

How Close a Bataknese One Another?

Study of Indonesian Batak's Family Tree

Hokky Situngkir
[hs@compsoc.bandungfe.net]
Dept. Computational Sociology
Bandung Fe Institute – Indonesia

Abstract

The paper conjectures some alternative acquisitions of mathematical models to see the Batak family tree that could enrich our understanding of the anthropological study of Bataknese people. We discuss some aspects of Bataknese Clan-group in Batak traditional social life. Since the family tree is drawn according to the genealogical patterns of degrees relative to the first Batak in northern Sumatera, the paper discusses interesting features of Malthusian growth rate. The latter discussions is about the relatedness of a clan-group of Bataknese one another as reflected in the family tree by observing the topology of the web. The conjectures for future development is also drawn.

Keywords: family tree, batak, customary law, scale-free network.

1. Introduction

More than ten millions Indonesian people is in the set of Batak ethnic groups. The modern Bataknese is spreading over the archipelago as shown in Figure 1 while most of them are concentrated in the large island of Sumatera neighboring and living closely with Malay, Acehnese (concentrated in north), Nias (concentrated in Nias Island in the East), and Padangnese (concentrated in south) since the very first identified as Batak people until now.

Indonesian Batak people are well known for keeping their "*marga*", a surname reflecting their group of clan. The study regarding to this issue mostly becomes the discourse of anthropology and among Bataknese when they are talking about traditional social law (*'adat'*). In fact, there are a lot of interesting things that we can learn from this traditional customs and how it emerges the face of the community of Indonesia Batak people even today. Batak's clan groups are rooted from the early genealogy of Bataknese habited the northern Sumatera at the place known as the Tapanuli. There are about six ethnicities can be regarded as Bataknese, *i.e.*: Batak Toba, Batak Karo, Batak Mandailing, Pakpak, Simalungun, and Angkola. The statistical proximities of the different languages among these ethnic groups along with other ethnic groups in Indonesia are discussed in Situngkir (2007). Nonetheless, an interesting thing in Bataknese is that they keep using the usage of the surname until now and still today a lot of debates are going on regarding to the genealogy of the clan groups (Sinaga, 1997). An interesting and similar data used related to sociological discussions but different theoretical conjectures is discussed in Bouquet (1996) while some biological theory conjectures of family trees related to the DNA is discussed in Serva (2004).



Figure 1

The cartogram showing the 30 regions in Indonesia resized regarding to the population fraction of Batak ethnic group. The lighter the color the more Bataknese in it.

The work presented here shows some insights that we can see from the social phenomena of this traditional Indonesian culture – as it has been theoretically discussed with broader theoretical perspective in Situngkir (2003 & 2004) – especially Bataknese. The paper raises some discussions on the major role of the clan group among Indonesian Bataknese and some certain traditions kept related to this aspect and then followed by some discussions related to the population of growth from the genealogy of the clans and thus followed by the discussions how Bataknese can be related one another concerning their clan groups. A lot of things can be learnt from this clan-tree of Bataknese as well as a lot more from the diverse ethnicities in the country.

2. About Bataknese and its Clan-Tree

Even further, they also have some certain way to calculate from the respective genealogy the number of the “*sundut*” – degree from “*Si Raja Batak*” – literally means the “king of batak”. However the label “king” here cannot be regarded equivalent with other Indonesian ethnic group using the same word (“*raja*”) as for political power, but merely a name of honor attached to him by all Batak people as his descendants (cf. Sinaga, 1997:42). Figure 2 shows the groupings of the Batak clan groups, while the surname (the “*marga*”) represents who the respective ancestor is. It is worth noting that the genealogy depicted here is a patrilineal, thus the names of the mothers are not yet to be counted on in the construction of clan groupings. There are however, some ancestors were practicing polygamy or married other woman after the previous one passed away – yet sons are treated as the same. Consequently to the practice of this patriarchy, Bataknese female who marries (‘*martondong*’) is recognized to be the part of the male’s family lines – a practice that also become the different social positions between male and female among Bataknese.

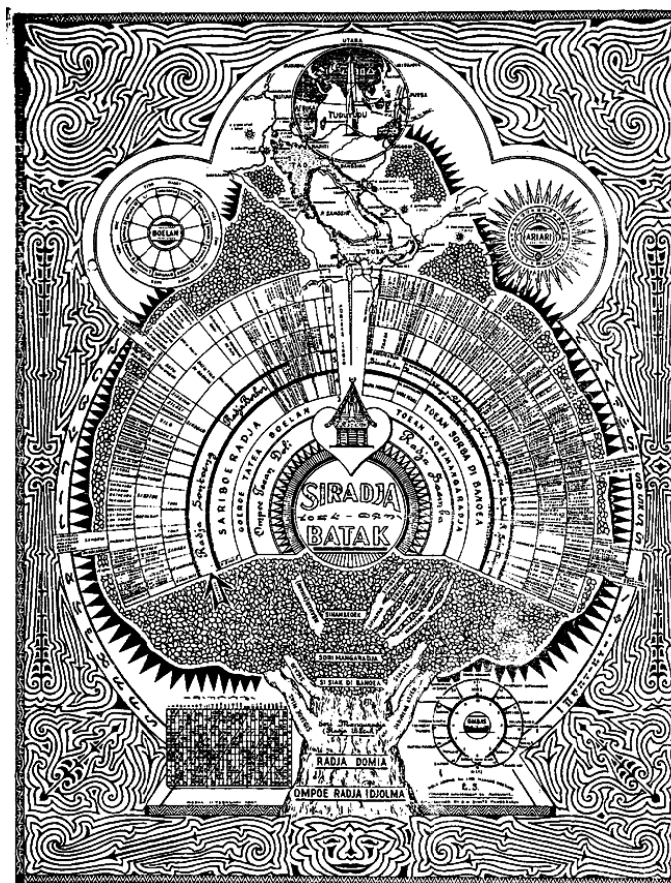


Figure 2
A Chart Depicting Bataknese Clan Tree

Figure 2 shows us the lineages of Batak clan groups from the first Batakese in the center, who has two noted children that became the source of the clans or “*marga*”, i.e.: *Guru Tateabulan* and *Raja Isumbaon*. The names of clan taken from the name of the old times Batak people are not from the same generations – furthermore there are stories, legends, or folklores on each names of Batak people that become the names of clan. The names of clans labeled from the Batakese forefathers from 6th upto 9th generations from the *Si Raja Batak*. There are some versions of this clan-genealogical tree as a matter of fact, regarding to some customary law related things, like who is the oldest clan group in the same siblings, etc. Nonetheless, in some cases there are similarities at least in the earlier generations from the *Si Raja Batak*. We use the *tarombo* as drawn in figure 2 that note the web of the *clans* upto 8th generation (‘*sundut*’).

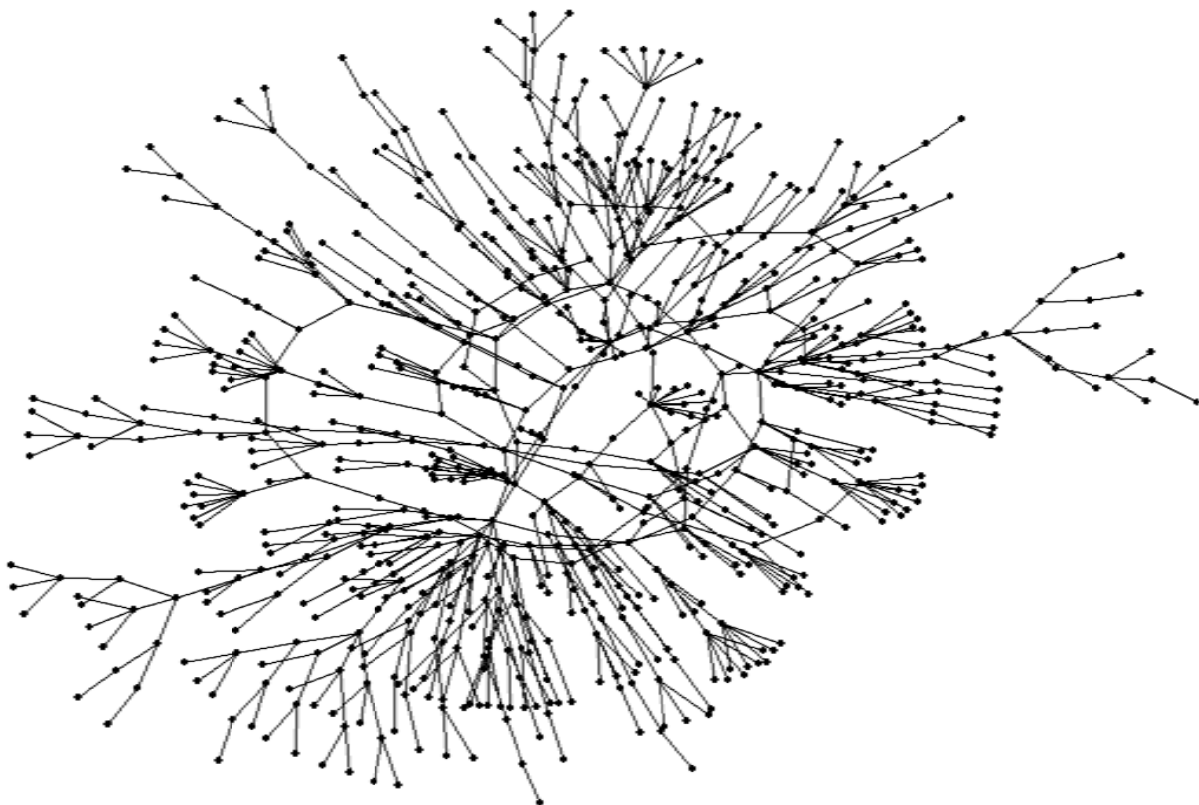


Figure 3

Transformation of the Batakese Family-Tree into Graph-Theoretical Topological Web

It is interesting to see that the existence of surname plays a major role in social interactions and relationship among Batakese people wherever they are until now. The *marga* or clan reflects the social identities and affinities that would be very important when we talk about mating and marriage among Batakese, family living, and a lot more things related to the traditional customs and intra-ethnic social relationship. The importance of clan groups among Batak people permeates the completely social life regarding to the customary law of Batak. Furthermore, since the discourse is about the family line, marriage becomes an important things the way Batak keeps the clan groupings. For instance, the male from the same with female from the same clan (or groups) cannot get married and there is a kind of tendency for male to get take female from the same clan group of his mother as wife (‘*pariban*’).

A very fundamental customary law in Batakese people is called *Dalihan Na Tolu*, a customary rule for social living and status related to the affinity-relationship of, to, and from marriage among Batakese. The *Dalihan Na Tolu* is the three basic laws among Batak people, *i.e.*:

1. “*The Somba Hula-hula*” (pay respect to the family of the wife’s parents and the related clan),
2. “*Elek Marboru*” (be kind to the family of son-in-law and the related clan), and
3. “*Manat Mardongan Tubu*” (keep the warm brotherhood from the same and related clan).

Vergowen (1964) discusses this in detail. Yet, what we want to show here is that the name of clan attached as the family name among Batakese is essential to Indonesian Batak people. When a Batakese meets another Batak, they will introduce themselves by using their surnames. Afterwards, they would have found the connections between them, be it as “*hula-hula*” or “*boru*” (the same clan with in-laws), “*dongan tubu*” or “*dongan sabutuha*” (the same clan or group of one). This interesting features of Batak has given an interesting questions, how a clan group really connected to another by using the network model shown in the next section of the paper.

3. Some Insights from Batakese Clan-Tree

From our understanding on Batakese clan, we would like to discuss some interesting aspects related to the growth of the earliest Batak people from *Si Raja Batak* to the 8th generations. We transform the chart in figure 2 into the one showed in figure 3. From this transformation we discover interesting facts about the relatedness of a clan to another by using the *tarombo*.

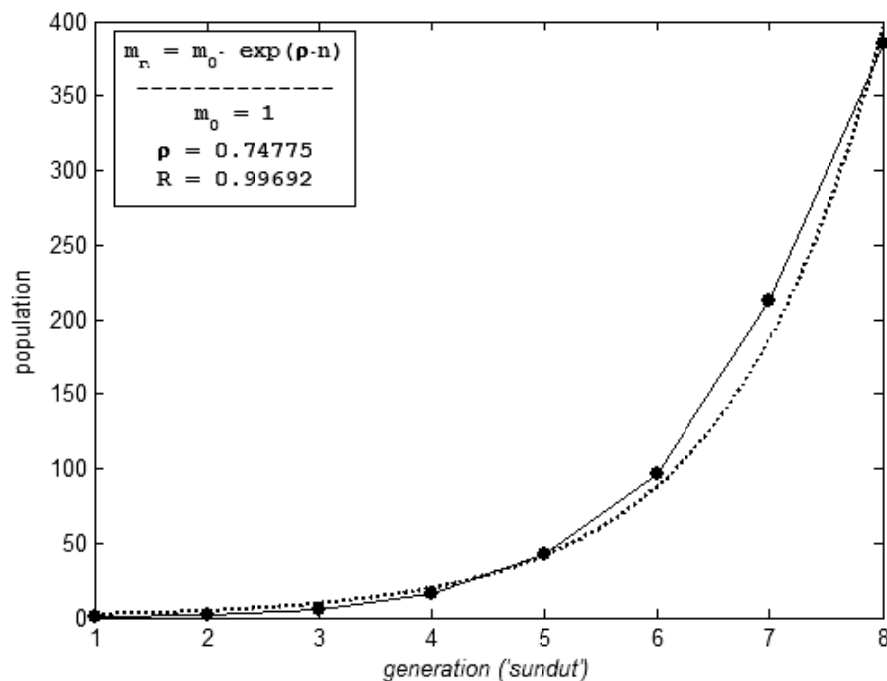


Figure 4
The exponential rate of population growth in Batak Family Tree

Batak Clan from the first generation to the eighth

Campos & de Oliveira (2003) discussed an evolutionary model related to the growth of population emerging the scale-free behavior that follows the Malthusian growth. A Malthusian growth can only occurred when there is no constraint of carrying capacity of the natural

environment. We plot the growth of the numbers of noted names in the *tarombo* and interestingly find a sort of Malthusian growth rate (of man, since the family tree does not contain the names of the woman at the respective generation) of

$$m_n = m_0 \exp(\rho n) \quad (1)$$

where m_n denotes the name in the n -th generation (“*sundut*”) and ρ denotes the growth rate. This is showed in figure 4. The exponential rate happens to be in Malthusian simple model is understandable for at the estimated year of earlier Batakese is in 1200s (Sinaga, 1997) where natural capacity was not a really matter for population growth in northern Sumatera.

Closeness Among Batakese Clan

The *Tarombo* can be seen as directed graph of $G(V, E)$, where the names of the individuals (most of them become the names of Batakese clans) are represented by the vertices (V) of the tree that can be regarded as a family-web and the edges (E). In our visualization, however, we can present the graph in the directed network which arrows showing the directions of fathers to sons for the nature of patrilineal Batak’s customs. In order to extract some interesting properties from the clan-genealogical tree, we employ the random graph concept by looking at the network as the set of N vertices that are connected each other with independent probability p . A similar problem has been pointed out by the seminal work on random graph related to the problem in mathematical genetics of Solomonoff & Rapoport (1951). Thus, the graph $G_{n,p}$ that according to Erdős & Rényi (1960) should exhibit the binomial degree distribution. The probability p_x that a randomly chosen node is connected to exactly x others can be written,

$$p_x = \binom{n}{x} p^x (1-p)^{n-x} \quad (2)$$

Thus,

$$p_x = \lim_{n \rightarrow \infty} \frac{n^x}{x!} \left(\frac{p}{1-p} \right)^x (1-p)^n \quad (3)$$

$$p_x \approx \frac{z^x \exp(-z)}{x!} \quad (4)$$

that is the so-called Poisson distribution. However, what we found in the clan-tree is not actually the Poisson distributed interconnectedness. As it is shown in figure 5, the degree distribution in Batakese clan-tree happens to be the fatter-tail of the power law,

$$p_x \sim x^\alpha \quad (5)$$

with exponent 3.0209 ($R=0.93787$)¹. The nature of this exponent is somehow different on some other networked systems we have seen before (*e.g.*: Situngkir, 2007) for the it’s value is > 3 . Reading the proof shown by Cohen & Havlin (2003), we can say that the diameter is not really ultrasmall².

¹ We use the standard Kolmogorov-Smirnov statistical test (Clauset, *et. al.*, 2007) and calculate the maximum-likelihood of the exponent of the power-law.

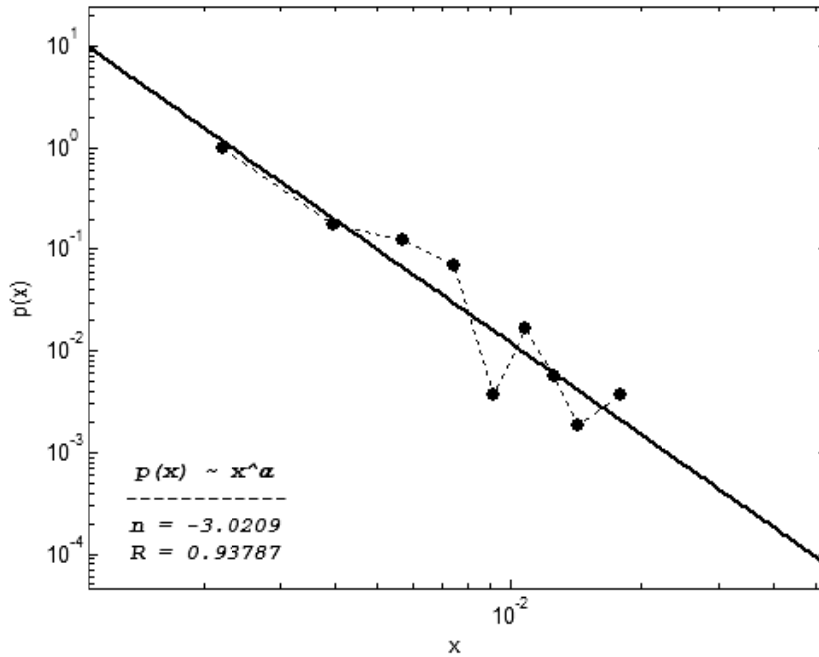


Figure 5
The degree distribution of Batakese clan network

The topology of the clan-tree can thus be regarded not-really a small-world topology. As it has also been depicted in Newman, *et. al.* (2001), we can do the simulation to see this in the nature of the generating functions. The clan network that is composed by large amount of N vertices can be constructed from the generating function

$$G_0(r) = \sum_{x=0}^{\infty} p_x r^x \quad (6)$$

where p_x is the probability function that a randomly chosen node in the graph has degree x . As the distribution supposedly can be normalized, thus $G_0(1) = 1$. As shown in Newman *et. al.* (2001), the probability p_x is given by the x -th derivative of G_0 ,

$$p_x = \frac{1}{x!} \left. \frac{d^x G_0}{dr^x} \right|_{r=0} \quad (7)$$

The diameter of the Batak clan-tree (the average minimum path length among nodes) as calculated by

$$d = \frac{1}{N} \sum_{j=1}^N \delta_{\min}(i, j) \quad (8)$$

² Ultrasmall diameter happens in the small-world topology of which $2 < \alpha < 3$ (Cohen & Havlin, 2003).

where $\delta(i, j) = \min(d_{ij})$ and d_{ij} is the minimum path-length between two nodes in the clan-tree, is $d = 9.4438$. The diameter of the generated web is smaller, approximately $d_{generated} \approx 3$. Interestingly, we can see that the exhibited scale-free does not represent a really close clans one another. This closeness could also be seen in the clustering coefficient that can be calculated as

$$C = \frac{1}{N} \sum_{i=1}^N C_i \quad (9)$$

where

$$C_i = \frac{1}{|\Gamma_i|} \left(\sum_{j=1}^N e_{ij} \left[\sum_{k \in \Gamma_i; j < k} e_{jk} \right] \right) \quad (10)$$

and

$$|\Gamma_i| = C(k_i, 2) = \frac{k_i(k_i - 1)}{2} \quad (11)$$

Our calculation shows that the general coefficient clustering is 0.0016 not very clustered network with the one we have from the simulation with the same graph generated before, $C \approx 0.012$.

The power law distribution in the Bataknesse clan-web shows the property of the topological properties of how the major “hubs” of the clan are closely followed by smaller ones and these smaller ones are also followed again with even the smaller ones showing the robust topology. As discussed in Barabasi (2003) this kind of topology has interesting properties of fault tolerant behavior. As it has been discussed in the beginning of the paper, there are sometimes debates among descendants about the positions of certain clan in the lines of the *tarombo*, the likelihood that a hub would be affected the macro properties of the system is unlikely. The acknowledgement of Bataknesse to the clan hubs are somehow becoming the key factor that made the network robust from time to time.

4. Concluding Remarks

We have discussed short anthropological features of Batak family tree or clan-genealogical tree and how it affects and is influenced by the traditional customary laws in social life, even until today’s modern life. The occurrence of Malthusian growth model is also found in the earliest Batak community for there is no significant environmental capacity problem at the time. Furthermore, we have shown the diameter of the *Tarombo Batak* (family tree) showing how closely related a clan to another. We found the scale-free behavior in the clan-web and see that even though there are some debates on the construction of family tree right now among Bataknesse, the robustness of the chart of the family tree is still persist for the general acknowledgement of the hubs – a property emerges from the topology of the scale-free network.

A lot of works can be directed from this work in modern anthropological approaches to genealogical tree. For instance, most of Bataknesse kept their family tree altogether rooted from the top to the bottom and analyzing the statistical properties of this can be useful to understand a lot of things related to this. Another work can also be conducted by computational simulations on how the fundamental of Batak traditional customary law would emerges such statistical properties. A more

comprehensive approach to enrich our understanding on anthropological works of complex Indonesian Batak people is open.

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