

# Pengenalan Pengelolaan dan Analisis Data

untuk peneliti, dosen, dan mahasiswa

@dasaptaerwin  

24 Oktober 2023

Kelompok Keilmuan Geologi Terapan,  
Fakultas Ilmu dan Teknologi Kebumihan,  
Institut Teknologi Bandung





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# WEBINAR #11

**INTRODUCTION TO DATA MANAGEMENT AND ANALYSIS FOR  
GENERAL RESEARCHERS (PENGENALAN PENGELOLAAN DAN  
ANALISIS DATA UNTUK PENELITI, DOSEN DAN MAHASISWA)**



**Narasumber**

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Institut Teknologi Bandung



**Moderator**

**Pancasila Wati, S.I. Pust**

Pustakawan Fakultas Perikanan dan Ilmu Kelautan  
Universitas Diponegoro



Selasa  
24 Oktober 2023



Time  
08.30 - 12.00 WIB



zoom meet

**GRATIS**



E-sertifikat



Materi & Ilmu

**TERBUKA UNTUK UMUM**

**REGISTRASI**

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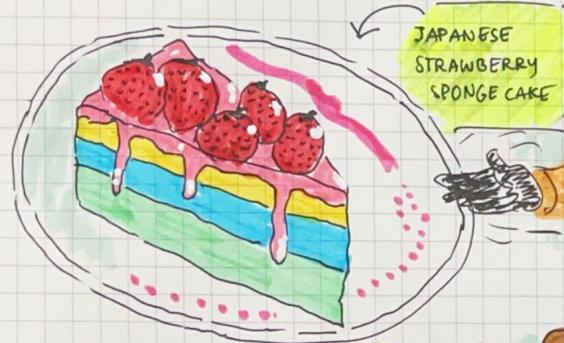
# WEBINAR UNDI

PERPUS UNDI 24/10/2023

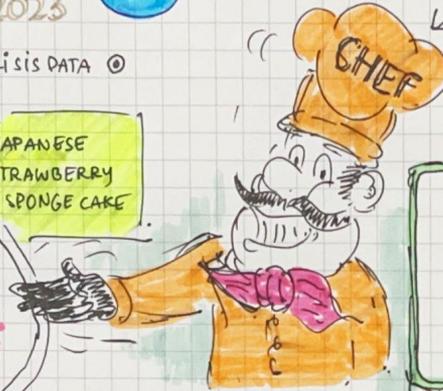


○ PENGENALAN MANAJEMEN DATA DAN ANALISIS DATA ○

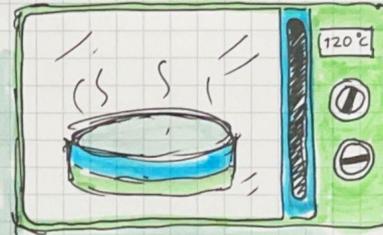
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JAPANESE  
STRAWBERRY  
SPONGE CAKE



PENELITI



PERANGKAT

RESEP

- 18 bh Strawberry (ukuran sedang)
- 4 butir telur (ambil kuningnya saja)
- 125 gr Tepung terigu
- 120 gr Gula halus
- 100 gr mentega
- 400 gr susu Krim
- 40ml air

METODE



DATA



PERANGKAT

PERTANYAAN :

- 1 Menurutanda darimana cerita dimulai?
- 2 Dan di mana cerita berakhir.
- 3 Apa syarat yang dibutuhkan

Cerita dalam gambar ini dimulai dari mana?

# Tujuh bagian yang akan kita bahas sekilas

---

1. Pendahuluan
2. Pentingnya data
3. Pengelolaan Data
4. Analisis Data
5. Perangkat dan Teknik
6. Studi Kasus
7. Tanya Jawab

# Pendahuluan

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More than 70% of researchers have tried and failed to reproduce another scientist's experiments, and **more than half have failed to reproduce their own experiments.** (rujukan)

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# Mari kita lihat contoh beberapa artikel berikut ini.

Makalah:

1. Makalah saya sendiri:  
<http://dasaptaerwin.net/wp/wp-content/uploads/2021/12/DEI-Ciremai-1-s2.0-S002216940900434X-main.pdf>
2. Makalah yang sedang saya tinjau (Heliyon).



## Hydrogeochemistry of volcanic hydrogeology based on cluster analysis of Mount Ciremai, West Java, Indonesia

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Multivariate analysis

### SUMMARY

Hydrogeochemical analysis has been conducted on 119 spring locations to portray volcanic hydrogeological system of Mount Ciremai, West Java, Indonesia. Cluster analysis on 14 parameters has extracted three clusters. Cluster 1 (112 springs) is distinguished by normal temperatures, low TDS, EC, and high bicarbonate concentrations. Cluster 2 (five springs) has moderately high temperature, TDS, EC, and high concentration of chloride. Cluster 3 (two springs) exhibits high temperature, anomalous high TDS, EC, and chloride concentration.

Three hydrogeological systems have been pictured based on the 3 clusters consecutively. The 1st system is developed in shallow unconfined aquifer, with domination of high bicarbonate (4.2 me/L) meteoric water. The 2nd system is predominated with mixing processes, between groundwater in unconfined aquifer and hot groundwater from deeper aquifers. The 3rd system is primarily dominated by groundwater flow from deep formation. The hot – deep seated groundwater flow also carries mud particles. It has anomalous high TDS (>1000 mg/L), EC (515 µS/cm), and chloride (99 me/L) from interaction between groundwater with clay formations, interpreted as Kaliwungu Formation.

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### Introduction

Indonesia is part of ring of fire, in form of volcanic belt with almost 128 volcanoes or 13–17% of total volcanoes in the world. The volcanic belt with focussing on Java Island is presented in Fig. 1. These volcanoes produce volcanic deposit cover a total area of 33,000 km<sup>2</sup> or one sixth of Indonesia's land (Dept. of Mining and Energy, 1979). In terms of hydrogeology, the volcanic deposits perform as productive aquifer. Such high productivity is shown by the emergence of spring belt at the foot slopes with enormous discharge and excellent quality. The aquifers come as porous system as well as fracture system. For example, at Ciremai volcano, there are at least 119 springs with variable discharge, from 10 L/s to nearly 100 L/s (Bapeda Kuningan, 2002).

This paper describes a hydrogeological assessment method to extract the geological control to groundwater springs. It is important in order to build a conceptual hydrogeological model of volcanic system at Ciremai. The methods are established using cluster analysis on hydrochemical parameters, measured at 119 groundwater springs.

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### Problem statement and objective

On Java island of Indonesia, the water demand increases due to the growing population and rising of water consumption (Puradimaja et al., 2002). The island has an area of 138,793 km<sup>2</sup>, with population of around 128 million people. The population had been doubled in the last four decades. Therefore, the density is around 1000 people per sq. km (Runtunuwu and Pawitan, 2008, op.cit Bapeda Kuningan, 2002). On the other side, the Indonesian islands receive abundant precipitation, ranging from 2000 to 4000 mm/year. In March 2009 for instance, the average precipitation in Java Island reached 300 mm (BKMG, 2009), which is not well distributed.

However, the water resources are not well-managed yet. On the slopes of volcanoes for example, the upslope movement of habitation and agriculture should have changed the water budget of particular region. Other problem is the productive zone of hydrogeological system has not been identified and understood in details.

The objective of this research is to clarify the geological control to groundwater system based on hydrochemical parameters from spring water samples. The hydrochemical parameters are analyzed using basic statistical and cluster analysis to extract the groupings of groundwater samples. Given the relatively complex setting and geological history of the study area, the analysis is expected to help distinguish the role of geological and hydrogeological parameters on this evolution.

Manuscript Number:	HELIYON-D-23-36172
Article Type:	Original Research Article
Section/Category:	Medical Sciences
Keywords:	Editorial staff; Spinal journal; Low income economies; Middle income economies; High income economies
Abstract:	<p>Background: The underrepresentation of research papers from low and middle income economies (LAMIE) in various fields has been noted. One possible reason for this may be the biased attitude of editors towards works from LAMIE. This phenomenon has been observed in several fields, but has been rarely reported in the field of spinal journals. This study aimed to examine the composition of editorial staff members (ESM) in major spinal journals and assess the international representation of editorial staff.</p> <p>Methods: This study analyzed the ESM of ten major spinal journals. The countries of the ESM were classified using World Bank categorizations. The ESM compositions of the journals were then analyzed.</p> <p>Results: A total of 982 ESM from 50 countries were identified. The United States had the highest number of ESM (395, 40.22%), followed by South Korea (57, 5.80%), Switzerland (53, 5.40%), Japan (52, 5.30%), the United Kingdom (48, 4.89%), and Italy (48, 4.89%). When categorized by regions, North America had the highest representation with 43.38% of board members (426), followed by Europe &amp; Central Asia (306, 31.16%), East Asia &amp; Pacific (175, 17.92%), Latin America &amp; Caribbean (35, 3.56%), Middle East &amp; North Africa (19, 1.93%), South Asia (15, 1.53%), and Sub-Saharan Africa (5, 0.51%). The majority of ESM (87.98%) were from high-income economies (HIE), followed by upper middle income economies (97, 9.88%), and lower middle income countries (21, 2.14%). No ESM were from low-income economies. The number of ESM for each country was not significantly correlated with their population (<math>p = 0.274</math>, <math>r = 0.281</math>), but showed a positive correlation with gross domestic product (<math>p = 0.033</math>, <math>r = 0.517</math>).</p> <p>Conclusions: Major spinal journals lack international representation in their editorial boards, with a predominantly high-income economy composition. This highlights a significant underrepresentation of editors from LAMIE in the field of spinal research.</p>

# Heliyon

Thank you for agreeing  
to review this manuscript



# Pentingnya data

# Mengapa data sangat penting?

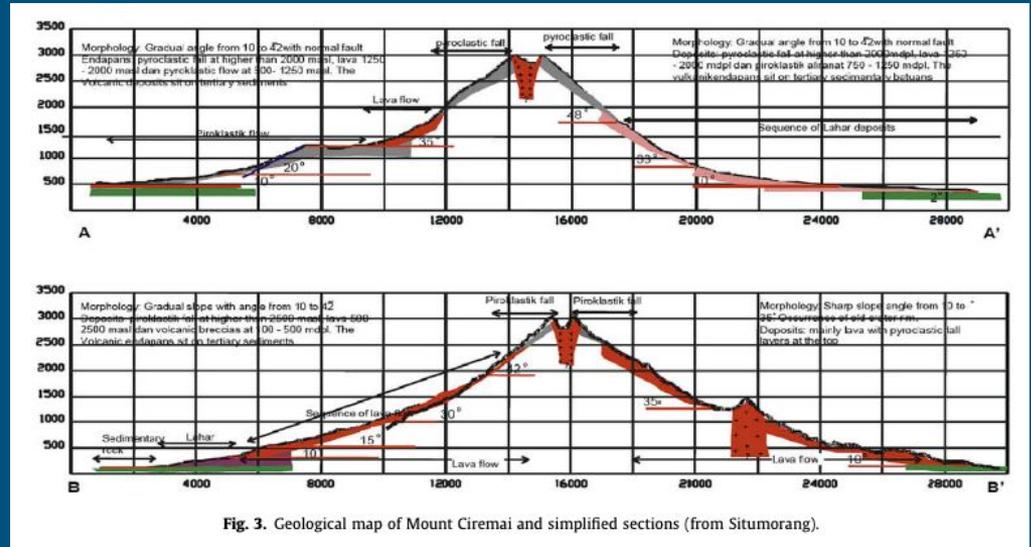
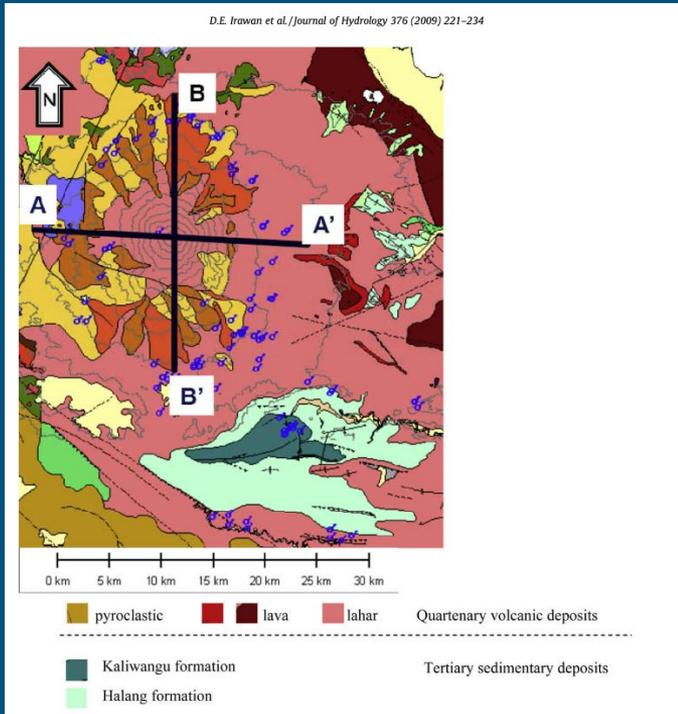
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- Meningkatkan pemahaman
- Mengatasi masalah
- Membuat keputusan yang tepat (yang melibatkan inovasi)



G. Ciremai, [Wikipedia Commons](#)

# Pada akhirnya kita menghasilkan peta dan penampang ini



# Sebelum itu kita perlu mengambil data

**Table 3**  
Raw data.

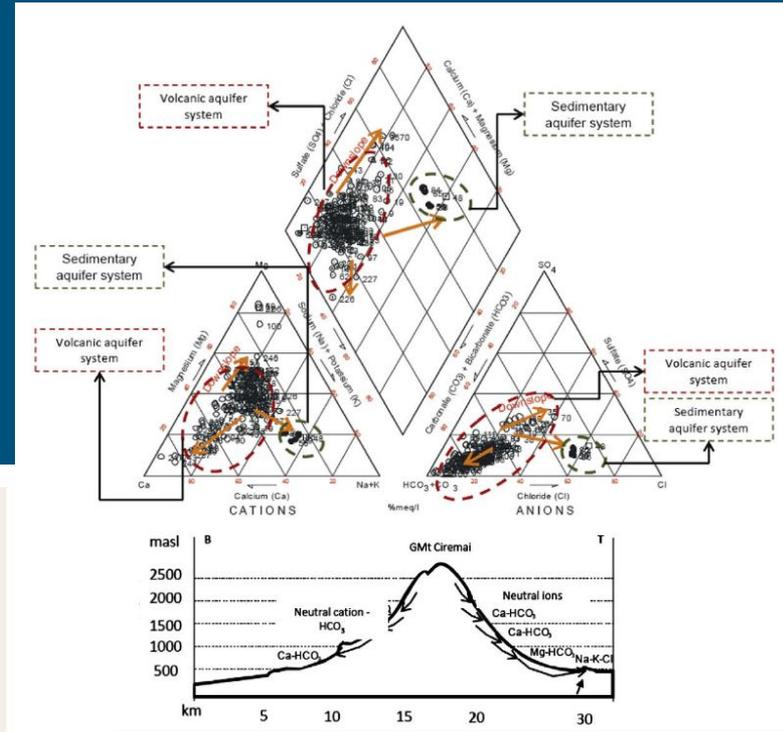
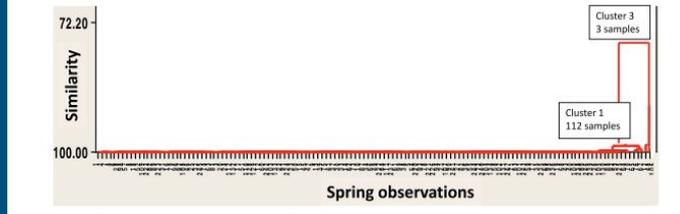
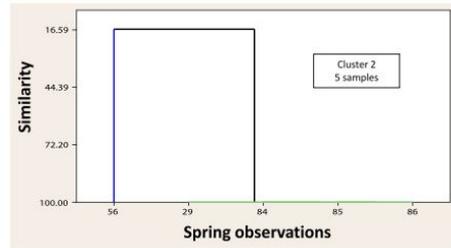
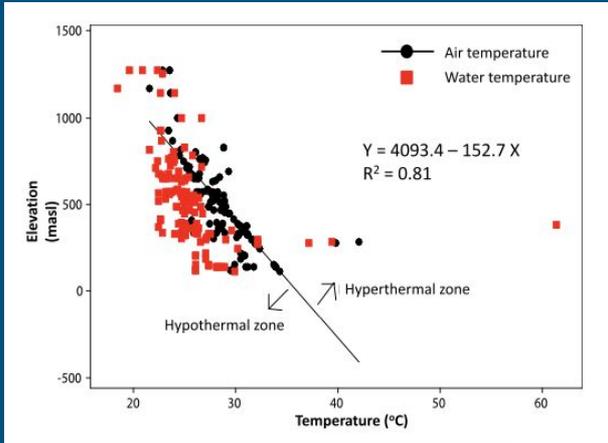
ID	Spring name	ELV (mas)	Q (L/s)	TDS (ppm)	EC (µS/cm)	pH	Water temp. (°C)	Air temp. (°C)	Na (meq/L)	K (meq/L)	Ca (meq/L)	Mg (meq/L)	Cl (meq/L)	HCO <sub>3</sub> (meq/L)	SO <sub>4</sub> (meq/L)	Charge Balance	Spring Type	Lithology
1	Cicurug i	573	19.49	88.00	176.00	6.70	23.70	26.70	0.36	0.15	0.65	0.68	0.27	1.54	0.19	-4.39	Fracture spring	Lava
2	Cicurug ii	573	18.81	90.00	190.00	6.80	23.10	26.12	0.38	0.12	0.73	0.54	0.28	1.36	0.26	-3.32	Fracture spring	Lava
3	Sindangparna	565	21.00	72.00	144.00	6.70	24.60	27.58	0.48	0.09	0.74	0.68	0.19	1.84	0.12	-3.79	Fracture spring	Lava
4	Pereng	577	28.42	91.00	182.00	7.60	24.10	27.09	0.43	0.09	0.53	0.40	0.10	1.16	0.10	3.44	Fracture spring	Lava
5	Cikamelayan	137	36.40	142.00	284.00	7.80	28.90	31.78	0.44	0.09	0.90	0.76	0.08	2.05	0.06	0.26	Fracture spring	Lahar
6	Leles	550	29.69	98.00	196.00	6.80	25.80	28.75	0.48	0.08	0.82	0.82	0.18	2.06	0.16	-4.15	Fracture spring	Lahar
7	Cipari	667	17.83	89.00	178.00	7.00	22.70	25.73	0.55	0.12	0.95	0.70	0.47	1.68	0.33	-3.14	Fracture spring	Lava
8	Cipicung Kubur	554	18.19	94.00	188.00	6.90	25.00	27.97	0.52	0.18	0.79	0.68	0.18	2.07	0.10	-4.01	Fracture spring	Lava
9	Palutungan	1165	5.53	107.00	214.00	8.10	18.40	21.53	0.97	1.15	1.01	0.92	0.60	2.80	1.03	-4.47	Fracture spring	Pyroclastic
10	Pereng	134	30.55	123.00	246.00	7.40	28.10	31.00	0.77	0.15	1.19	0.66	0.37	2.27	0.24	-1.88	Fracture spring	Lahar
11	Talaga Remis	310	25.24	62.50	125.00	7.70	27.10	30.02	0.57	0.11	0.65	0.76	0.30	1.63	0.28	-2.90	Fracture spring	Lava
12	Balong Kagungan Cilimus	560	18.77	64.00	128.00	7.00	23.50	26.51	0.52	0.12	0.51	0.40	0.15	1.22	0.10	2.54	Fracture spring	Lahar
13	Cibulan	544	17.00	109.00	218.00	7.90	24.70	27.68	0.65	0.13	0.85	0.96	0.37	2.02	0.39	-3.50	Fracture spring	Lahar
14	Dangdeur	330	11.57	111.00	222.00	7.60	27.30	30.22	0.62	1.08	1.21	0.88	0.16	3.48	0.10	0.61	Depression spring	Lahar
15	Cicerem	332	23.40	61.00	122.00	6.85	22.80	25.83	0.51	0.12	0.48	0.36	0.16	1.20	0.18	-2.19	Fracture spring	Lahar
16	Kebon Balong	466	21.65	84.00	168.00	7.20	25.50	28.46	0.56	0.14	0.81	0.44	0.19	1.81	0.05	-2.53	Fracture spring	Pyroclastic
17	Sangkanhurip	462	32.21	1200.00	2400.00	6.80	24.80	27.78	0.57	0.14	0.77	0.48	0.22	0.12	1.70	-2.00	Fracture spring	Lahar
18	Balong Dalem	571	29.54	94.00	188.00	6.70	24.70	27.68	0.43	0.14	0.89	0.40	0.19	1.45	0.17	1.21	Fracture spring	Lahar
19	Balong Kagungan (Kramat Mulya)	638	20.54	172.00	344.00	7.80	25.00	7.80	0.87	1.20	1.54	0.56	0.93	2.72	0.92	-4.63	Fracture spring	Lahar
20	Cikajayaan	408	15.58	72.00	144.00	6.80	22.60	25.63	0.57	0.13	0.69	0.44	0.11	1.71	0.05	-1.04	Fracture spring	Lahar
21	Citengah	135	29.78	132.50	265.00	7.40	28.30	31.19	0.65	0.14	1.15	0.36	0.15	1.86	0.12	3.93	Fracture spring	Lahar
22	Cicerem	320	13.43	63.00	126.00	6.48	25.00	30.30	0.48	0.13	0.69	3.45	0.11	4.59	0.07	-0.21	Fracture spring	Lahar
23	Silingganom	668	17.94	69.00	138.00	7.20	23.30	26.31	0.93	0.10	0.69	0.22	0.14	1.38	0.07	2.52	Fracture spring	Lahar
24	Situsari	705	19.93	72.50	145.00	7.10	22.10	25.14	0.45	0.10	0.69	0.44	0.16	1.50	0.16	-4.28	Fracture spring	Lava
25	Cibitung	743	16.46	83.00	166.00	7.00	23.90	26.90	0.28	0.06	0.98	0.72	0.19	1.83	0.16	-3.30	Fracture spring	Lava
26	Cibewok	570	27.85	199.00	398.00	7.90	25.20	28.17	0.77	0.17	1.54	1.45	0.93	2.08	1.03	-1.47	Fracture spring	Lahar
27	Cibulakan	530	31.56	45.00	90.00	7.35	23.10	26.12	0.58	0.11	1.17	0.68	0.18	2.15	0.18	0.91	Fracture spring	Pyroclastic
28	Cikole	335	20.45	97.00	194.00	6.60	25.90	28.85	0.52	0.09	0.89	0.52	0.18	1.82	0.13	-2.61	Depression spring	Lahar
29	Ciuyah Desa	278	2.45	12000.00	24000.00	7.30	39.40	42.03	2.90	3.20	2.20	0.40	4.80	2.70	1.20	2.79	Fracture spring	Klv
30	Cigugur	678	9.66	107.00	214.00	6.90	22.40	25.43	0.25	0.10	1.40	0.36	0.12	1.06	0.15	-4.75	Fracture spring	Lava
31	Ciputri	815	6.43	98.00	196.00	7.10	21.50	24.56	0.42	0.11	0.85	0.74	0.41	1.61	0.24	-3.26	Fracture spring	Pyroclastic
32	Cibinuang	762	15.81	81.00	162.00	7.25	23.40	26.41	0.50	0.09	0.77	0.52	0.15	1.68	0.16	-3.00	Fracture spring	Lava
33	Cibulakan	650	19.00	108.00	216.00	7.00	22.80	25.83	0.32	0.09	0.73	0.48	0.15	1.50	0.12	-4.45	Fracture spring	Lahar
34	Citambak	658	16.86	123.00	246.00	7.70	25.40	28.36	0.48	0.10	1.89	0.76	0.18	2.63	0.42	0.12	Fracture spring	Lava
35	Cibuluh	389	20.00	34.00	108.00	7.00	24.40	27.39	0.50	0.13	0.85	0.85	0.58	1.10	0.75	-2.95	Fracture spring	Lahar
36	Citengah	519	27.33	82.00	164.00	7.00	22.40	25.43	0.39	0.13	0.65	0.25	0.16	1.17	0.12	-4.42	Fracture spring	Lava
37	Cikupa	770	9.55	109.00	218.00	6.15	23.70	26.70	0.54	0.12	0.67	0.32	0.16	1.20	0.16	4.11	Depression spring	Pyroclastic
38	Cipanas II	367	15.85	126.00	252.00	9.00	22.40	25.43	4.64	0.06	0.61	0.12	1.20	3.70	1.02	-4.35	Fracture spring	Lahar
39	Citis	629	25.89	110.00	220.00	7.90	24.70	27.68	0.61	0.17	0.85	0.81	0.40	1.65	0.55	-3.27	Fracture spring	Pyroclastic
40	Cikabuyutan	361	19.30	156.00	312.00	8.00	25.60	28.56	0.71	0.08	1.63	1.27	0.15	3.14	0.11	4.07	Fracture spring	Lahar
41	Cibulakan	672	10.33	110.00	220.00	7.20	23.40	26.41	0.38	0.10	1.52	0.20	0.12	1.69	0.27	2.55	Fracture spring	Lava
42	Cipetey	534	20.72	45.00	90.00	7.10	23.10	26.12	0.38	0.10	0.50	0.32	0.15	1.11	0.05	-1.57	Fracture spring	Lahar
43	Chanayir	517	19.71	165.00	330.00	7.20	25.90	28.85	0.36	0.14	0.60	0.16	0.16	1.10	0.11	-4.56	Fracture spring	Lava
44	Citambak Girang	651	23.00	116.50	233.00	6.90	22.90	25.92	0.50	0.10	1.09	0.56	0.47	2.09	0.44	4.20	Fracture spring	Lava
45	Balong Beunteur	751	14.69	77.00	154.00	6.90	24.00	27.00	0.42	0.12	0.95	0.26	0.15	1.59	0.12	-3.02	Fracture spring	Lahar
46	Bandorasa	453	21.05	86.00	172.00	6.70	25.90	28.85	0.42	0.10	1.01	0.70	0.21	1.78	0.15	1.95	Fracture spring	Lahar
47	Puncak Lapang	754	11.06	76.00	152.00	7.60	23.60	26.61	0.42	0.11	0.93	0.39	0.27	1.50	0.26	-4.85	Depression spring	Lava
48	Liang Panas	275	3.86	1000.00	2000.00	6.70	37.10	39.79	2.28	2.25	1.14	0.60	3.50	2.20	1.15	-4.42	Fracture spring	Klv
49	Cibuyuning	535	21.41	123.00	246.00	7.10	25.90	28.03	0.39	0.13	0.65	0.25	0.16	1.25	0.14	-4.51	Fracture spring	Lava
50	Cibulakan Cilimus	571	20.32	69.00	138.00	7.10	23.70	27.50	0.52	0.10	0.65	0.66	0.20	1.71	0.12	-2.53	Fracture spring	Lava
51	Cibulakan 1	484	11.02	63.00	126.00	6.40	26.50	29.00	0.35	0.10	0.80	0.90	0.18	1.78	0.10	2.01	Fracture spring	Lahar
52	Cibulakan tarik	925	4.72	93.00	186.00	6.92	22.60	23.40	0.61	0.20	1.00	0.66	0.31	1.93	0.23	0.03	Fracture spring	Lava

(continued on next page)

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# Untuk dianalisis (dengan berbagai metode)



# Dengan rincian metode (resep) seperti ini

**Table 1**  
Various techniques of multivariate analyses (Smith, 2002).

Method	Cations used	Anions used	Other parameters	Input data and plotting units
Cluster analysis (HCA and KMC)	All major, minor and trace elements	All major, minor and trace elements	All applicable parameters Yes (1) or no (0) statements, discrete variables	Input: z-scores of the log-transformed data Output: distance matrix (KMC) and dendrogram (HCA)
Principal components analysis (PCA)	All major, minor and trace elements	All major, minor and trace elements	All applicable parameters Yes (1) or no (0) statements, discrete variables	Input, z-scores of the log-transformed data Output: PCA scores
Fuzzy k-means Clustering (FKM)	All major, minor and trace elements	All major, minor and trace elements	Same as above	Input: same as above matrix Output: membership
Piper diagram	Na + K, Ca, and Mg	Cl, SO <sub>4</sub> and HCO <sub>3</sub> + CO <sub>3</sub>	n/a	Relative %meq L <sup>-1</sup>
Collins bar diagram	Na + K, Ca, and Mg	Cl, SO <sub>4</sub> and HCO <sub>3</sub> CO <sub>3</sub> (or HCO <sub>3</sub> + CO <sub>3</sub> )	n/a	Relative %meq L <sup>-1</sup> or meq L <sup>-1</sup>
Pie diagram	Na + K, Ca, and Mg	Cl SO <sub>4</sub> and HCO <sub>3</sub>	na	Relative %meq L <sup>-1</sup>
Stiff pattern diagram	Na (or Na + K), Ca, and MgFe (optional)	Cl,SO <sub>4</sub> and HCO <sub>3</sub> CO <sub>3</sub> (optional)	n/a	meq L <sup>-1</sup>
Schoeller semi logarithmic diagram	Na + K, Ca, and Mg	Cl, SO <sub>4</sub> and HCO <sub>3</sub>	n/a	meq L <sup>-1</sup> in log-scale
Chenoff faces	Up to 20 parameters can be plotted		n/a	meq L <sup>-1</sup> or mg L <sup>-1</sup> Other parameters, in their respective units

# Berbagai jenis data

- Data kuantitatif
- Data kualitatif

- Data primer
- Data sekunder

- Data nominal
- Data ordinal
- Data interval
- Data rasio

- Data spasial
- Data temporal

# Pengelolaan data

# Kenapa data perlu dikelola?

---

Untuk

- meningkatkan transparansi
- meningkatkan kualitas data
- meningkatkan efisiensi
- meningkatkan keamanan data
- meningkatkan dampak penelitian

# Tiga indikator kualitas data?

1. Akurat
2. Lengkap
3. Konsisten

**Table 3**  
Raw data.

ID	Spring name	ELV (mas)	Q (L/s)	TDS (ppm)	EC ( $\mu\text{S/cm}$ )	pH	Water temp. ( $^{\circ}\text{C}$ )	Air temp. ( $^{\circ}\text{C}$ )	Na (meq/L)	K (meq/L)	Ca (meq/L)	Mg (meq/L)	Cl (meq/L)	HCO <sub>3</sub> (meq/L)	SO <sub>4</sub> (meq/L)	Charge Balance	Spring Type	Lithology
1	Cicurug i	573	19.49	88.00	176.00	6.70	23.70	26.70	0.36	0.15	0.65	0.68	0.27	1.54	0.19	-4.39	Fracture spring	Lava
2	Cicurug ii	573	18.81	90.00	190.00	6.80	23.10	26.12	0.38	0.12	0.73	0.54	0.28	1.36	0.26	-3.32	Fracture spring	Lava
3	Sindangpama	565	21.00	72.00	144.00	7.60	24.60	27.58	0.48	0.09	0.74	0.68	0.19	1.84	0.12	-3.79	Fracture spring	Lava
4	Pereng	577	28.42	91.00	182.00	6.70	24.10	27.09	0.43	0.09	0.53	0.40	0.10	1.16	0.10	-3.44	Fracture spring	Lava
5	Cikamlayan	137	36.40	142.00	284.00	7.80	28.90	31.78	0.44	0.09	0.90	0.76	0.08	2.05	0.06	0.26	Fracture spring	Lahar
6	Leles	550	29.69	98.00	196.00	6.80	25.80	28.75	0.48	0.08	0.82	0.82	0.18	2.06	0.16	-4.15	Fracture spring	Lahar
7	Cipari	667	17.83	89.00	178.00	7.00	22.70	25.73	0.55	0.12	0.95	0.70	0.47	1.68	0.33	-3.14	Fracture spring	Lava
8	Cipicang Kubur	554	18.19	94.00	188.00	6.90	25.90	27.97	0.52	0.18	0.79	0.68	0.18	2.07	0.10	-4.01	Fracture spring	Lava
9	Palutungan	1165	5.53	107.00	214.00	8.10	18.40	21.53	0.97	1.15	1.01	0.92	0.60	2.80	1.03	-4.47	Fracture spring	Pyroclastic
10	Pereng	134	30.55	123.00	246.00	7.40	28.10	31.00	0.77	0.15	1.19	0.66	0.37	2.27	2.04	-1.88	Fracture spring	Lahar
11	Talaga Remis	310	25.24	62.50	125.00	7.70	27.10	30.02	0.57	0.11	0.65	0.76	0.30	1.63	0.28	-2.90	Fracture spring	Lava
12	Balung Kagungan Cilimus	560	18.77	64.00	128.00	7.00	23.50	26.51	0.52	0.12	0.51	0.40	0.15	1.22	0.10	2.54	Fracture spring	Lahar
13	Cibulan	544	17.00	109.00	218.00	7.90	24.70	27.68	0.65	0.13	0.85	0.96	0.37	2.02	0.39	-3.50	Fracture spring	Lahar
14	Dangdeur	330	11.57	111.00	222.00	7.60	27.30	30.22	0.62	1.08	1.21	0.88	0.16	3.48	0.10	0.61	Depression spring	Lahar
15	Cicerem	332	23.40	61.00	122.00	6.85	22.80	25.83	0.51	0.12	0.48	0.36	0.16	1.20	0.18	-2.19	Fracture spring	Lahar
16	Kebon Balong	466	21.65	84.00	168.00	7.20	25.50	28.46	0.56	0.14	0.81	0.44	0.19	1.81	0.05	-2.53	Fracture spring	Pyroclastic
17	Sangkanharup	462	32.21	1200.00	2400.00	6.80	24.80	27.78	0.57	0.14	0.77	0.48	0.22	0.12	1.70	-2.00	Fracture spring	Lava
18	Balung Dalam	571	29.54	94.00	188.00	6.70	24.70	27.68	0.43	0.14	0.89	0.40	0.19	1.45	0.17	1.21	Fracture spring	Lahar
19	Balung Kagungan (Kramat Mulya)	638	20.54	172.00	344.00	7.80	25.00	27.80	0.87	1.20	1.54	0.56	0.93	2.72	0.92	-4.63	Fracture spring	Lahar
20	Cikawayan	408	15.58	72.00	144.00	6.80	22.60	25.63	0.57	0.13	0.69	0.44	0.11	1.71	0.05	-1.04	Fracture spring	Lahar
21	Citengah	135	29.78	132.50	265.00	7.40	28.30	31.19	0.65	0.14	1.15	0.35	0.15	1.86	0.12	3.93	Fracture spring	Lahar
22	Cicerem	320	13.43	63.00	126.00	6.48	25.00	30.30	0.48	0.13	0.69	3.45	0.11	4.59	0.07	-0.21	Fracture spring	Lahar
23	Sililngonon	568	17.94	69.00	138.00	7.20	23.30	26.31	0.53	0.10	0.69	0.36	0.14	1.38	0.07	2.52	Fracture spring	Lahar
24	Situsari	545	14.93	72.50	145.00	7.10	22.10	25.16	0.40	0.10	0.44	0.16	0.50	1.16	0.16	-4.28	Fracture spring	Lava
25	Cibitung	743	16.46	83.00	166.00	7.00	23.90	26.90	0.28	0.06	0.98	0.72	0.19	1.83	0.16	-3.30	Fracture spring	Lava
26	Cibewok	570	27.85	199.00	398.00	7.90	25.20	28.17	0.77	0.17	1.54	1.45	0.93	2.08	1.03	-1.47	Fracture spring	Lahar
27	Cibulakan	530	31.56	45.00	90.00	7.35	23.10	26.12	0.58	0.11	1.17	0.68	0.18	2.15	0.18	0.91	Fracture spring	Pyroclastic
28	Ciole	345	20.45	97.00	194.00	6.60	25.90	28.85	0.52	0.09	0.89	0.52	0.18	1.82	0.13	-2.61	Depression spring	Lahar
29	Ciyuh Desa	278	2.45	12000.00	24000.00	7.30	39.40	42.03	2.90	3.20	2.20	0.480	4.80	2.70	1.20	2.79	Fracture spring	Kiwi
30	Cigugur	678	9.66	107.00	214.00	6.90	22.40	25.43	0.25	0.10	1.40	0.36	0.11	2.06	0.15	-4.75	Fracture spring	Lava
31	Ciputi	815	4.43	98.00	196.00	7.10	21.50	24.56	0.42	0.11	0.85	0.74	0.41	1.61	0.24	-3.26	Fracture spring	Pyroclastic
32	Cibianung	762	15.81	81.00	162.00	7.25	23.40	26.41	0.50	0.09	0.77	0.52	0.15	1.68	0.16	-3.00	Fracture spring	Lava
33	Cibulakan	650	19.00	108.00	216.00	7.00	22.80	25.83	0.32	0.09	0.73	0.48	0.15	1.50	0.12	-4.45	Fracture spring	Lahar
34	Citambak	658	16.86	123.00	246.00	7.70	25.40	28.36	0.48	0.10	1.89	0.76	0.18	2.63	0.42	0.12	Fracture spring	Lava
35	Cibuh	389	19.00	54.00	108.00	7.00	24.40	27.39	0.50	0.13	1.85	0.85	0.18	1.80	0.76	-2.95	Fracture spring	Lahar
36	Citengah	519	27.33	41.00	82.00	7.00	22.40	25.43	0.39	0.12	0.62	0.20	0.16	1.17	0.12	-4.42	Fracture spring	Lava
37	Cikupa	770	9.55	109.00	218.00	6.15	23.70	26.70	0.54	0.12	0.67	0.32	0.16	1.20	0.16	4.11	Depression spring	Pyroclastic
38	Cipanas II	367	15.85	126.00	252.00	8.00	22.40	25.43	4.64	0.06	0.61	0.12	1.20	3.70	1.02	-4.35	Fracture spring	Lahar
39	Citis	629	25.89	110.00	220.00	7.90	24.70	27.68	0.61	0.17	0.85	0.81	0.40	1.65	0.55	-3.27	Fracture spring	Pyroclastic
40	Cikabyutan	361	19.30	156.00	312.00	8.00	25.60	28.56	0.71	0.08	1.63	1.27	0.15	3.14	0.11	4.07	Fracture spring	Lahar
41	Cibulakan	672	10.33	110.00	220.00	7.20	23.40	26.41	0.38	0.10	1.52	0.20	0.12	1.69	0.27	2.55	Fracture spring	Lava
42	Cipey	534	20.72	45.00	90.00	7.10	23.10	26.12	0.38	0.10	0.50	0.32	0.15	1.11	0.06	-1.57	Fracture spring	Lahar
43	Chanyir	517	19.71	165.00	330.00	7.20	25.90	28.85	0.36	0.14	0.60	0.16	0.16	1.10	0.11	-4.56	Fracture spring	Lava
44	Citambak Girang	651	23.00	116.50	233.00	6.90	22.90	25.92	0.50	1.10	1.09	0.56	0.47	2.09	0.44	4.20	Fracture spring	Lava
45	Balung Beunteur	751	14.69	77.00	154.00	6.90	24.60	27.00	0.42	0.12	0.95	0.26	0.15	1.59	0.12	-3.02	Fracture spring	Lahar
46	Bandorana	453	21.05	86.00	172.00	6.70	26.90	28.85	0.42	0.10	1.01	0.70	0.21	1.78	0.15	1.95	Fracture spring	Lahar
47	Puncak Lapang	754	11.06	76.00	152.00	7.60	23.60	26.61	0.42	0.11	0.93	0.39	0.27	1.50	0.26	-4.85	Depression spring	Lava
48	Liang Panas	275	3.86	1000.00	2000.00	6.70	37.10	39.79	2.28	2.25	1.14	0.60	3.50	2.20	1.15	-4.42	Fracture spring	Kiwi
49	Chayoning	535	21.41	123.00	246.00	7.10	25.90	28.85	0.39	0.13	0.65	0.25	0.16	1.25	0.14	-4.51	Fracture spring	Lava
50	Cibulakan Cilimus	571	20.32	69.00	138.00	7.10	23.70	27.50	0.22	0.10	0.65	0.60	0.20	1.71	0.12	-2.53	Fracture spring	Lava
51	Cibulakan I	484	11.02	63.00	126.00	6.40	26.50	29.00	0.35	0.10	0.80	0.90	0.18	1.78	0.10	2.01	Fracture spring	Lahar
52	Cibulakan tarik	925	4.72	93.00	186.00	6.92	22.60	23.40	0.61	0.20	1.00	0.66	0.31	1.93	0.23	0.03	Fracture spring	Lava

(continued on next page)

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# Lima prinsip mengelola data riset?

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1. Perencanaan pengumpulan data
2. Pengumpulan data
3. Validasi data
4. Penyimpanan data
5. Berbagi data

# Lima prinsip mengelola data riset?

---

1. Perencanaan pengumpulan data
2. Pengumpulan data
3. Validasi data
4. Penyimpanan data
5. Berbagi data

## Prinsip F.A.I.R

**F** indable

**A** ccessible

**I** nteroperable

**R** eusable

# Bagaimana dengan data sensitif?

---

- Data pribadi: Nama, alamat, nomor telepon, nomor kartu identitas, data biometrik
- Data keuangan: Data rekening bank, kartu kredit, investasi
- Data kesehatan: Riwayat penyakit, hasil tes, resep obat
- Data rahasia dagang: Rencana pemasaran, formula produk, algoritma
- Data sensitif lainnya: Data agama, politik, ras/etnis

# Tiga jenis akses terhadap data/informasi

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- Akses publik: data dapat ditemukan dan diakses secara bebas.
- Akses terbatas/terkontrol: data dapat diakses melalui pendaftaran (misal: data dari BMKG), dengan surat permohonan (misal: data dari KLHK).
- Akses tertutup: data hanya dapat diakses pihak yang berwenang (misal: data KPU, data bank).

# Tiga opsi mengunggah data

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1. Ke repositori kampus (bila ada)
2. Ke repositori umum, misal: [RIN](#), [Zenodo](#), [Figshare](#), [Pangaea](#)
3. Ke jurnal: sebagai makalah data, sebagai material pendukung (supplementary material)

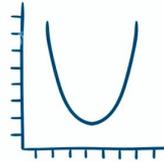
Analysis data

# Lima tujuan menganalisis data

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1. Mendeskripsikan data: melihat distribusi, mendeteksi pola.
2. Menemukan korelasi: scatter plot.
3. Membandingkan nilai.
4. Melihat tren terhadap waktu.
5. Melihat proporsi.

# Lima jenis grafik dalam analisis data



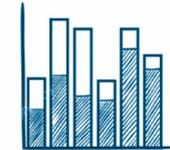
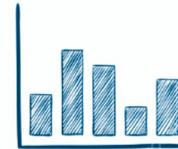
**Histogram, Boxplot**

Mendesripsikan data: melihat distribusi, mendeteksi pola.



**Scatter plot**

Mendeteksi korelasi



**Bar/column chart**

Membandingkan nilai



**Line chart**

Melihat tren terhadap waktu



**Pie chart**

Mengidentifikasi proporsi

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# Perangkat yang dibutuhkan dalam analisis data



Spreadsheet



Statistical tools with point and click approach



Statistical tools with command line approach



Qualitative data tools

# Tanya Jawab