTube Video Thumbnail Object Recognition from our dataset.

- Used **OpenCV** library and the **Yolo Single-Stage Detector** trained on the **COCO** dataset (80 labels).

- Identified objects present in video thumbnails in order to create a **one-hot encoding**.

Future Work

- Evaluate the sentiment in **comments** and social media shares.

- Run OpenCV and Yolo on the **first 30 seconds** of each video to predict whether users will watch the entire video or not.

Acknowledgements

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