Revealing the Blackmarket Retweet Game: A Hybrid Approach

First Workshop on Combating Online Hostile Posts in Regional Languages during Emergency Situation

CONSTRAINT-2021, AAAI'21

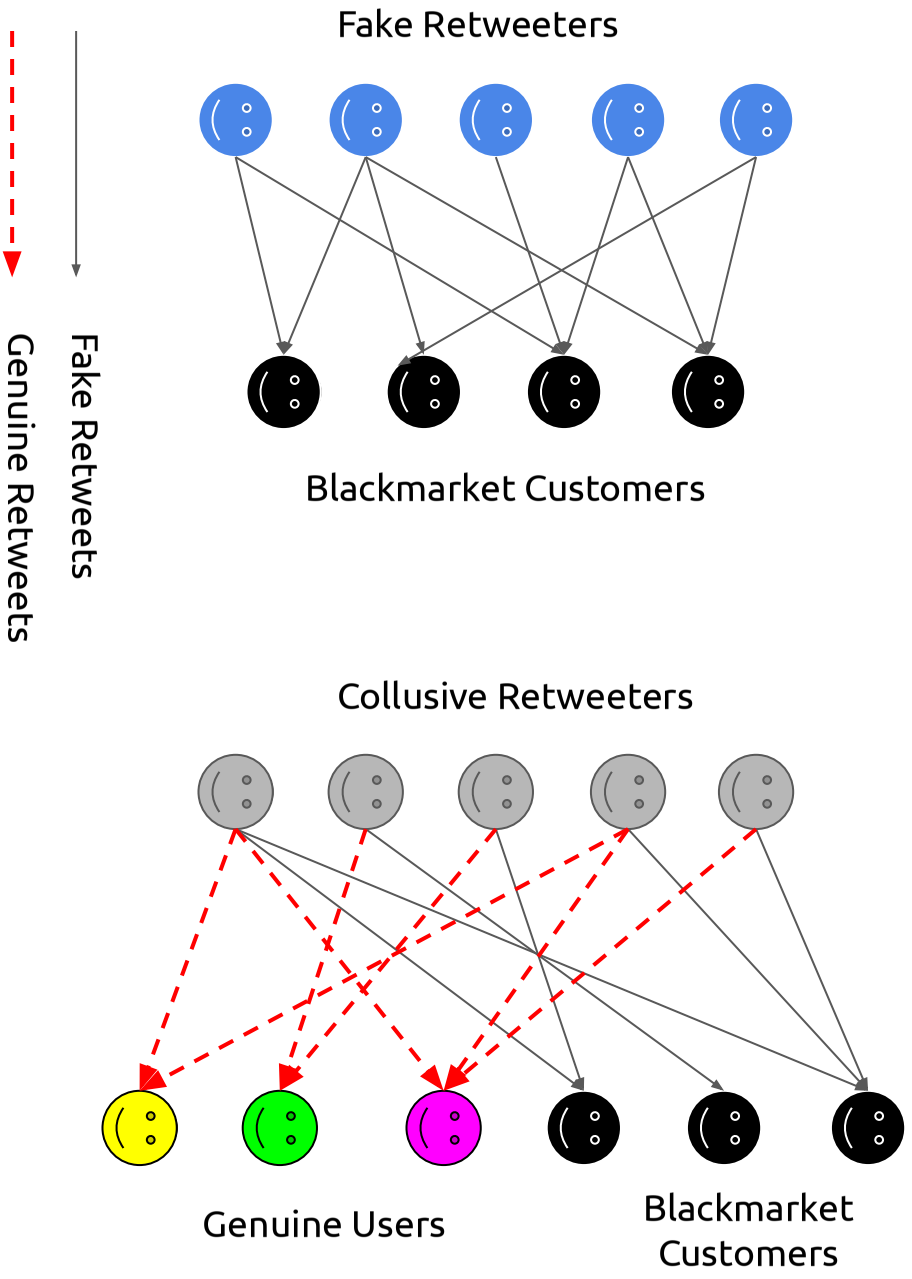
Shreyash Arya and Hridoy Sankar Dutta

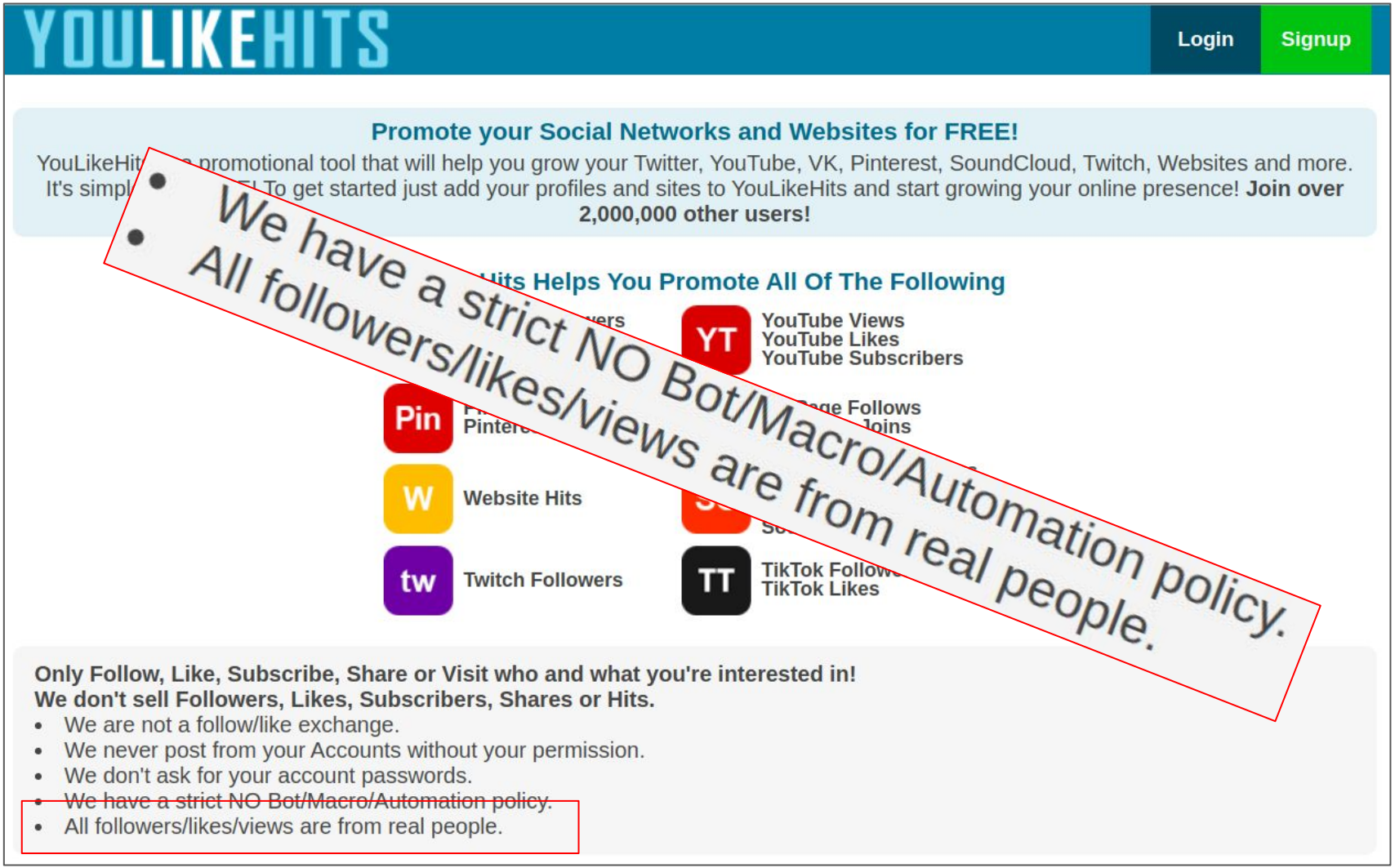


INDRAPRASTHA INSTITUTE *of*
INFORMATION TECHNOLOGY **DELHI**

WHO ARE BLACKMARKET/COLLUSIVE RETWEETERS?


GENUINE
Shreyash Arya @shrebox · 2s
I will be attending #CONSTRAINT-AAAI21 to present our paper "Revealing the Blackmarket Retweet Game: A Hybrid Approach" with @hridaydutta123. If you are attending, let's connect and meet up!
@CONSTRAINT_AAAI
COLLUSIVE USERS
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It's simpl To get started just add your profiles and sites to YouLikeHits and start growing your online presence! Join over 2,000,000 other users!
Hits Helps You Promote All Of The Following
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YouTube Likes
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Website Hits
Twitch Followers
TikTok Likes
We have a strict NO Bot/Macro/Automation policy.
All followers/likes/views are from real people.
Only Follow, Like, Subscribe, Share or Visit who and what you're interested in!
We don't sell Followers, Likes, Subscribers, Shares or Hits.
We are not a follow/like exchange.
We never post from your Accounts without your permission.
We don't ask for your account passwords.
We have a strict NO Bot/Macro/Automation policy.
All followers/likes/views are from real people.

TYPES OF BLACKMARKET SERVICES

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IS A NETWORK THAT WILL HELP YOU GROW YOUR SOCIAL PRESENCE FOR FREE.

- WE ALLOW YOU TO LOOK AND CHOOSE WHO YOU WANT TO LIKE, SUBSCRIBE, FOLLOW, VIEW, CIRCLE, HIT, SHARE AND SKIP THOSE WHO YOU ARE NOT INTERESTED IN.
- WE DO NOT SELL LIKES, SUBSCRIBES, FRIENDS, FOLLOWERS, VIEWS, HITS, CIRCLES AND SHARES.
- WE ABIDE BY TWITTERS RULES, FACEBOOKS POLICIES, GOOGLE CONDITIONS, ETC...
- WE WILL NEVER REQUEST FOR USERNAMES OR PASSWORDS OF YOUR SOCIAL NETWORK ACCOUNTS AND WILL NEVER POST, TWEET OR UPDATE STATUS FROM YOUR ACCOUNTS.
- WE HAVE A STRICT NO BOT, NO MACRO, AND NO AUTOMATION POLICY.



Buy Twitter Followers

ViewsExpert – Your #1 Source For Twitter Followers

500 Twitter Followers	1000 Twitter Followers	2000 Twitter Followers	3000 Twitter Followers
$15	$29	$54	$77
Best Quality Followers	Best Quality Followers	Best Quality Followers	Best Quality Followers
No Password Required	No Password Required	No Password Required	No Password Required
Delivery: 1-4 Days	Delivery: 1-6 Days	Delivery: 3-7 Days	Delivery: 3-9 Days
24/7 Support	24/7 Support	24/7 Support	24/7 Support
Enter Twitter Profile link	Enter Twitter Profile link	Enter Twitter Profile link	Enter Twitter Profile link
Buy Now	Buy Now	Buy Now	Buy Now

5000 Twitter Followers	7000 Twitter Followers	10000 Twitter Followers	20000 Twitter Followers
$ 129	$177	$240	$430
Best Quality Followers	Best Quality Followers	Best Quality Followers	Best Quality Followers
No Password Required	No Password Required	No Password Required	No Password Required

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Buy Twitter Followers with Fast Delivery

★★★★★ (64 Reviews)

Ready to get the exposure you deserve? Pick the #1 choice for Twitter promotion; the team at Viralyft has over 50 years of marketing experience to help you reach your full potential and increase credibility!

100 Followers	500 Followers	1000 Followers
$2.99	$14.99	$29.99
Top Quality Followers	**Top** Quality Followers	**Top** Quality Followers
No Password Needed	No Password Needed	No Password Needed
1-3 Day Delivery	1-3 Day Delivery	1-3 Day Delivery
Global Followers	**Global Followers**	**Global Followers**
24/7 Support	24/7 Support	24/7 Support
Buy Now	Buy Now	Buy Now

DETECTING COLLUSIVE ACTIVITIES IS HARD!

DATASET







Hybrid Framework

INDICATORS

- Tweet Indicators:
  - Retweet count
  - Tweet2vec
  - LDA similarity
- Source Indicators:
  - Retweeter aggression
  - Top collusive tweets
  - User-user interaction matrix

Experiments

ANALYSES

- Quantitative (Classification):
  - Linear SVM
  - Thresholded R^2
  - Logistic Regression
  - XGBoost
  - MLP
- Qualitative:
  - Retweet count change pattern
  - Two blackmarket retweet comparison
  - Discontinuity score
  - Core component + Bot analysis

Experiments - Quantitative Analysis

Classification

Table 1. Classification Test Accuracy Scores

Features	Linear SVM	Thresholded R^2	Logistic Reg.	XGBoost	MLP
Tweet2vec	0.784	0.791	0.805	0.805	0.800
Retweet Aggression	0.772	0.811	0.811	0.777	0.783
Top Collusive Tweet	0.762	0.777	0.765	0.752	0.783
LDA Similarity	0.745	0.743	0.761	0.745	0.772
User-user interaction	0.964	0.965	0.959	0.967	0.975
Combined (expect user)	0.920	0.891	0.936	0.945	0.923
Combined (total)	0.961	0.963	0.961	0.962	0.974

Table 2. Classification Metrics (Precision, Recall, F1-score; Macro)

Classifiers	**Except interaction matrix**	**Interaction matrix**	**Combined**
Linear SVM	0.92, 0.92, 0.92	0.97, 0.96, 0.96	0.96, 0.96, 0.96
Thresholded R^2	0.89, 0.89, 0.89	0.97, 0.96, 0.97	0.96, 0.96, 0.96
Logistic Regression	0.94, 0.93, 0.94	0.96, 0.96, 0.96	0.97, 0.96, 0.96
XGBoost	0.95, 0.94, 0.94	0.97, 0.97, 0.97	0.97, 0.96, 0.96
MLP	0.93, 0.92, 0.92	0.98, 0.96, 0.97	0.97, 0.97, 0.97

Experiments - Qualitative Analysis

Retweet count change pattern

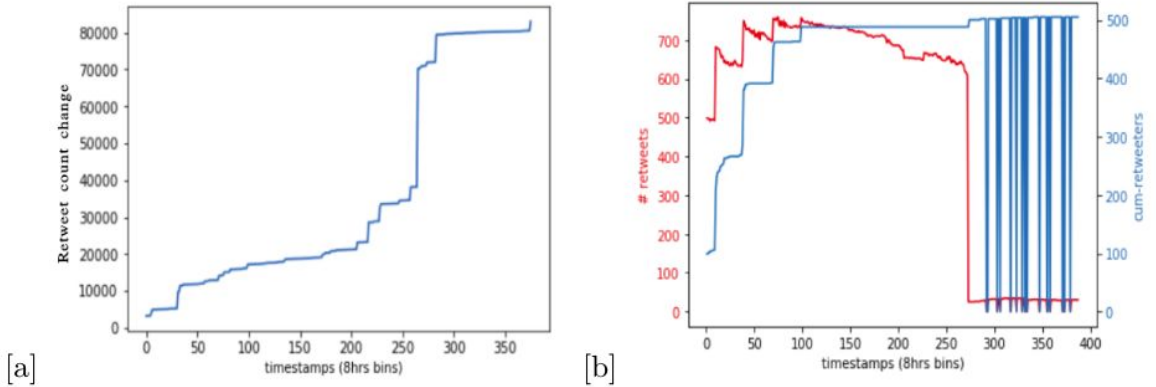


Fig. 3. (a) Retweet count change over time when tweet is submitted to a blackmarket service and (b) Number of retweets and cummulative retweeters over different timestamps.

Change in retweets in two blackmarket services

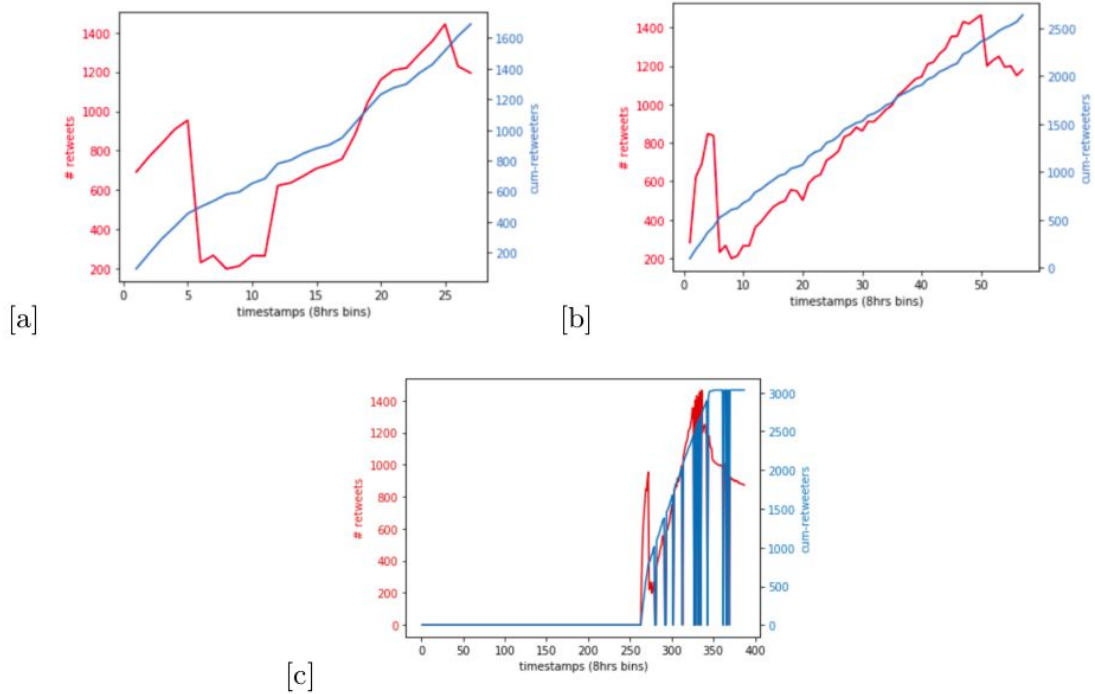


Fig. 4. (a) YouLikeHits (YLH), (b) Like4Like (L4L) and (c) YLH + L4L combined: Number of retweets and cummulative retweeters over different timestamps for the same tweet.

Discontinuity score

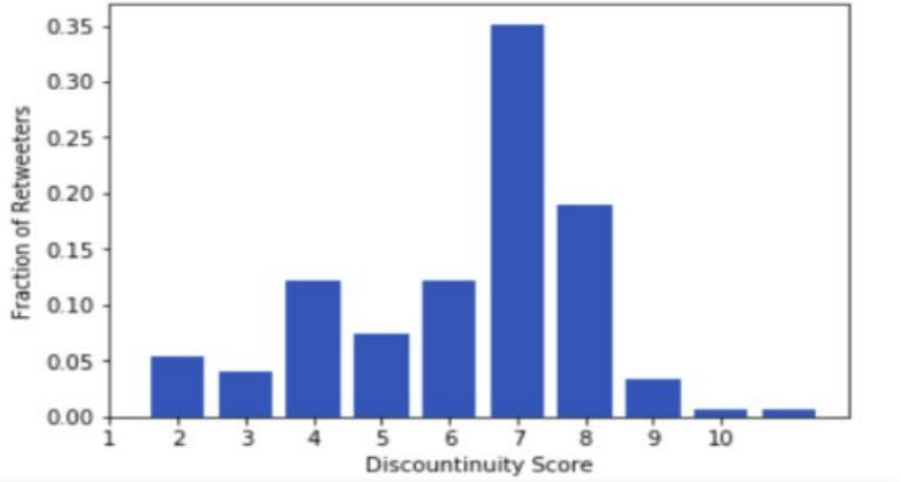


Fig. 5. Fraction of retweeters vs. Discontinuity Score.

Core component + Bot analysis

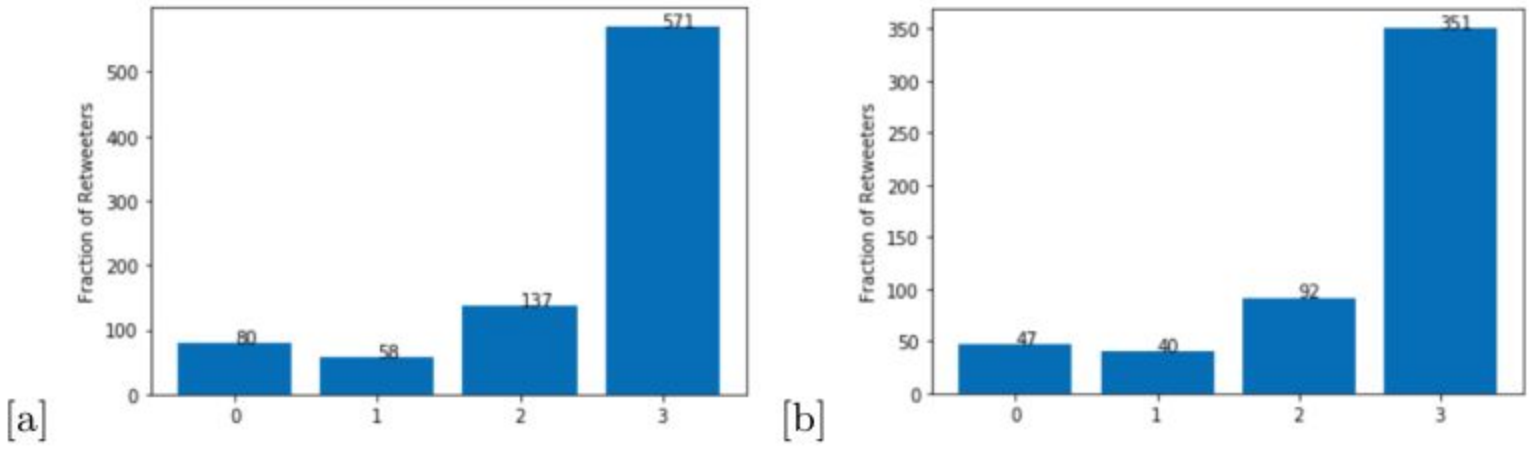


Fig. 6. (a) YouLikeHits (YLH), (b) Like4Like (L4L): Fraction of retweeters from k-core maximal subgraph vs. bins indicating the Botometer score ranges. 0: 0-25%, 1: 25-50%, 2: 50-75%, 3: 75-100%.

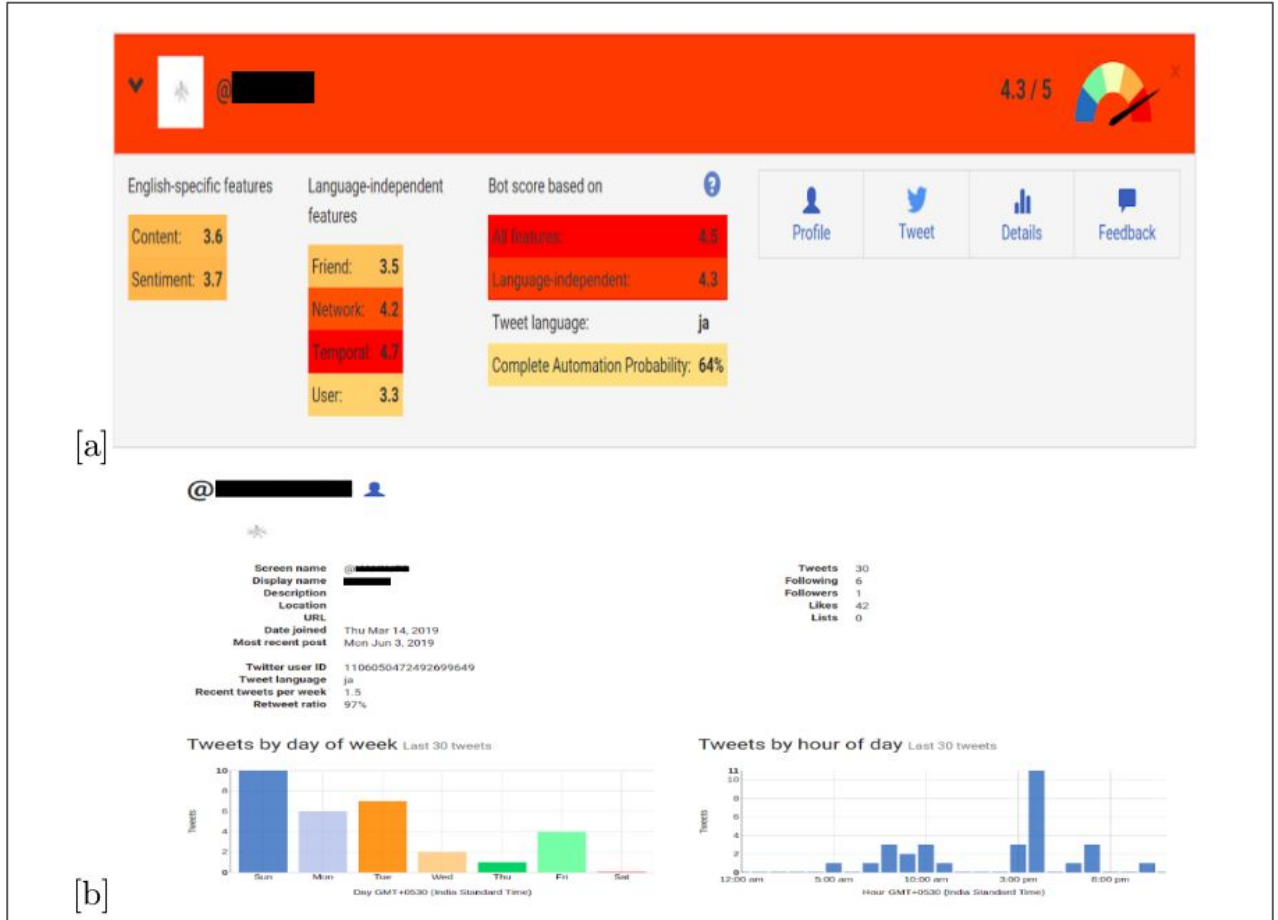


Fig. 7. Botometer analysis of a suspicious account (name of the user redacted).

Summary

- Collusive entity detection is not an easy task.
- We proposed a feature engineering-based approach.
- Annotated dataset collection for collusive and genuine users.
- Quantitative and qualitative analyses.
- Successful detection of collusive tweets and improvement over the previous literature results.

THANK YOU!

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