

Twitter におけるデマ拡散のシュミレーション

プロジェクトマネジメントコース

ソフトウェア開発管理グループ

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第 1 章

序論

当研究では Twitter のデマ拡散をシミュレーションで再現することができるかの調査を行う．実際にデマの拡散をシミュレートするためには，ユーザ同士のネットワーク作成，つぶやきの頻度，RT の頻度を求めることが必要である．それぞれのデータを得るために TwitterAPI でデータを取得し，そのデータをもとにシミュレートを行う．

第 2 章

背景

Twitter はマイクロブログの 1 つでスマートフォンなどの普及により急激に普及している．この Twitter の特徴としてリアルタイムな情報を手軽に多くの ユーザへと伝播できるため社会に影響を与えている．#MeToo というハッシュタグの投稿により性的被害やセクハラについて考えるきっかけが，世界中に広がった事が挙げられる．しかし悪い影響を与えてしまう場合もある．例えば東日本大震災 時のライオンの脱走や北朝鮮のミサイルの目撃デマが挙げられる．このようなデマの拡散をシュミレート出来るのではないかと考えた．

第 3 章

目的

本研究では TwitterAPI により 1 日のツイート，RT 数の分布と現実に近いネットワークを構築するためにフォロー数を出すためにデータを取得し，現実のデマ拡散に近い状況を再現できるシミュレーションの開発を行うことを目的にする．

第 4 章

研究環境の構築

4.1 計算機環境の構築

4.1.1 Chocolatey とは

Chocolatey は Windows のためのパッケージ管理ツールである。Chocolatey を使うことによって Windows 上で動作するソフトウェアをコマンドラインからインストール、アンインストール、アップデート、検索を行うことができる。

4.1.2 Chocolatey のインストール

Windows のコマンドプロンプトを管理者として実行する。

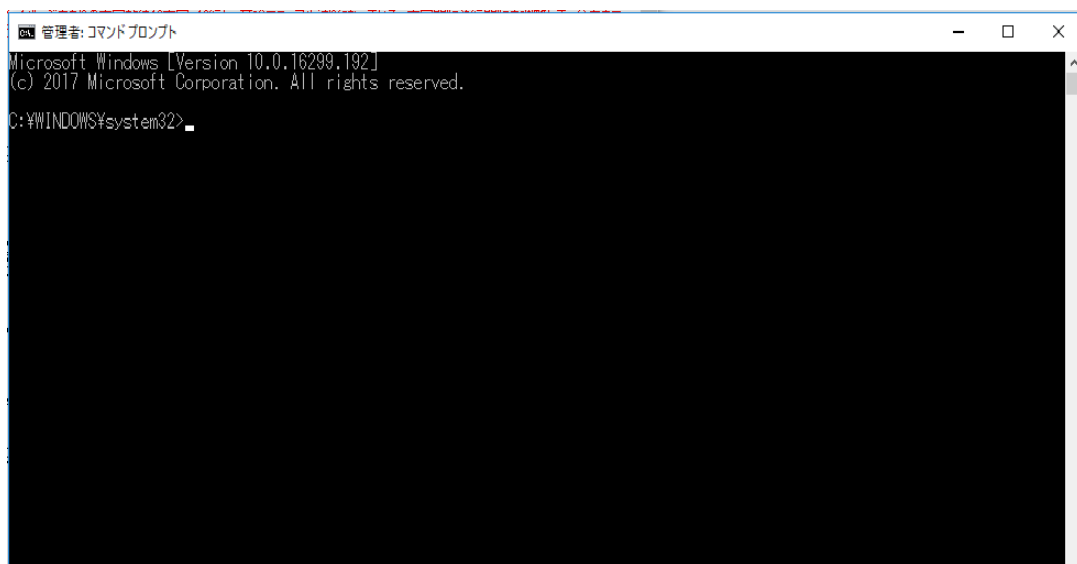


図 4.1 管理者で起動したコマンドプロンプト

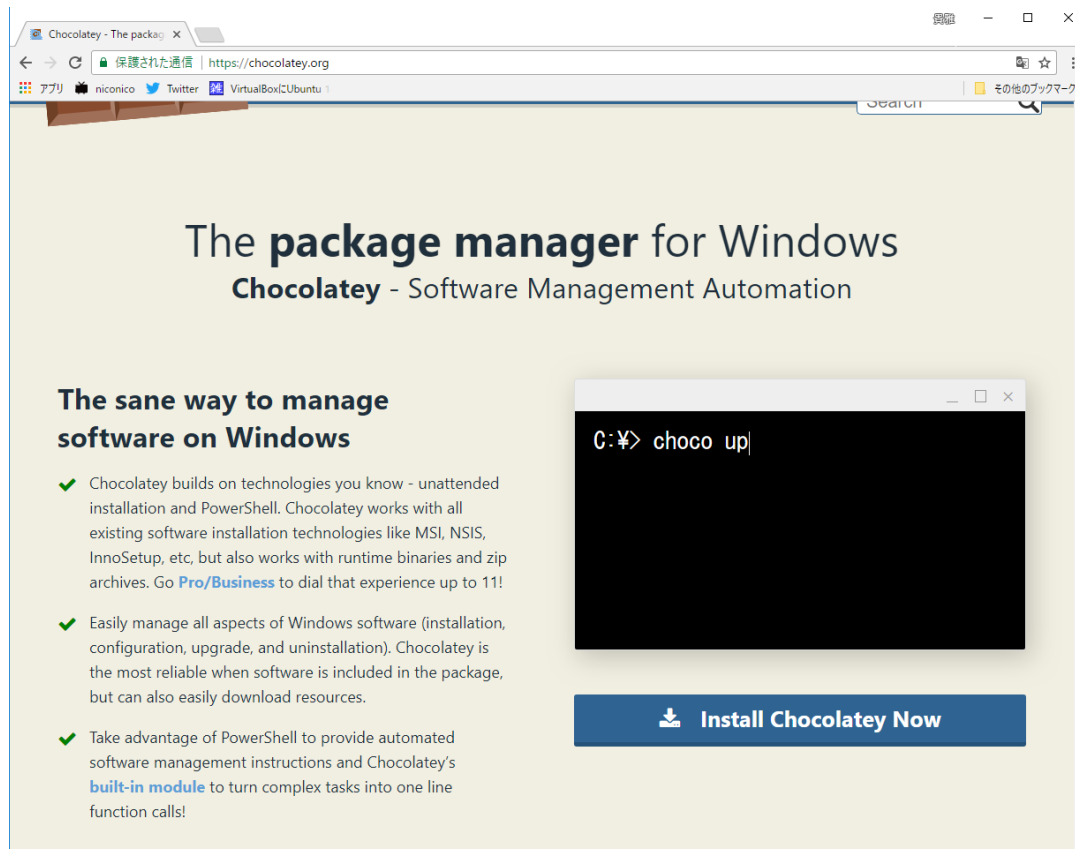


図 4.2 ダウンロードサイト 1

chocolatey のサイト <https://chocolatey.org/>に掲載されているコマンドを実行する。

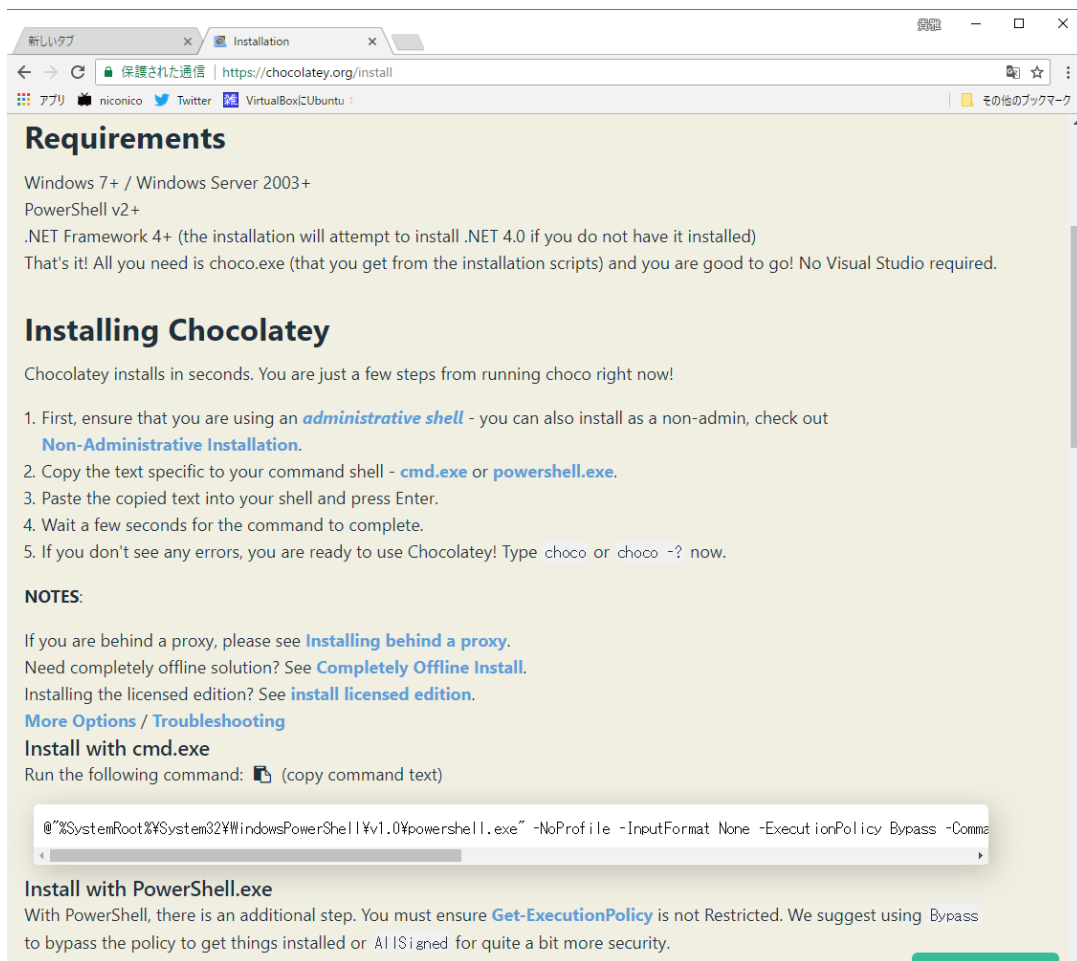


図 4.3 ダウンロードサイト 2

ダウンロードサイトの Install Chocolatey Now をクリックする



```
Microsoft Windows [Version 10.0.16299.192]
(c) 2017 Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>@"%SystemRoot%\System32\WindowsPowerShell\v1.0\powershell.exe" -NoProfile -InputFormat None -ExecutionPolicy Bypass -Command "iex ((New-Object System.Net.WebClient).DownloadString('https://chocolatey.org/install.ps1'))" && SET "PATH=%PATH%;%ALLUSERSPROFILE%\chocolatey\bin"
```

図 4.4 コマンドプロンプト

Install with cmd.exe に書かれているコマンドをコピーし、起動したコマンドプロンプトで実行する。

4.1.3 Chocolatey によるインストール

Virtual Box のインストール

Choco インストールするには , コマンドプロンプトに以下のコマンドを入力する .

```
cinst -y virtualbox
```

Vagrant のインストール

インストールのコマンドは以下のとおりである .

```
cinst -y vagrant
```

4.1.4 VirtualBox

Oracle VM VirtualBox は Oracle が開発，提供するソフトウェアで，ホスト OS 上にゲスト OS（これを仮想マシンという）を実装することができるものである．

VirtualBox を起動すると，図のような画面が表示される．「新規」ボタンを押すと仮想マシンを作成することができるが，今回は Vagrant を通すため，使用しなくてよい．

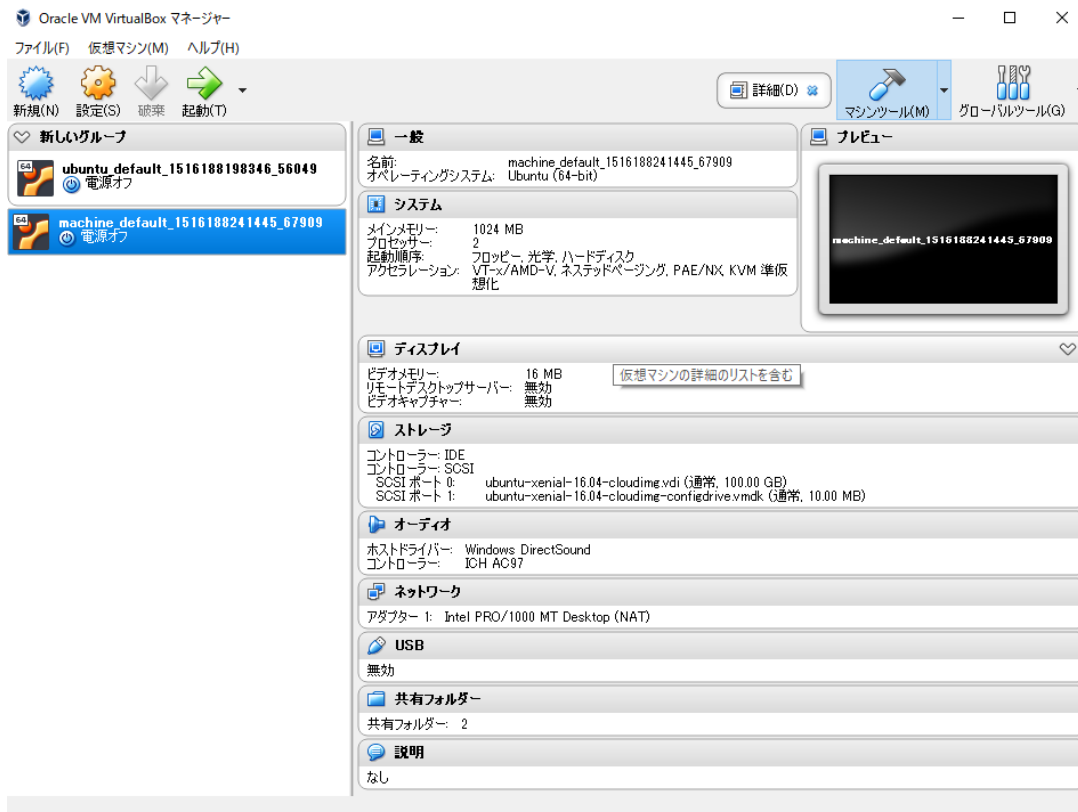


図 4.5 VirtualBox の画面

4.1.5 Vagrant

Vagrant は仮想環境の構築・管理を容易にし、さらに配布をすることができるようになるソフトウェアである。

Vagrant を使うには、Box と呼ばれるファイルが必要になる。今回は矢吹研究室の公式マシンを使用する。

矢吹研究室公式マシンは以下の URL の GitHub リポジトリで公開されており、このリポジトリを clone (少し違うが、簡単に言えばダウンロードして) して使用する。なお、矢吹研究室公式マシンは Linux ディストリビューションの一つである Ubuntu を使用している。矢吹研究室公式マシンは初回起動時に様々なアプリケーションを自動でインストールする。そのため、本論文に書かれているコードを公式マシン以外で実行してもうまく動作しない可能性がある。その際は必要なアプリケーションを `apt-get install [パッケージ名]` (ubuntu の場合) でインストールすることができる。

<https://github.com/yabukilab/machine>

本研究では `c:/vagrant` というディレクトリに clone する。

そうすると、`c:/vagrant/machine` 下に `Vagrantfile` というファイルが存在するはずである。存在を確認したらコマンドプロンプトで以下のコマンドを入力する。

```
cd c:\vagrant\machine
```

```
vagrant up
```

```
vagrant ssh
```

これで、コマンドプロンプト上で仮想マシンに ssh 接続できれば成功である。

第 5 章

手法

5.1 大まかな流れ


1. ツイートの拡散する様子をシュミレートする手法を確立するために，ランダムグラフでの RT シミュレーションを試みる [1] .
2. TwitterAPI を用いて 50 万人のユーザから 1 日のツイート数取得を行い，それをもとに 1 日あたりのツイート数の分布を出す .
3. ユーザから 1 日の RT 数の取得を行い，分布を出す .
4. ネットワークの作成のためユーザーのフォロー数の平均を出す [2] .

5.2 シミュレーション手法の確立

シミュレーション手法の確立のために，ランダムグラフのを用いた RT シミュレーションを試みる．

```
n = 10; (*人数*)
p = 0.2; (*任意のAが任意のBをフォローする確率。一定とする*)
q = 0.5; (*RTする確率。一定とする*)
steps = 2;
(*全員同期して2ステップ行動する*)
ランダムグラフを作る。

In[49]:= graph = RandomGraph[{n, IntegerPart[n (n - 1) p]}, DirectedEdges -> True]
```



```
Out[49]:=
```

フォローされる関係。「A->B」ならAがBにフォローされているということ。

```
In[50]:= Edgelist[graph]
Out[50]:= {1 -> 3, 1 -> 10, 2 -> 6, 2 -> 8, 2 -> 10, 3 -> 1, 3 -> 4, 3 -> 8, 4 -> 6,
4 -> 9, 5 -> 4, 5 -> 9, 5 -> 10, 7 -> 6, 8 -> 3, 9 -> 4, 9 -> 10, 10 -> 2}
```

行列表現。

```
In[55]:= m = q AdjacencyMatrix[graph];
```

図 5.1 ランダムグラフの作成

```
In[66]:= MatrixForm[m]
Out[66]//MatrixForm=

$$\begin{pmatrix} 0. & 0. & 0.5 & 0. & 0. & 0. & 0. & 0. & 0. & 0.5 \\ 0. & 0. & 0. & 0. & 0. & 0.5 & 0. & 0.5 & 0. & 0.5 \\ 0.5 & 0. & 0. & 0.5 & 0. & 0. & 0. & 0.5 & 0. & 0. \\ 0. & 0. & 0. & 0. & 0. & 0.5 & 0. & 0. & 0.5 & 0. \\ 0. & 0. & 0. & 0.5 & 0. & 0. & 0. & 0. & 0.5 & 0.5 \\ 0. & 0. & 0. & 0. & 0. & 0. & 0. & 0. & 0. & 0. \\ 0. & 0. & 0. & 0. & 0. & 0.5 & 0. & 0. & 0. & 0. \\ 0. & 0. & 0.5 & 0. & 0. & 0. & 0. & 0. & 0. & 0. \\ 0. & 0. & 0. & 0.5 & 0. & 0. & 0. & 0. & 0. & 0.5 \\ 0. & 0.5 & 0. & 0. & 0. & 0. & 0. & 0. & 0. & 0. \end{pmatrix}$$

```

1番目の人の1個のつぶやきがどのように拡散するかを調べる。

```
In[67]:= state = Table[0, n];
state[[1]] = 1;
state
Out[69] = {1, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

状態ベクトルに行列をかけると、次の状態がわかる。

```
In[81]:= state.m
Out[81] = {0., 0., 0.5, 0., 0., 0., 0., 0., 0., 0.5}
```

2回かければ2ステップ後の状態がわかる。

```
In[83]:= state.m.m
Out[83] = {0.25, 0.25, 0., 0.25, 0., 0., 0., 0.25, 0., 0.}
```

steps回の場合はmのsteps乗をかければよい。

```
In[84]:= state.MatrixPower[m, steps]
Out[84] = {0.25, 0.25, 0., 0.25, 0., 0., 0., 0.25, 0., 0.}
```

上は確率。RTを見た人を、この確率で決める。

```
In[85]:= Map[If[RandomReal[] < #, 1, 0] &, result]
Out[85] = {0, 0, 1, 0, 0, 0, 0, 0, 0, 0}
```

RTを見た人の数。

```
In[86]:= Total[%]
Out[86] = 1
```

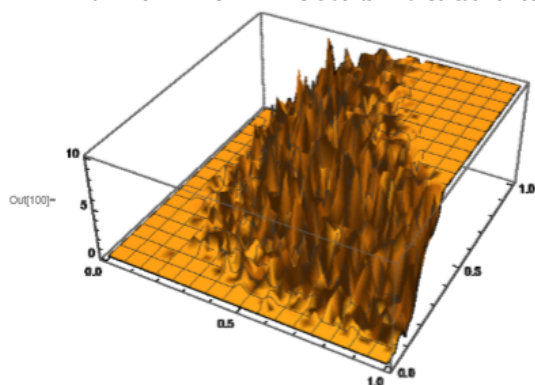
以上を一つにまとめる。

```
In[87]:= simulate[n_, p_, q_, steps_] := Module[{graph, state, result},
  graph = RandomGraph[{n, IntegerPart[n (n - 1) p]}, DirectedEdges -> True];
  m = q AdjacencyMatrix[graph];
  state = Table[0, n];
  state[[1]] = 1;
  result = state.MatrixPower[m, steps];
  Total[Map[If[RandomReal[] < #, 1, 0] &, result]]]
```

図 5.2 シミュレーションのルール

パラメータを決めてシミュレーションを行う [3] .

```
n = 10;  
p = 0.2;  
q = 0.5;  
steps = 2;  
simulate[n, p, q, steps]  
  
Out[89]= 1  
  
pとqを動かして, 何人がRTになるかを可視化する。  
  
In[99]:= n = 10;  
steps = 2; Plot3D[simulate[n, p, q, steps], {p, 0, 1}, {q, 0, 1}]
```



パラメータを変えてみる。

```
In[96]:= n = 50;  
p = 0.1;  
q = 0.1;  
steps = 2;  
Plot3D[simulate[n, p, q, steps], {p, 0, 1}, {q, 0, 1}]
```

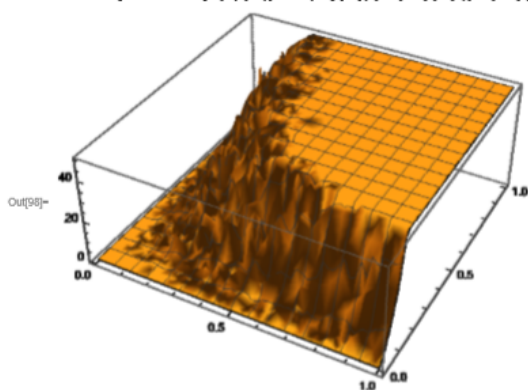


図 5.3 シュミレーションの結果

5.3 ツイート数の分布

5.3.1 ツイート数分布算出の準備

この <http://blog.unfindable.net/archives/4257>[4] の方法で Streaming データを集め、<http://blog.unfindable.net/archives/4302>[5] の方法で集めたデータを処理する。ただし、処理する際に、1 日あたりのツイート数とユーザー名にフォロー、フォロワー数を取り出すために、図を使う。こうしてできたファイルを tweetsperday.csv とする。サンプルの一部が次のページの通りである。

```
1 # -*- coding: utf-8 -*-
2
3 import sys, json, time, datetime, calendar
4 from pprint import pprint
5
6 def daysBetween(timeFrom, timeTo):
7     timeF = datetime.datetime.strptime(timeFrom, '%a %b %d %H:%M:%S +0000 %Y')
8     timeT = datetime.datetime.strptime(timeTo, '%a %b %d %H:%M:%S +0000 %Y')
9     return int((timeT - timeF).total_seconds() / (24 * 60 * 60))
10
11 users = set([])
12
13 print('screenname,daytweets,friends,followers')
14 for line in sys.stdin:
15     try:
16         tweet = json.loads(line)
17         # pprint(tweet)
18         if 'retweeted_status' not in tweet:
19             id = tweet['user']['id_str']
20             if id not in users:
21                 users.add(id)
22                 screenName = tweet['user']['screen_name']
23                 statuses = tweet['user']['statuses_count']
24                 tweetTime = tweet['created_at']
25                 accountBitrhday = tweet['user']['created_at']
26                 days = daysBetween(accountBitrhday, tweetTime)
27                 text = tweet['text'].encode('utf-8')
28                 friends = tweet['user']['friends_count']
29                 followers = tweet['user']['followers_count']
30                 print('{}',{},{},{},{}'.format(screenName, 1.0 * statuses / days, friends, followers))
31     except:
32         pass
```

図 5.4 データの処理

screenname,daytweets,friends,followers
 Ashiya_Soushitu,12.092846270928463,4,7
 oitakanesumu,18.7447216890595,353,61
 Kuma_Junior_82,6.317073170731708,90,91
 DesIsTheBest,11.74535519125683,453,328
 h1h1hs,4.030487804878049,143,66
 BeatrixzAna,25.191176470588236,282,563
 whosgc,17.831987075928918,851,1567
 R_F_511,13.82857142857143,82,145
 35__ys,7.571428571428571,343,345
 hiro_MtF,35.23131672597865,137,197
 USA_Knights,2.8467065868263473,40,100
 rsbumper3817,13.840909090909092,181,53
 wadawyju,199.0,96,119
 chipon_e,14.802083333333334,29,50
 DarrenProtacio,28.615326821938392,189,283
 kcczand,3.0258899676375406,2172,1448
 aaaa__2014,13.042776998597475,1285,834
 BiancaWestfall,6.037563451776649,1137,743
 Ze_Fernandu,2.383624272651704,349,406
 siddl369,24.79121338912134,1976,761
 ylaah_souza,30.864978902953588,1141,1737
 AlbaYCM,11.948501872659175,2658,2147
 midnightzonee,0.9648351648351648,657,240
 annefitzpatrick,1.8905132192846035,615,236
 AmeerteeAna,13.756137479541735,1,15
 juuzinhah_s2,0.10326086956521739,38,44
 ChrisVelezPlus,52.4,11,5
 BrianBrownNet,553.9084905660377,171,5067
 GensenKankoku,6.7108742004264395,436,2793
 souseix5,18.756924816280385,11,24
 kumazel,7.235838150289017,114,58
 RiNkAkinnnn,0.5043859649122807,103,56
 bintangbete,26.38351254480287,546,56821
 heyitsdinds,25.41025641025641,52,69
 terriesamundra,0.1950286806883365,947,472
 Aaron_Peters0n,10.808259587020649,1138,810
 alasalahtours,3.764336917562724,1,7
 Futaba053Kara,8.189677419354839,487,110

insuportavel_17,10.382995319812792,1109,576
_OnceYouGoBlack,80.74153074027603,981,1289
MuhammadAAAlHel1,196.57142857142858,937,676
matsuko10171,9.817047817047817,184,213
endlesslyJY,17.42967032967033,125,18
KendraAgnew,5.884017758046615,142,198
paradisxjimin,39.1300539083558,379,2900
JJ_1798,935.0,113,4
sayaka7100,4.653465346534653,31,36
beeftango,3.05530253741054,169,80
guilhermevolp3,12.694728560188828,166,330
sa_emptyhead,78.89795918367346,198,174
sourcreamon,0.2385411532774766,210,195
karsyn_leonard,4.935515388373229,16,30
KalpSoldanAtar,5.571367703451214,4065,3863
CoachGibson5,4.936305732484076,805,409
illicitum,28.765865195112337,288,621
SteelCity4L,16.823093220338983,1587,516
nitanviudo,3.09628302731751,1743,5337
PeninsulaClima,73.31270903010034,75,96
16Marquess,2.4214775938635444,85,101
frcstbitx,48.49033149171271,1177,1286
0703Kumit,41.41530054644809,514,520
bondinsulin,6.880434782608695,106,105
sakachi8,22.725247524752476,497,424
pol_pot_bot,46.300840336134456,219,184
tom6957,33.232142857142854,185,417
Noir_korpokkur,17.671763175016267,80,178
ugkjunior,0.5454545454545454,27,5
gangaf1,7.346099290780142,273,78
e_gamerr,0.22340425531914893,10,1
mickeey_17,7.3029818956336525,303,490
daism,19.24265300620113,34,211
Habs4Stanley,6.11864406779661,422,481
derek_skillet,8.630825838103025,717,289
LoudTweet39,343.07421875,147,100
RamSports,2.8086763070077865,329,2621
Eduardadns,26.720073664825048,608,1037
nkazumasa,8.778591352859136,415,349
DQueen1712,2.823586744639376,1159,421

27elqf8dpl7o7k5,0.03125,0,0
 iamjundy,3.2932604735883424,156,180
 St_Kaede_bot,21.83728813559322,1,7
 KNMCLOVI18,95.44640998959417,2,33
 Kboo4649,0.26153846153846155,0,0
 BABYTOBH,88.36538461538461,336,281
 imporgs,31.703703703703702,99,14
 ya_oto_me_8,9.661764705882353,17,17
 nano_benegassss,6.424751718869366,647,967
 Ibrahim_Madyan,0.5680131904369332,163,125
 whymaxwhy2,0.4663951120162933,172,78
 ThugaaaC,41.69704433497537,3914,4826
 emilyd_wilkes,0.5417485265225933,129,37
 inditimesofnews,282.2457912457912,108,42
 akosisyd,4.02589641434263,87,132
 I_am_phsyco,5.182926829268292,1455,908
 KikaReyes05,0.2991788646911817,314,150
 JSchipperWDRB,0.7310664605873262,193,508
 invincibles_10,22.345864661654137,1275,3248
 exsdaioh,77.3359127682026,611,399
 0awuu1JoYbtwPP6,6.088050314465409,149,370
 poyopoyokunni,33.1968085106383,174,123
 tf2536,4.027484143763213,165,127
 W_R_R,38.7582679849983,2009,1591
 surajdadra,0.9796320630749015,936,120
 non_cosplay_819,4.434782608695652,153,142
 DeathByDropkick,50.082135523613964,4877,3023
 karimalbert__,4.206896551724138,34,32
 MaroshAlm,11.501940491591203,40,24
 mila3100,75.31364275668074,99,369
 nicolasnacho80,7.212281415209435,211,280
 2000sANDbeyond,0.052821997105643996,221,21
 maduraiveeran86,0.1587753648985404,175,42
 vick_botelho_,12.940751445086706,619,700
 korpuskula777,0.26081657525898844,0,3
 kthIovbot,103.52380952380952,189,659
 DanStrafford,16.406056860321385,927,5605
 stenneshasmith1,5.310344827586207,1020,441
 TheRealNZone,1.800428418421992,262,2248
 LaPajamasNC,33.18034447821682,3092,1184

ggbebe9500,24.56875,74,1702
 jaydenx1997,29.620645161290323,353,580
 MaLu_____,30.2262118491921,533,977
 fijiru,38.23113810741688,793,1169
 Fabiossjr18,46.55072463768116,597,501
 coraletoile,5.258196721311475,298,98
 abdalgo,13.127698951264652,91,58
 karudie_,27.84607745779543,14,14
 ggschampion,28.979174020472996,690,461
 TannerBanter,0.8994082840236687,197,34
 Doctor_Shaw,22.75623491552695,964,2970
 ____ood__9,47.904761904761905,273,363
 vhobi93,137.6496062992126,143,208
 doughamann,0.9042316258351893,265,31
 caskeyy,6.336520076481835,442,335
 yuka_shiki,20.35421449655625,448,979
 Yamil1110,0.03330161750713606,65,0
 zen_muuta,26.815170008718397,220,143
 Veanord,8.869596031183558,630,129
 therealscottj,5.031986531986532,798,334
 offrigovnen1975,2.3333333333333335,66,0
 Tammysdragonfly,674.1442379182156,134169,141993
 MBrBahia,523.7466666666667,2125,54
 rinayusri_,2.2290697674418603,36,90
 m08_rs,46.22609208972845,568,920
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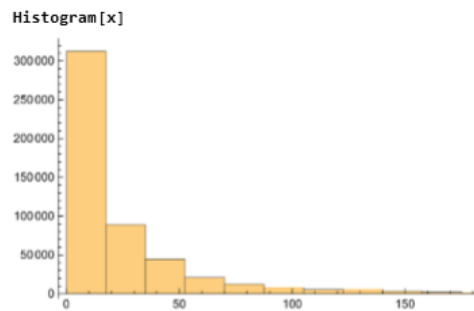
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5.3.2 確率分布

```
data = Rest[Import["C:/vagrant/machine/streaming/tweetsperday.csv"]]; Length[data] 511
649
```

```
x=#[[2]]&/@data;
Histogram[x]
```



よくつぶやく人のツイートはよく観測されるはずだから、その分の補正をしなければならない。観測される確率を、(1/つぶやく確率)とすればいいだろう。

```
y = {#, 1 / #} & /@ x;
```

10刻みで集計する。(15とかにしても結果はほとんど変わらない。)

```
alpha = 10;
```

```
result = GroupBy[y, IntegerPart[First[#] / alpha] &];
```

```
result[100]
```

```
{ {1004., 0.000996011}, {1007.65, 0.000992412},
  {1006.5, 0.000993538}, {1000.82, 0.000999177},
  {1005.57, 0.000994465}, {1005.95, 0.000994082}, {1003., 0.000997009},
  {1008.8, 0.000991273}, {1009.91, 0.000990184}, {1007.5, 0.000992556} }
```

```
keys = Sort[Keys[result]]
```

```
{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24,
  25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45,
  46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66,
  67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87,
  88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106,
  107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 121, 122, 123, 124,
  125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141,
  142, 143, 144, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159,
  160, 161, 162, 163, 164, 165, 166, 167, 169, 171, 172, 174, 176, 178, 179, 180,
  181, 182, 183, 184, 185, 186, 187, 189, 191, 192, 193, 194, 195, 196, 197, 199,
  201, 202, 203, 205, 207, 208, 209, 210, 212, 215, 222, 226, 228, 230, 235, 243,
  246, 248, 255, 258, 263, 275, 284, 297, 302, 313, 314, 315, 331, 390, 671, 1751}
```

図 5.5 1 日あたりのツイート数のヒストグラム

```
hist = {alpha #, Total[#[2] & /@result[#]]} & /@keys; ListPlot[hist]
```

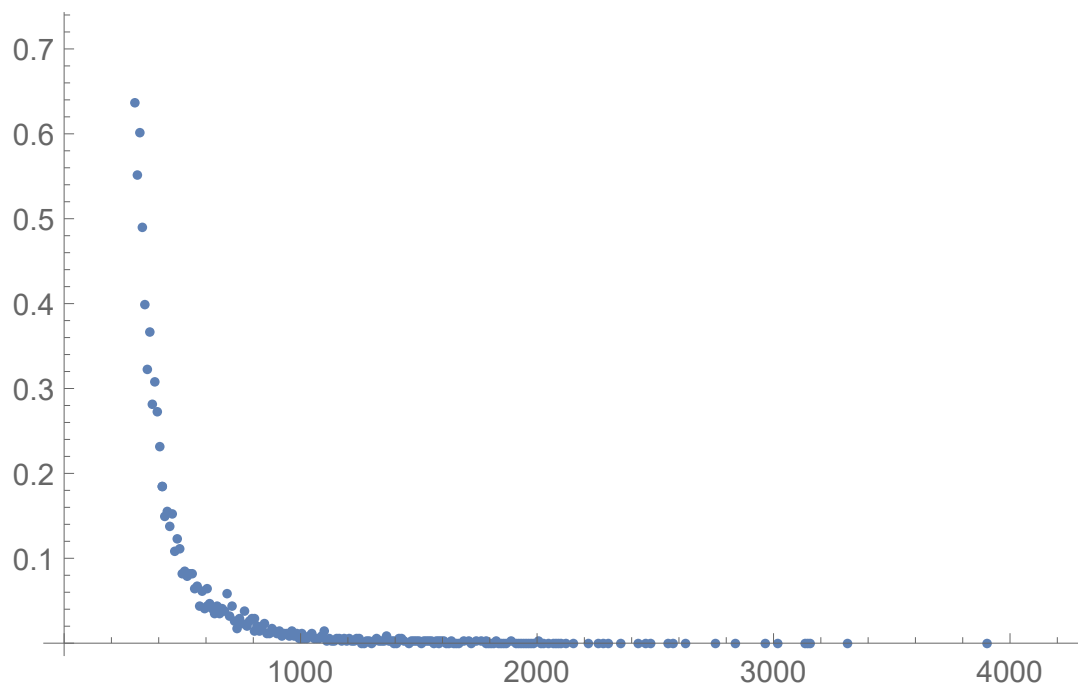


図 5.6 1日のツイート数に対する割合

これに合う関数を求める。

FindFormula[hist, t]

$$1.34259 \times 10^6 - \frac{1.34254 \times 10^6}{(1. + 2.7^{-1. (-1. + t)})^1.}$$

$1/(1+\text{Exp}[t-1])$ ということである。全確率を1にするために、積積分する。

Integrate[1 / (1 + Exp[t - 1]), {t, 0, Infinity}]

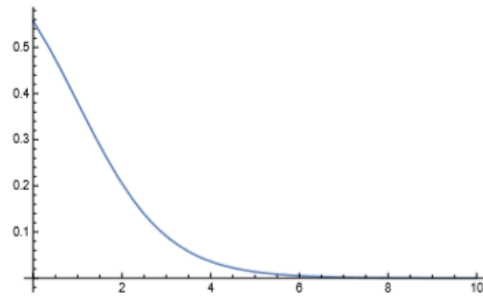
Log[1 + e]

というわけで、1日あたりt回ツイートする人の割合は、

$1/1/(1+\text{Exp}[t-1])/\text{Log}[1+E]$ ということである。

p[t_] := 1 / 1 / (1 + Exp[t - 1]) / Log[1 + E]

Plot[p[t], {t, 0, 10}]



1日あたりのツイート数の平均は

Integrate[t p[t], {t, 0, Infinity}]

$$\frac{3 + \pi^2 + 6 \text{PolyLog}\left[2, -\frac{1}{e}\right]}{6 \text{Log}[1 + e]}$$

図 5.7 t 回のツイートする人のグラフ

% // N 1.37542

第 6 章

結果

Twitter ユーザ 50 万人分のデータを使って、1 日あたりのツイート数の確率分布を描くと図 6.1 のようになる。これによくフィットする関数を探索すると $C/(1 + \exp(t - 1))$ (C は定数) であった。全確率が 1 になるように $C = 1/\log(1 + e)$ とし、ツイート数の期待値を求めると約 1.38 となった。またグループ構築にランダムグラフを使ったツイート拡散のシミュレート手法も確立できた。しかし 1 日あたりの RT 数の分布と 1 ユーザのフォロー人数の平均が出せなかったため現実的なシミュレーションを行うことはできなかった。

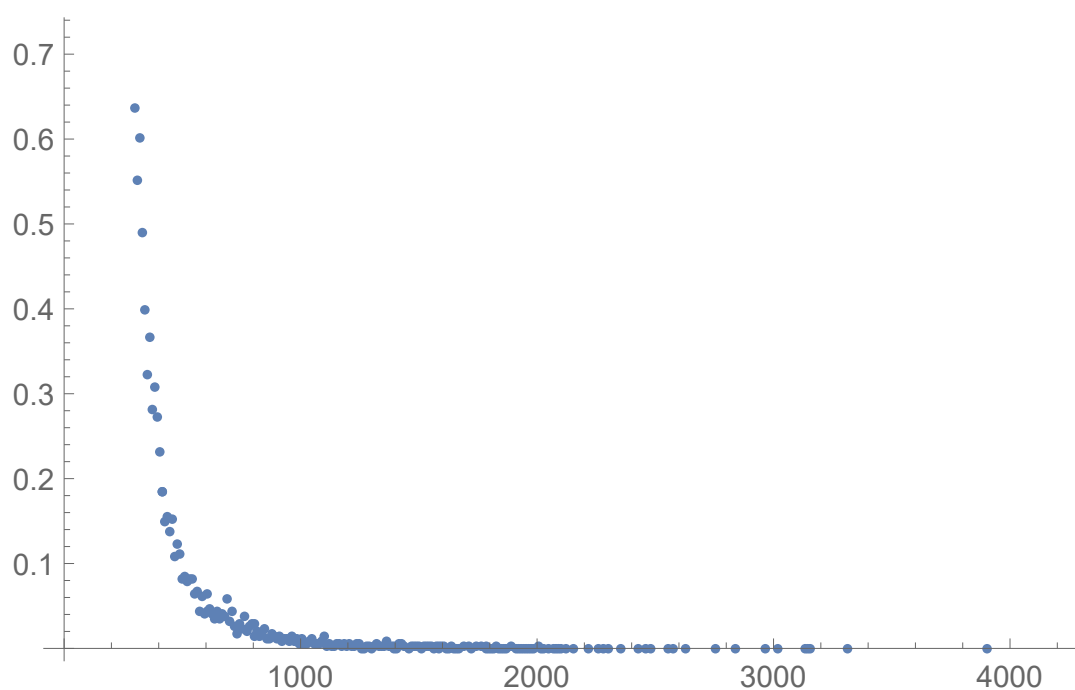


図 6.1 1 日のツイート数に対する割合

第 7 章

考察

10 人でのシミュレーションのメンバ全てがツイートを確認できるようになるのは互いに繋がってる確率が 0.5 で RT する確率が 0.6 のときである。この場合メンバ内のユーザーにはフォローしている人間は 5 人で、特定のツイートがそのユーザーに RT された場合その中で 3 人の人間が RT をすると考えられる。

第 8 章

結論

本研究では、1 日のツイート数の分布とツイート拡散のシュミレートをする手法の確立を行った。その結果 1 日のツイート数の分布確認、ツイートの拡散シュミレートの手法の確立が行えた。この結果に 1 日あたりの RT 数の分布と 1 ユーザのフォロワー人数の平均が取得できれば現実に近いシミュレーションを行うことが期待できる。

参考文献

- [1] アルバート＝ラズロ・バラバシ. 新ネットワーク思考. NHK 出版, 2002.
- [2] グイド・カルダレリミケーレ・カタンツァロ. ネットワーク科学. 丸善出版, 2015.
- [3] 増田直紀. 私たちはどうつながっているのか. 中公新書, 2007.
- [4] 矢吹太郎. Streaming api で大量のつぶやきをリアルタイムに保存する方法 (python 編).
<http://blog.unfindable.net/archives/4257> (2018.01.15 閲覧).
- [5] 矢吹太郎. Streaming api で取得したつぶやきの処理方法. <http://blog.unfindable.net/archives/4302> (2018.01.15 閲覧).

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