THE POLITICAL ROBUSTNESS IN INDONESIA

Evaluation on hierarchical taxonomy of legislative election results 1999 & 2004

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Abstract

The result of Indonesian legislative election 2004 is analyzed with certain comparative with the previous one (1999). This analysis is constructed by using the graph theoretical analysis by finding the Euclidean distances among political parties. The distances are then treated in ultrametric spaces by using the minimum spanning tree algorithm. By having the Indonesian hierarchical taxonomy model of political parties we show some patterns emerging the pattern agrees with the classical anthropological analysis of socio-political system in Indonesia. This fact accentuates a character of robustness in Indonesian political society as a self-organized system evolves to critical state. Some small perturbations i.e.: different voting process resulting the same pattern and occasions statistically, emerges from the social structure based upon political streams: Islamic, secular, traditional, and some complements of all.

Keywords: indonesia, election, robustness, democracy, political streams, ultrametric distance, portfolio.

1. The social identities in Indonesia

The politics in Indonesia was believed to be dependent on some major ideological streams anthropologically analyzed by Clifford Geertz (1960) and politically by Herbert Feith (1970) in Indonesia for the period 1945-1965. The fact was articulated even more clearly by showing the link between Indonesia cultural aspects with political thinking in Indonesia by Anderson (1990).

By using the terminologies used by Geertz (1960) and Feith (1970), we can summarize that some voter's political domain can be stated as (at the minimum) four ideological streams, i.e.:

→ nationalist or secular streams, supported by the nationalist power and the social group within relaxed and syncretic outlook of Javanese. Some of them are also socialists, libertarians, etc.

→ modernist moslem, came from some Islamic streams known as pious moslems; generally practice Islam in a more pure and orthodox way.

→ traditionalists, as the hybrid political stream. Most of them came from the eastern part of Java. They are living in Islamic way of life but with some certain openness with secular one.

→ the other political streams are some political power that cannot be traced to the other three. Most come from the political power like the Golongan Karya and other political streams like non-Moslem religions, religious nationalist, etc. Apparently, the terminologies presented above can be seen from the platform of the political parties or social organizations with their formal and informal networks.

Nonetheless, the partitions of social system politically were seen in the old time elections. There are certain changes occurred in the two previous general elections. Political strategies among people can be analyzed statistically as the aggregate product of individual actions guided by certain constraints, that can be the logic or the regularities and rules of field, the individual's current position defined by the volume and structure of accredited capital or resources she possesses, the structure of forces in social field (other individuals' possessions of different sorts of capital), and the individual's mental and bodily capabilities (Bourdieu, 1990: 64).

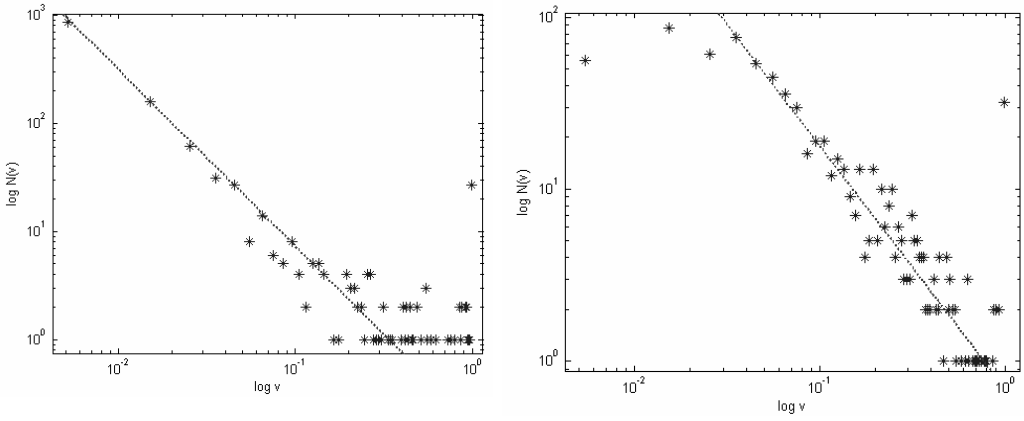


Figure 1
The power-law signature of Indonesian legislative election result 1999 and 2004.

In the previous work (Situngkir, 2004) we have showed how the social system evolves toward the critical self-organization by analyzing the statistical properties of the national elections in 1999 and 2004. The power-law signature of the general elections will be tried to be analyzed deeper by analyzing the political structures of the voters in Indonesia; why and how it occurs. There are some patterns, and the paper aims to explore some scale-invariant causes of the election results. We use method that has been used more familiarly in econophysics, i.e.: the Euclidean distances among parties based on their votes and find to describe the statistical situations into the ultrametric spaces by using the minimum spanning tree algorithm. Eventually, we will find out portfolio-like diagram evolves from 1999 to 2004 elections and that there happens the political robustness in the political structure of the voters (Mantegna & Stanley, 2000:105-12).

2. Visualizing political streams in ultra-metric space

We normalize the votes of each political party by the highest vote in each province from data of the election result held in 1999 and 2004. As it has been analyzed in Situngkir (2004), we built the histogram with a unique histogram showing the number of political parties, *N(v)*, that received certain fraction of votes, *v*. The log-log plot of both histograms show power-law signature as figured in figure 1. The election result shows that the data is fitted with power-law distribution, $N(v) \sim v^{-\alpha}$, $\alpha = 1.632$ and $\alpha = 1.41$, for 1999 and 2004 election respectively.

After the normalization, we find the cross-correlation among the party in each province to construct cross-correlation matrix. that shows the cross-correlation coefficient among party *i* with party *j*,

$$\rho_{ij} = \frac{\langle V_i V_j \rangle - \langle V_i \rangle \langle V_j \rangle}{\sqrt{\langle V_i^2 - \langle V_i \rangle^2 \rangle \langle V_j^2 - \langle V_j \rangle^2 \rangle}} \qquad (1)$$

V_i is the normalized votes of party i in each province and the angular brackets indicate the average of the votes. Here, we can have the correlation coefficient $\rho_{ij} = [-1..1]$, where

$$\rho_{ij} = \begin{cases} 1, \text{completely correlated} \\ 0, \text{uncorrelated} \\ -1, \text{completely anti correlated} \end{cases} \quad (2)$$

We will use the cross-correlation coefficient among parties by modificating the calculation of Euclidean distance among log-price difference (Mantegna & Stanley, 2000: 105-6) to extract the information hiding in the election result by calculating the distances among parties. By constructing the algebraic vectors on closely related parties, it was found out that the Euclidean distances (d_{ij}) among parties can be calculated as

$$d_{ij} = \sqrt{2(1-\rho_{ij})} \quad (3)$$

Fulfilling the properties of Euclidean distance, it should be held by properties

$$properties \rightarrow \begin{cases} d_{ij} = 0 \Leftrightarrow i = j \\ d_{ij} = d_{ji} \\ d_{ij} \leq d_{ik} + d_{kj} \end{cases} \quad (4)$$

As explained in (Mantegna & Stanley, 2000: 107, & Mantegna, 1999), in order to construct a hierarchical model of such complex system whose elements have Euclidean distances, we need to form taxonomy about the topological space of *n* objects. We do this by implicating the Minimum Spanning Tree (MST) Algorithm to the *n x n* distance matrix. MST is a concept of weighted graph of *n* objects in which a tree having *n-1* edges that minimize the sum of the edge distances. To do this, we resemble the distance matrix by applying the well-known Kruskal's algorithm. In this case, we can define tree as a connected graph without cycles with some properties, i.e.: there is one and only one path joining any two of its vertices, and that every one of its edges is a bridge. Thus, the MST is a weighted and connected graph having one (possibly more) the least total weight.

The MST technique aims to quantify spatial dot patterns by revealing hidden nearest-neighbor correlations, and the Kruskal's algorithm we use can be stated as follows:

```
begin

      do while (all vertex in the graph)
            Find the least edge in the graph;
            Mark it with any given color, e.g.: blue;
            Find the least unmarked (uncolored) edge in the graph
            that doesn't close a colored or blue circuit;
            Mark this edge red;
      end;

The blue edges form the desired minimum spanning tree;

end
```

The resulting matrix is specially known as description of political parties in an ultrametric space by physicists (Rammal, et. al., 1986).

In summary, the metric of the set of political parties $\boldsymbol{V}$ is given by the assignment of real number d_{ij}^{ult}, where d_{ij}^{ult} fulfils requirements of Euclidean properties (eq. 4) with additional requirement, i.e.:

$$d_{ij}^{ult} \leq \max(d_{ik}^{ult}, d_{kj}^{ult}) \qquad (5)$$

By using the algorithm above, we can have the matrix describing the relative closest parties with their neighborhoods for each year of election, 1999 and 2004. The result will be elaborated in the next section.

3. The result and analysis

We have the MST of the distances of Indonesian political parties as the result of election in 1999 and 2004, and discover how the parties clustered with certain patterns in the graph. Figure 1 shows the result of our simulation on the data of the General Election 1999. There have been 48 political parties joined the election where the citizens voted for depend on their appropriateness. It is believed that this is the first most democratic election Indonesia ever had after escaping from 32 years of dictatorship regime. The distance scale in the figure equals to the maximal distance between two successive political parties encountered when moving from a certain political party to the other over the shortest path of the MST connecting them (the number of the respective political party can be seen in the appendices).

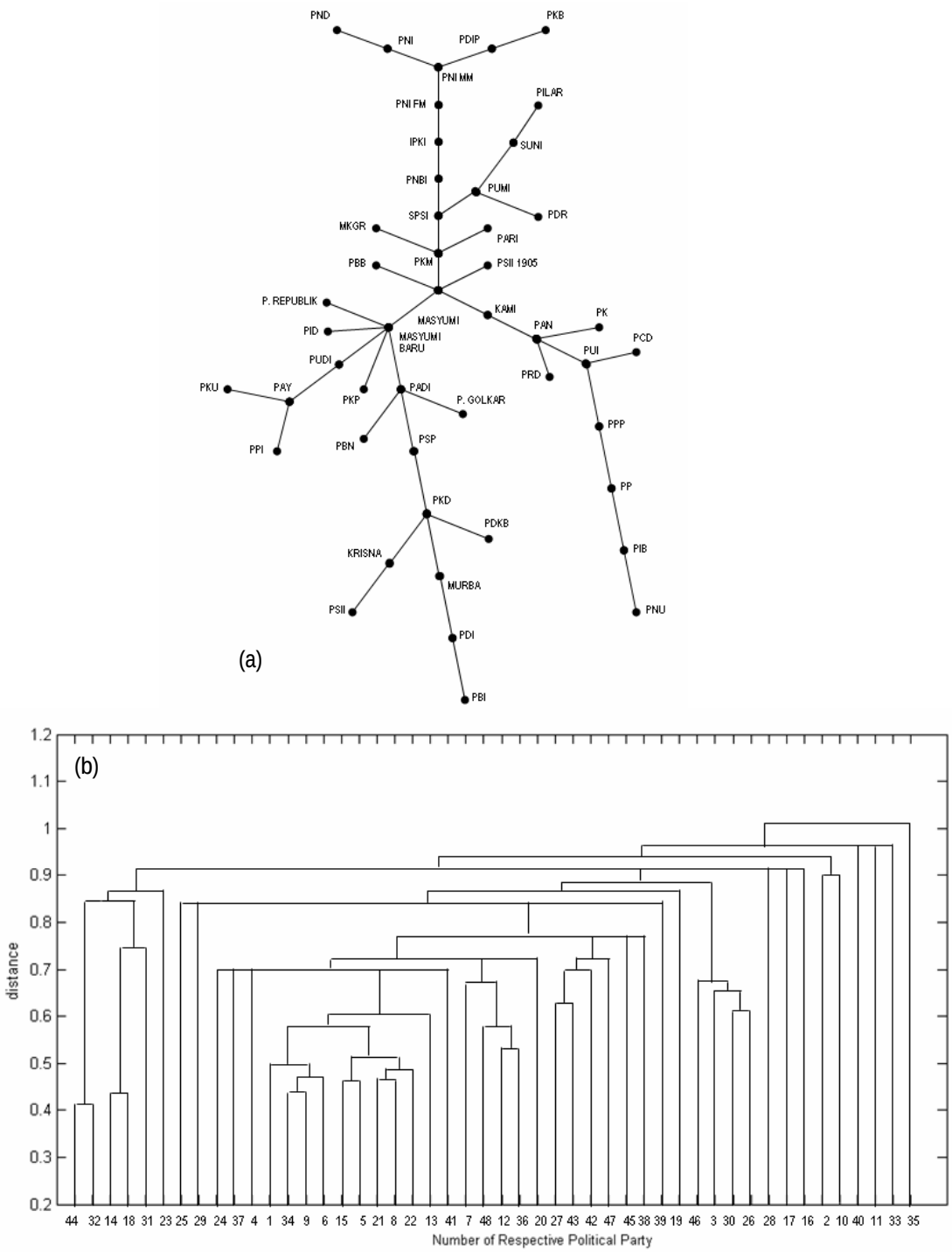


Figure 2
The structure of the MST of the result of the General Election 1999 *(a)*, and The distances among parties in ultrametric space *(b)*

The taxonomy presented here is associated with the subdominant ultrametric of certain political parties. It is a meaningful political tool since we can see how the structure of the gains of political parties regarding their voters. From the figure, we can see how most parties are closed enough while some other parties are separated apart. It is

also obvious that some parties are very close to each other since there is no major difference among them perceived by the voters. In general we can see that only three big parties are seemingly very different, and they are the big-three of the election winner, the PKB (National Awakening Party) supported by the massive Moslem-traditionalist social organization: *Nahdlatul Ulama*, the old regime inherited Golongan Karya Party, and the PDIP (Indonesian Democratic for Struggle Party).

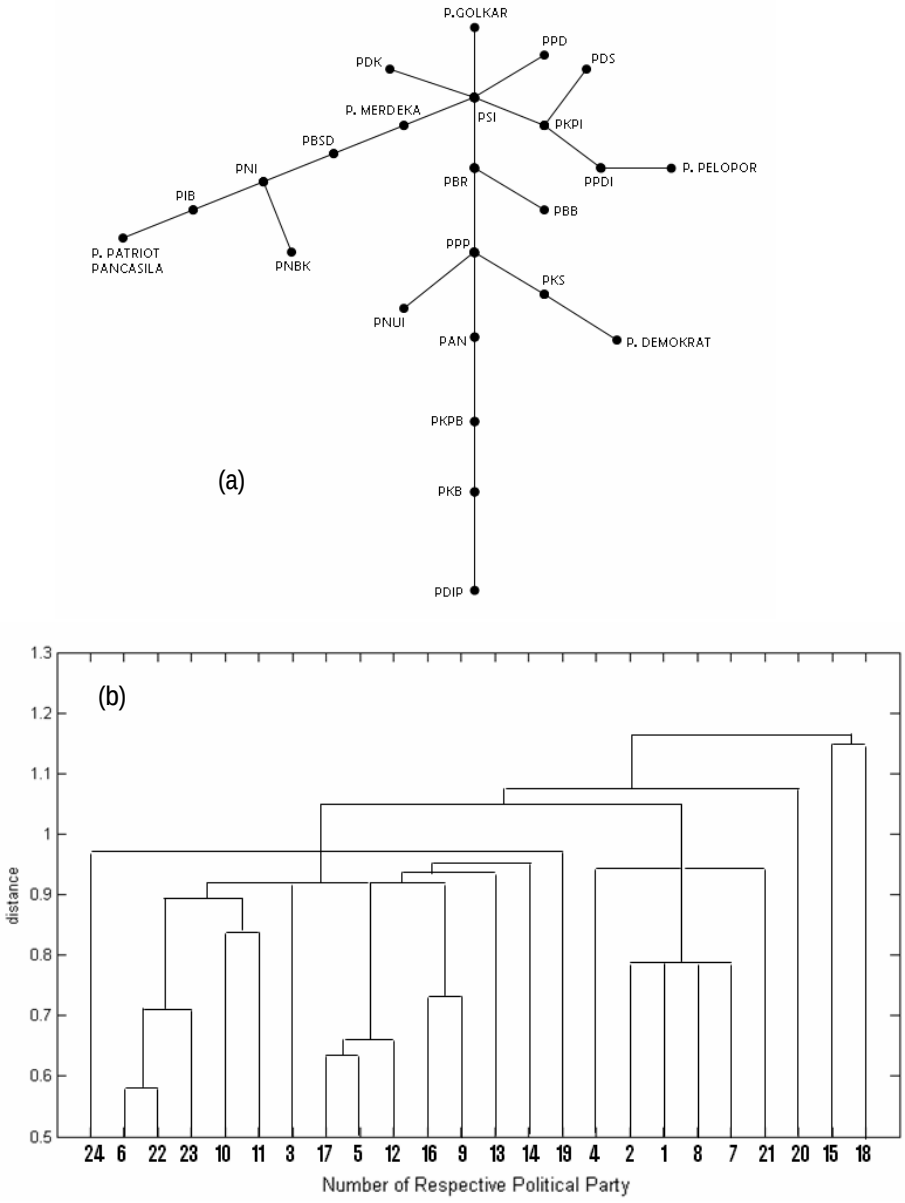


Figure 3
The structure of the MST of the result of the General Election 2004 *(a)*, and The distances among parties in ultrametric space *(b)*

Figure 3 shows the MST for the statistics of legislative election 2004. In 2004, the political reform has urged to change the rule of political system including the election system. The political system has changed to be the bicameralism system while General Election is held in order to let citizens choose directly the members of DPR (House of Representatives), DPRD I & II (city councils) and DPD (the Regional Representative Council). Directly is by means of choose not only from the collection of political parties but choose directly the individuals to be seated in certain political institutions. It is obvious that the election 2004 become a hope for a better political system in Indonesia.

Interestingly, compared to the previous one, the legislative election 2004 holds the similar pattern, i.e.: three big parties are very distant, Golongan Karya Party, The PDIP, and the PKB. This is contrast with the total result of votes on each party. In the general election 1999, the five biggest parties are the PDIP, Golongan Karya Party, the moslem-based old-regime inherited PPP (The United Development Party), PKB, and moslem-modernist PAN (National Mandate Party), while in the legislative election 2004, they are Golongan Karya Party, PDIP, PKB, PPP, and the newly Democratic Party.

One thing that we can summarize from here is that the three big parties, PDIP, Golongan Karya Party, and PKB are the strongest parties with nearly-constant voters. In the other hand, other big parties such as PPP and PAN joins the fight for votes with the other small parties since both does not place the same clusters in the taxonomy from 1999 to 2004. In 2004, PDIP can take good advantage for the network it has since placed the executive power in 1999. Golongan Karya Party gains advantage from the network it has since the old regime, although the social system has ever once judged them as the hands of old-regime. The most interesting phenomenon is PKB, since it only took advantage from their massive network where it based on, but surprisingly can gain better popularity in 2004 relative to 1999. This fact may indicate the strong grass-root and loyality of the voters to the party.

4. Some Discussions

It is important to note that the significant changes in voting rules of Indonesian election in 1999 and 2004 do not change the result of the elections. The legislative election is perceived not much different in 1999 and 2004. There is also a hypothesis that the focus of the election 2004 is in the president election; but this can impact many sociological propositional, e.g. the quality of understanding about democracy and parliamentary system.

There has been also interesting phenomenon, i.e.: the emergence of newly party, Democratic Party and the improvement of voters PKS (Prosperous Justice Party), an Islamic based on young voters. The Democratic Party cannot be affiliated to any dominant political stream or any massive social organization – many analysts assume that the party gain votes from the protest voters (voters who are not satisfied with the on going executive) and the raising popularity of the party's president candidate. In the other hand, the urban and campus based moslem modernist party, PKS, gained more voters than the previous election. Interestingly, we can see that in the election of 1999, PKS was clustered with some important Islamic parties, e.g. PAN, PPP, and moslem modernist party PBB (Crescent Star Party), but in the election 2004, they correlated with strongly with Democratic Party, but still clustered with other big moslem-modernist parties, e.g.: PAN, PBB, PPP and its separated fraction PBR (Reform Star Party). It is clearer that the popularity of Democratic Party is quite fragile since its lower ultrametric distance with moslem-modernist parties than where it should belongs to regarding political stream, nationalist or non-streaming political clusters.

Overall looking, we can see from figure 4, how the distribution of the ultrametric distances among parties evolve from 1999 to 2004.

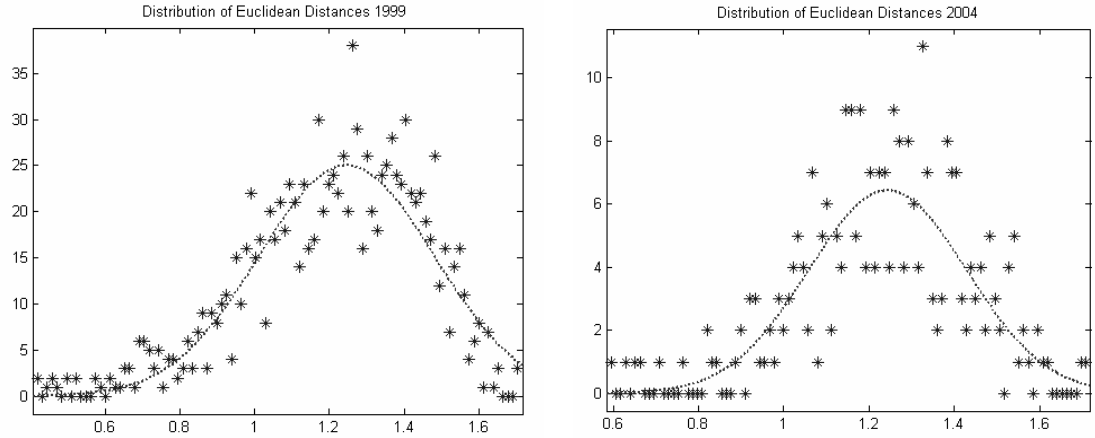


Figure 4
The distribution of the ultrametric distances among parties in 1999 and 2004.

The distribution in each year is obviously fitted with Gaussian with some changes in the coefficient. By the fitting equation,

$$f(x) \approx \exp\left(-\left(\frac{bx}{c}\right)^2\right) \qquad (6)$$

we have *b=1.246, c=0.332* for the election 1999 and *b=1.243, c=0.2629*. The highest density of parties separated with each other is varying mostly from zero to unity. There

are only several parties separated far enough from each other to become strong political fractions. These distributions are not quite different as also described in figure 5. This fact indicates that there are similar patterns on how citizens perceived decide in both the general elections.

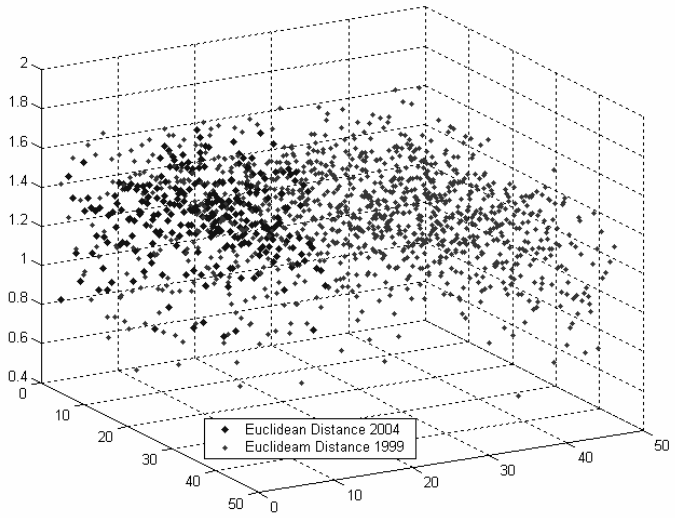
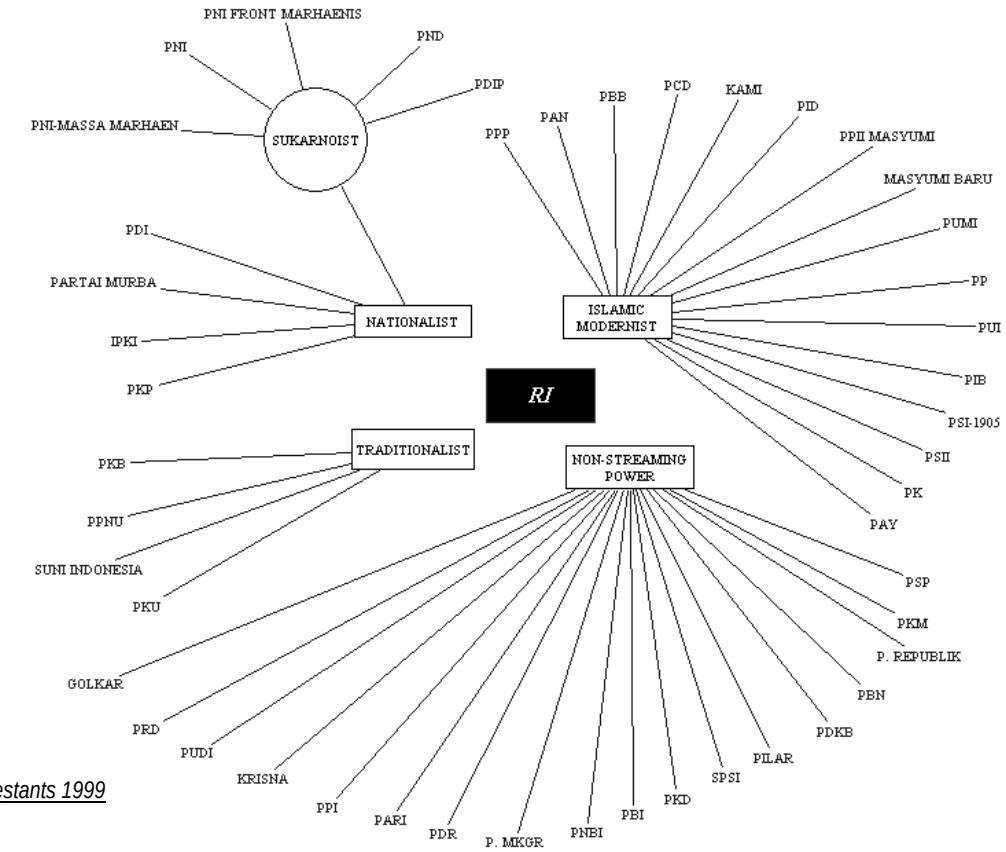


Figure 5
The spreading of Euclidean distances among parties 1999 and 2004.

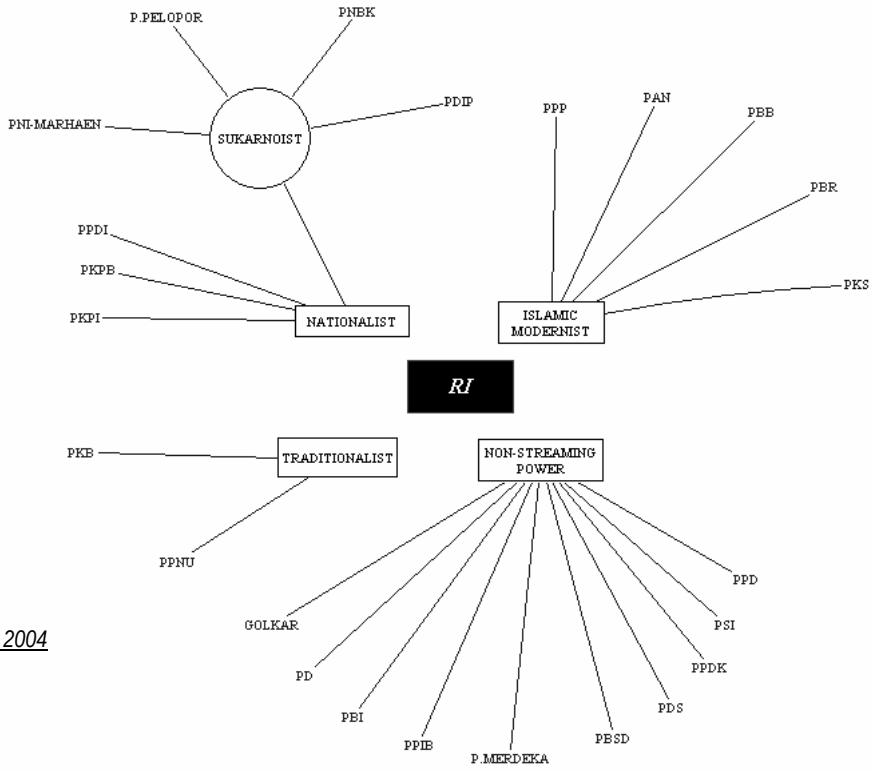
5. Actual Election Result compared with classical anthropological works

In the beginning of the paper, we have showed how the qualitative anthropological political segregation in aggregated political circumstances in Indonesia that made upon observation. The graph showing the clustering of the existing political parties is made intuitively based on classical works elaborated shortly above and some recent findings on political parties in 1999 and 2004.

From figure 2b and 3b, we can see how the votes of the political parties reflected the structural voter of each. Secular parties will tend to be clustered with the same political streams, moslem-modernists with the same streams, and so on. However, as has been described above, we can see that a few parties with certain political streams are not clustered with ones belongs to them. Hypothetically we can say that this happens since there is no straight ideological stream perceived by the voters – it is also quite possible, the votes for them came from swinging voters or any voters wrongly-perceived the political streams brought by.



Contestants 1999



Contestants 2004

Figure 6
Clusters of political parties in Indonesian Legislative Election 1999 and 2004 appropriated to classical anthropological analysis

Figure 6 shows how certain political parties are attached to the most likely political streams. It is obvious that by referring to our previous statistical ultrametric structural topography, we can see that there are at least four groups of socio-political clustering represented by the high distance ultrametric among them. The nationalist group is dominated by PDIP, the traditionalist by PKB, moslem-modernist by PPP jointly with PBR, PAN, PBB, and the big potential party PKS, while the non-streaming by Golongan Karya Party. As showed in previous sections, most of other parties are trying to gain votes from the highly networked social institutions circling related political parties. Intuitively, based upon this we can realize how the power-law signature appears in Indonesian general election, since only several parties dominate in several political streams and groups among plenty of available political parties.

6. Concluding Remarks

We have showed how methodologically we can have the hierarchical taxonomy of political parties in ultrametric space as a meaningful way to see the clustering of the parties. This can be an alternative on extracting the result of general election across the country as an important statistical property.

Eventually, we show also that the political streams figured out by the hierarchical taxonomy accentuate and is directly related to the anthropological analysis proposed many years before the election. Even further, the significant changes in the micro-stages of the election do not impact directly with the taxonomy – a signature of robustness of socio-political environment.

As an epilogue, several questions are left to the reader about the process reform and democratization in Indonesia. How robust are the circling social organizations relating to the demand of social transformations? If the social networks and social identities have huge influence on deciding the future of a nation, how can this concern with the political program brought by the candidates? It is for sure that we are now having a signal and symptom, that the work and struggle for democracy is about to begin by the democratic process and it is still a long journey to finish line.

Acknowledgement

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APPENDIX 1

The name and the number of political party in Indonesian General Election 1999

1	PIB
2	KRISNA
3	PNI
4	PADI
5	KAMI
6	PUI
7	PKU
8	MASYUMI BARU
9	PPP
10	PSII
11	PDI PERJUANGAN
12	PAY
13	PKM
14	PDKB
15	PAN
16	PRD
17	PSII 1905
18	PKD
19	PILAR
20	PARI
21	MASYUMI
22	PBB
23	PSP
24	PK
25	PNU
26	PNI FM
27	IPKI
28	P. REPUBLIK
29	PID
30	PNI MM
31	MURBA
32	PDI
33	GOLONGAN KARYA
34	PP
35	PKB
36	PUDI
37	PBN
38	MKGR
39	PDR
40	PCD
41	PKP
42	SPSI
43	PNBI
44	PBI
45	SUNI
46	PND
47	PUMI
48	PPI

APPENDIX 2

The name and the number of political party in Indonesian Legislative General Election 2004

1	PNI
2	PBSD
3	PBB
4	P.MERDEKA
5	PPP
6	PDK
7	PIB
8	PNBK
9	P.DEMOKRAT
10	PKPI
11	PPDI
12	PNUI
13	PAN
14	PKPB
15	PKB
16	PKS
17	PBR
18	PDIP
19	PDS
20	P.GOLONGAN KARYA
21	P.PAT.PANCASILA
22	PSI
23	P.PERS.DAERAH
24	P.PELOPOR