TALON: Traficked Animal LLM Optimised Network analysis

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1   Introduction

Social media activity naturally forms a network of interactions, where many interactions consist of text being shared from one profile to another. Language models can use the textual context to understand the roles of profiles in these interaction, and network anaylsis can find profiles that are influential within certain communities. We apply these techniques within the context of 9 selected online communities known to be involved in illegal animal trafficking, primarily acting on Facebook.

2   Data

We use data provided by XXXX which contains anonymised facebook profiles, and their activity. We focus on comments, as these contain interaction between multiple accounts and also text.

For each comment, we can see the profile that wrote the comment, and the profile that wrote the post the comment was on.

3   Methodology

3.1   Translation

Since the comments are written in different languages, before applying NLP techniques, we standardize them to english. While introducing translation errors, and reducing data quality, this enables us to use powerful LLMs trained in English that are not available in low resource languages (e.g. Sudanese)

To perform this translation, we use the Google Translate API, which performs automatic language detection and translation.

3.2   Buyer/Seller Classification

We aim to identify key players in the trafficked animal network and the role they play. To do this, we aim to find comments that are indicative of buying or selling activity. We feed the translated comments to an LLM to determine whether they are likely to be an attempt to sell e.g. '200£ Can ship to Europe' or an attempt to buy e.g. 'What breed is this? Do you have documentation?'

3.3   Implementation Details

To classify comments we pass them to Google Gemini with a few shot prompt to determine intent. Full details of the prompt can be found in the appendix.

Due to time constraints we were unable to process the whole dataset. An example of the kind of plot we could produce with this information is shown. Clusters of sellers and buyers, as wellers as traders can be seen.

3.4   Network Analysis

To find which profiles are important within the communities, we apply statistical network analysis techniques. We first construct a graph with vertices representing profiles, and edges representing
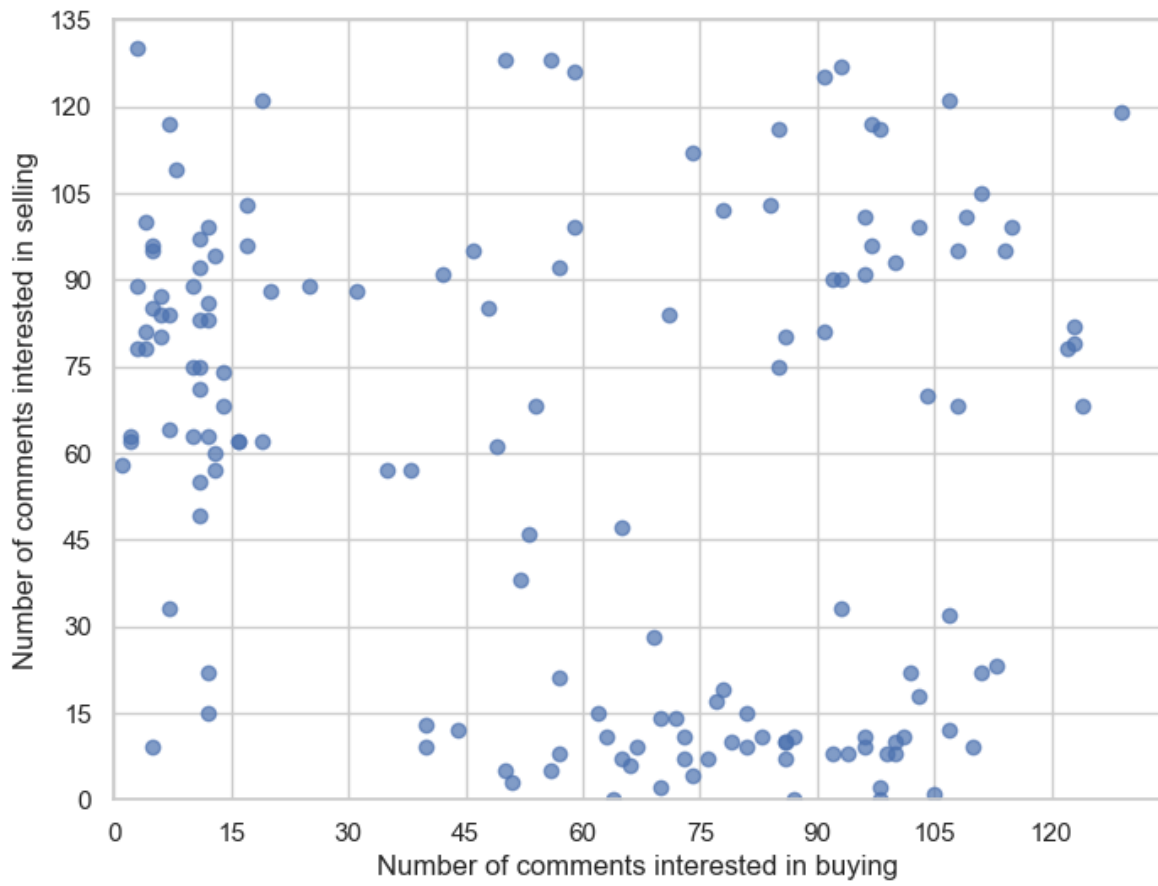
Figure 1: Synthetic Plot of Buy/Sell activity.

comments. The graph is directed with the source being the profile who commented, and the target being the profile who made the post the comment was on.

To improve the centrality metrics by adding more connections, we include data on friends and followers. Here a bi-directional edge will be added between two nodes if they have become friends, and if one profile starts following another, this will add an edge from the follower to the followed profile. We drop nodes that are isolated (have no edges).

Summary information about the graph can be seen in Table 1.

Number of Nodes	Number of Edges	Number of Comments
15127	20199	7645

Table 1: A simple 4-column table

To find important actors we apply centrality measures to this network. We select degree centrality (in and out degree) as a baseline and compare to PageRank and Betweenness.

The code outputs a CSV of profiles ranked by Betweenness, and includes information of the

3.5 Results

Examining the activity of the most central nodes in the network we see evidence of attempts to sell, with comments directed towards this node including intent to buy. Sample comments from this profile include:

Eragon Wangkrapong, average about 3 years old. The bottom pair is from the last litter.

Can you send to united states?

Is the price too high?

This shows that key players involved in trafficking can be identified, and their role as buyer and seller can be determined, allowing for faster inervention to recognise risky activity.
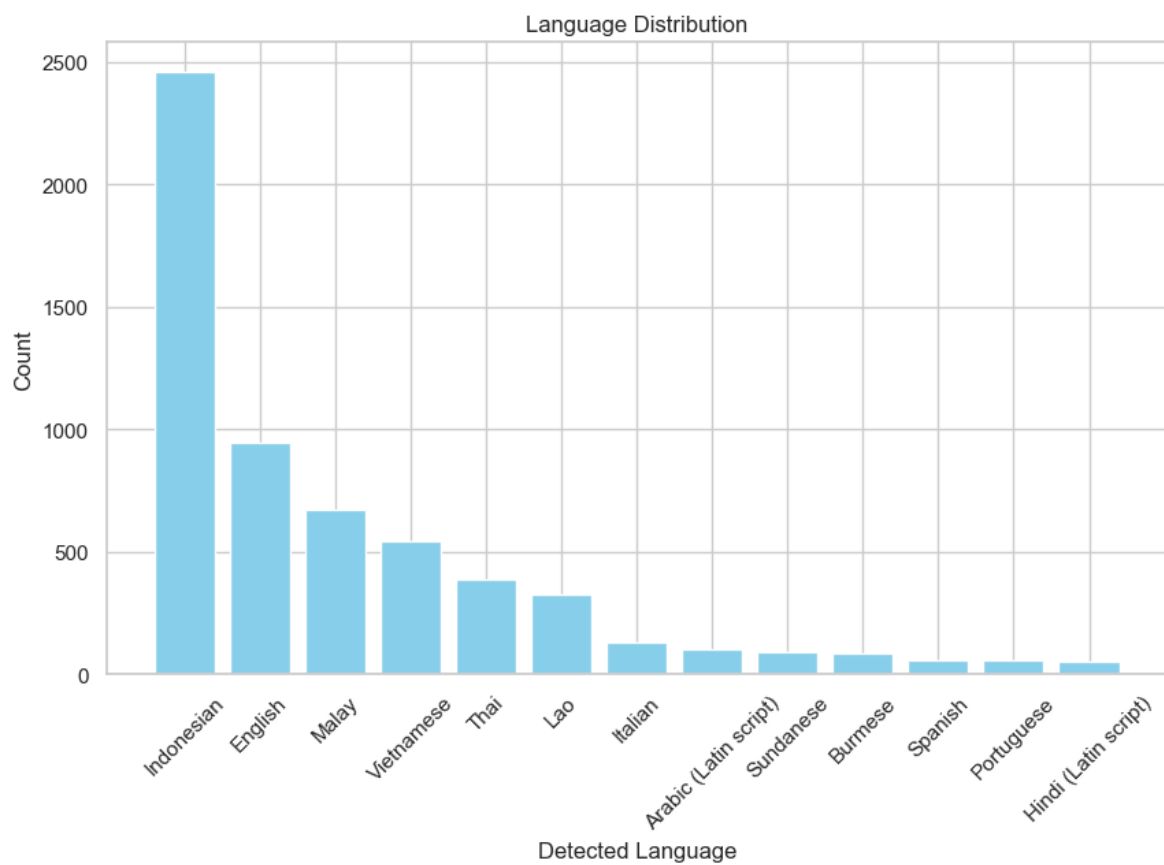
Figure 2: Breakdown of languages appearing in comments.