**Analysis for identifying the bots**

As per the analysis of the underlying cryptocurrency transfer network on the blockchain reveals that more than 16% transfers of cryptocurrency in Steemit are sent to curators suspected to be bots and finds the existence of an underlying supply network for the bots, Concretely, if there is a suspicious vote cast by a curator to an author through a vote operation, there should also be a suspicious fund transferred to the curator from the author through a transfer operation that happens before the vote operation is performed by the curator. Specifically, we consider a transfer operation is suspicious if the ‘memo’ area (allowing sender to leave a message) of the transfer operation only contains a link pointing to a recent post created by the sender. If in addition, the recipient of the transfer operation, after receiving the fund from the sender, votes for the post matching that link within the 7-days’ time window after the post creation time, we consider it as a suspicious trade between a post author and a voting bot.

As we have data for 45 months for transfer and vote operations in steemit. We can do monthly analysis.

Step 1:

Loading the transfer csv file from the path along with required columns.

Step 2:

Filtering the memo column if they have any URLs in the records of the data file.

Step 3:

Saving all the records with URLs in the memo into new data frame.

Step 4:

Checking if the Sender name is present in the URL data frame and saving the records with the sender’s name in the URL in a new data frame.

Step 5:

Filtering the data with group by for the to and from columns by taking the count and saving the count in a new column with name transfercount. And saving the data in a new dataframe

Step6:

Loading the vote table data with the required columns.

Step7:

Filtering the voters table data by taking count of voter and author with the groupby and saving the count in voter count. And saving the records in new data frame

Step8:

Merging the transfer table transfercount column and voter table voter count. Which helps us to get the records in which the transfer of money was done in transfer table between from and to and matching the to column with voter and from with author and find the records and saving those records into a new data frame with the votercount and author count.

Step9:

Sorting the data frame in the descending order.

Step10:

Changing the type of the votercount column and transfer count column into int.

Step11:

Checking if the votercount and transfercount is same for each record and saving in a new column with TRUE if they both match.

Step12:

Filtering the data with the true and saving all the records with true in a new data frame.

Step13:

The final data frame has all the records with equal number of transactions and number of times vote action performed between the two persons.