

Research of Fake News Spreading Through Whatsapp

Pooja Khurana, Deepak Kumar, Sanjeev Kumar

Abstract— *Whatsapp, a social media app that allows instant, cross-platform messaging facility for the users to send or receive text messages, voice calls, video calls, images, documents and user location in just a single click from any location of the country. It makes the system of communication highly secure by providing the feature of end-to-end encryption. However, there are many cases observed where fake news or inaccurate information spread/ escalate like a world fire on Whatsapp. Concerning the problem (situation), we have tried to estimate the spread of Fake news on Whatsapp based on the Analytic Modeling, considering the number of feasible authors those are relevant for spreading of fake news (S), the wide variety of coetaneous authors who are highly active for posting the fake information (I), the range of authors who got the right information (R) through TV channels, newspaper etc who are inactive to spread the fake information.*

The conclusion came to be as unsteady because of the results that showed the trend of speeding fake news will be more in next upcoming years due to lack of awareness among the users.

Index Terms: SIR Model, mobile messenger, differential equation model, social media users.

I. INTRODUCTION

Social media messengers are masses of community who share a commonality. People are either connected to each other by clubs or by professional circles called messengers groups. With the flying success of the internet and establishment of social media, social networking has come to symbolize the podium by using which people have interaction, collaboration, and intercommunication. For example, Facebook, Twitter, LinkedIn are viewed as most likely social messengers whereas Whatsapp, viber, snap chat are viewed as social media platforms.

Instant messaging is a sort of on-line chat which offers actual-time textual content transmission over the net. Due to the fact that the advent of smartphone and the successive access of cell apps, small price or open chat and social messaging apps have demonstrated themselves as a reasonably-priced alternative to operator-based text messaging through SMS. Whatsapp is predominately free prominent mobile messenger with currently more than users and gives simple, comfortable, reliable messaging and calling, available on smart phones all over the world, which makes it extraordinarily popular. Jan Koum and Brian Acton both are the founders of this popular messenger who had previously spent twenty years mixed at Yahoo. Later on Whatsapp is accompanied by using Facebook in 2014, but continues to serve as a separate app with a focus on sending

and receiving an array of media: text messages, pictures, videos, documents, and location, as well as voice calls that works like a bullet and reliable all over in the world. More than one million individuals in over one hundred eighty countries use app to stay in contact with companions, whenever and wherever. The app has about nine hundred million monthly active authors who stock approximately six hundred million facts in keeping with day. We have applied an enhanced epidemiological SIR model to describe dynamics of spreading of fake news through social media platform named Whatsapp.

Nikhil et al. (2017) calculated that Whatsapp customers in India use the video calling feature for a complete of 50 million minutes per day, the highest aggregate usage inside the global, in keeping with the enterprise. Manish et al. (2017) told about Whatsapp users in India, that about 200 million people are actively using this app in India. Anatoly Khorozov et al.(2016) revealed that Whatsapp messenger site has become most favorite app and is being widely used by 63% people in India and this percentage is growing day by day. Prashant Naidu et al.(2015) presented a data in which he showed that Whatsapp users in India are approximately 44% in the age group of 20-29 years and this growth is going like a bullet. Krishnan et al. reported that in India we have one of the largest markets for many social media messengers apps - it has 160 million of WhatsApp's monthly active users and fake news are being speeded through this messenger like a wild fire, further he told two major factors driving fake news. Mukherjee et al. (2017) explained that Whatsapp underlying encryption makes that tough to handle the challenge of rumors, as Whatsapp active users haven't any approach of seeing what quite misinformation is being outspread on their networks, unless it's reported to them directly by active authors. Zoey et al.(2017) reported that due to end-to-end encryption in Whatsapp, government is unable to stop and punish people spreading fake news. Alan et al.(2017) Whatsapp engineer termed this messaging app as "Complex" due to encryption mechanism because it does not store any information on the server. Iyoha et al.(2015) differentiated between social media and social network and told that Whatsapp now further exist on the web via www.web.whatsapp.com (Chrome browser only) and can now access it on the personal computer.

In India rumor spreading/fake news is a growing issue. The follow of the use of social media messengers' kind of Whatsapp to popularize fictitious information is leading in an unsafe direction. There are two main aspects urging the

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fake news flow. Firstly, the decrease in the prices of mobile smart phones from last many years. And, secondly the cheap drop in internet data prices. Therefore, this rising trouble of rumors will problem going to increase more, and also knowing the fact will not be going to know easily. We heard about so many fake news at the time of demonetization of currency notes in India during Nov. 2017. Lots of fake news, videos and photos on the conflicts of Hinds and Muslims are shared through Whatsapp.

II. MATHEMATICAL MODEL:

The first epidemiological SIR model is given by W. O. Kermack and A.G. Mckendrick [9].

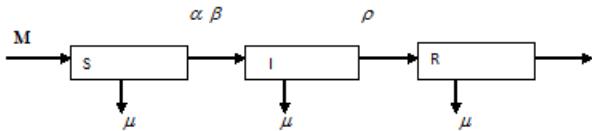


Figure 1: Flow Structure of SIR

S: represents the number of feasible authors those are relevant for spreading of fake news, I: represents the wide variety of coetaneous authors who are highly active for posting the fake information, R: represents the range of authors who got the right information through TV channels, newspaper etc who are inactive to spread the fake information. M: Production rate of S population. We considered a deterministic model based on differential equations.

$$S' = M - \mu S - \alpha S \tag{1}$$

$$I' = \alpha S - \beta I - \mu I \tag{2}$$

$$R' = \beta I - \mu R - \rho R \tag{3}$$

$$N = S + I + R \tag{4}$$

The above equations describe the transition of individuals from S to I and I to R. $\alpha = \frac{\lambda I}{N}$, β , μ , ρ and λ are the parameters called as transfer rate, recovery rate, death rate and possibilities of authors not infected from individuals and transmission probability.

III. STABILITY ANALYSIS OF THE MODEL & RESULTS:

Now we have

$$N' = S' + I' + R' = M - \mu N - \rho R$$

Determine stationary points:

$$\begin{aligned} 0 &= M - \mu S - \alpha S \\ 0 &= \alpha S - \beta I - \mu I \\ 0 &= \beta I - \mu R - \rho R \end{aligned}$$

In reversed order we get from the above equations:

$$R = \frac{\beta}{(\mu + \rho)} I, S = \frac{(\mu + \beta)}{\alpha} I, S = \frac{M}{\alpha + \mu},$$

$$I = 0 \text{ Or } S = \frac{(\beta + \mu)}{\lambda} N^*, I = \frac{M - \mu S}{\alpha} \frac{N}{S}.$$

When $I = 0$, we get $S = 0, R = 0, N = X$ means system is without infection as stationary point is (0, 0, and 0)

When $I \neq 0$ we have

$$\begin{aligned} S &= \frac{(\beta + \mu)}{\lambda} N^* \\ I &= \frac{M - \mu S}{\alpha} \frac{N}{S} = \frac{M - \mu \frac{(\beta + \mu)}{\lambda} N^*}{\alpha} \cdot \frac{\alpha}{(\beta + \mu)} \\ &= \frac{M}{(\beta + \mu)} - \frac{\mu}{\lambda} N^* \end{aligned}$$

$$R = \frac{\beta}{(\mu + \rho)} I = \frac{\beta}{(\mu + \rho)} \left(\frac{M}{(\mu + \beta)} - \frac{\mu}{\lambda} N^* \right)$$

We can now compute the value of N^*

$$\begin{aligned} N^* &= S^* + I^* + R^* \\ &= \frac{(\beta + \mu)}{\lambda} N^* + \frac{M}{(\beta + \mu)} - \frac{\mu}{\lambda} N^* \\ &+ \frac{\beta}{(\mu + \rho)} \left(\frac{M}{(\mu + \beta)} - \frac{\mu}{\lambda} N^* \right) \\ &= \left(\frac{(\beta + \mu)}{\lambda} - \frac{\mu}{\lambda} - \frac{(\mu\beta)}{\lambda(\mu + \rho)} \right) N^* + \frac{M}{(\beta + \mu)} \\ &+ \frac{\beta M}{(\mu + \rho)(\mu + \beta)} \end{aligned}$$

From these we get

$$\begin{aligned} \left(1 - \frac{(\beta + \mu)}{\lambda} - \frac{\mu}{\lambda} - \frac{(\mu\beta)}{\lambda(\mu + \rho)} \right) N^* &= \frac{M}{(\beta + \mu)} \\ &+ \frac{\beta M}{(\mu + \rho)(\mu + \beta)} \\ N^* &= \frac{\frac{M}{(\beta + \mu)} + \frac{M\beta}{((\beta + \mu)(\mu + \rho))}}{\left(1 - \frac{(\beta + \mu)}{\lambda} - \frac{\mu}{\lambda} - \frac{(\mu\beta)}{\lambda(\mu + \rho)} \right)} \end{aligned}$$

which shows that the mathematical model is stable (convergence) [26].

General solution of differential equations (1), (2) and (3) are given below:

$$\begin{aligned} S(t) &= \frac{- \left[e^{-t(\alpha + \mu)} (\alpha - \rho) \left(\frac{c_1 + {}_0(M\alpha\beta e^{t(\alpha + \mu)})}{(\alpha + \mu)(\alpha - \beta)(\alpha - \rho)} \right) \right]}{\beta} \\ &= \frac{- \left[e^{-t(\beta + \mu)} (\beta - \rho) \left(\frac{c_2 - (M\alpha\beta e^{t(\beta + \mu)})}{(\beta + \mu)(\alpha - \beta)(\beta - \rho)} \right) \right]}{\beta} \end{aligned}$$



$$I(t) = e^{-t(\alpha+\mu)} \left(\frac{c_3 + (M\alpha\beta e^{t(\alpha+\mu)})}{(\alpha+\mu)(\alpha-\beta)(\alpha-\rho)} \right) + e^{-t(\beta+\mu)} \left(\frac{c_4 - (M\alpha\beta e^{t(\beta+\mu)})}{(\beta+\mu)(\alpha-\beta)(\beta-\rho)} \right) + e^{-t(\rho+\mu)} \left(\frac{c_5 + (M\alpha\beta e^{t(\rho+\mu)})}{(\rho+\mu)(\alpha\beta - \alpha\rho - \beta\rho + \rho^2)(\beta-\rho)} \right)$$

$$R(t) = \frac{e^{-t(\alpha+\mu)}(\alpha-\beta)(\alpha-\rho) \left(\frac{c_6 + (M\alpha\beta e^{t(\alpha+\mu)})}{(\alpha+\mu)(\alpha-\beta)(\alpha-\rho)} \right)}{\alpha-\beta} +$$

Table1: Parameters estimations

Parameters	Values in Million	
M	226	[21]
S(0)	200	[22]
I(0)	160	[23]
R(0)	30	[22]
A	0.8	(estimated)
B	0.187	(estimated)
μ	0.1	(estimated)
ρ	0.01	(estimated)

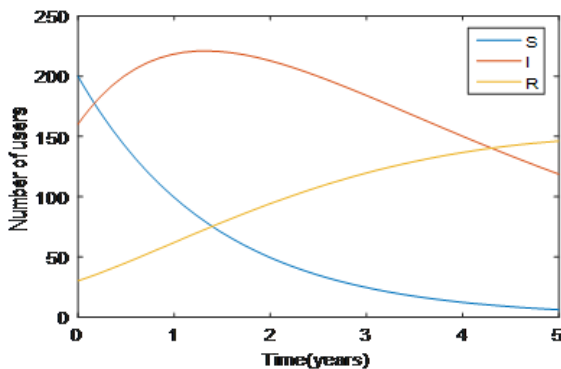


Figure 2: Fake news spreading on Whatsapp (Social media)

In figure 2, S represents the number of possible authors with the blue color, I represent the coetaneous number of authors who are actively posting the fake news on the media messenger with red color and R represents the number of authors who has got the right information and from any other media with yellow color. From the graph it is clear that the situation is vary with respect to time in each of the three cases i.e. the misinformation sending through authors who are infected is vary that is this trend is going to be the same with respect to time in coming years. We have considered the stability for coming five years only. In a social messenger users dynamicity is a major feature where can impact of users behaviors.

IV. CONCLUSION

Fake news, a type of pseudo news that causes the spread of misinformation on social media especially what’s app is a measure of various scams and scares. In this study, we have demonstrated that how the fake news spread among the users and who are responsible for spreading this kind of rumors by estimating the parameters of SIR model.

The stability of the model has been evaluated and is compared analytically as well as numerically showing the significant incrementally in the trend of posting unreal information of What's app which is not going to be decreased in the next upcoming years as the ones who are active in posting rumors will remain sending fake news and the receivers will believe due to lack of awareness. This study, based on conclusion, suggested that all What's app users required to check the truthfulness of news before sending them to other users.

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