

PENGENALAN KEPADA ANALISIS SPATIAL MENGUNAKAN ARCGIS DESKTOP

Disampaikan oleh:

Mohd Redzuan B. Abd Rahim

Seksyen Pembangunan & Penyelidikan

Cawangan Pembangunan Geodata

MaCGDI, NRE

Redzuan_rahim.macgdi@1govuc.gov.my

Dibantu oleh:

Siti Nor Asniza bt Kamaruzaman

Seksyen Pembangunan & Penyelidikan

Cawangan Pembangunan Geodata

MaCGDI, NRE

asniza.macgdi@1govuc.gov.my



Data
Collection



**DATA
SOURCES**



Take Action



USERS

**KONSEP
GIS**

Input of Data



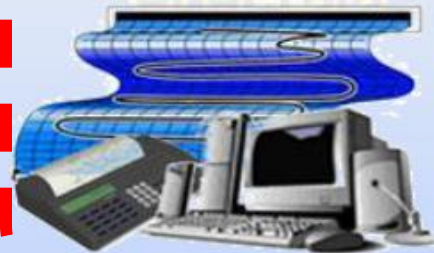
**DATA
MANAGEMENT**



Information for
Decision
Making



ANALYSIS



Data Retrieval
& Analysis



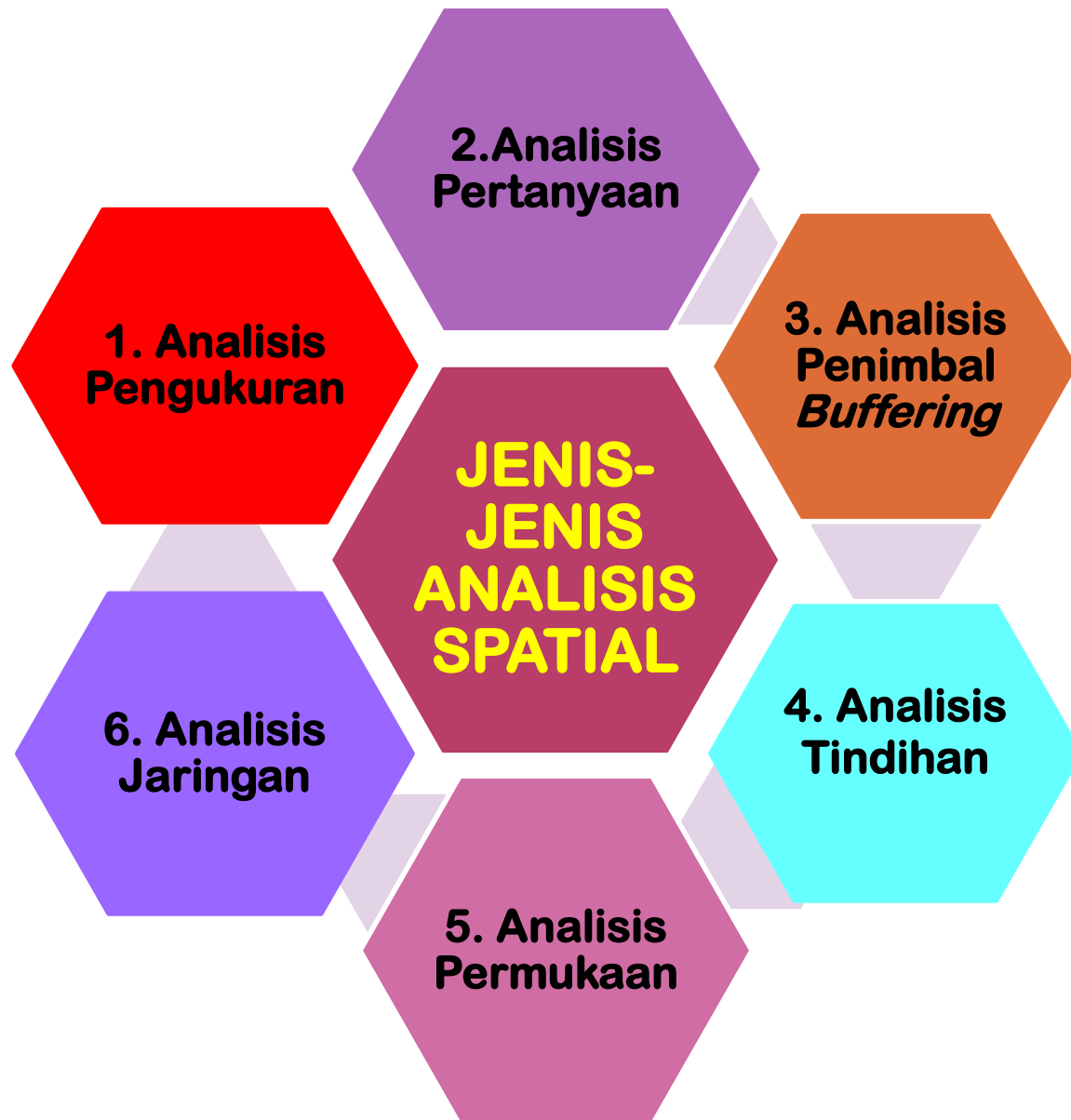
Analisis Spatial

- Analisis spatial merupakan satu set Operasi analisis data spatial di mana keputusan analisis bergantung kepada kedudukan objek yang dianalisiskan.
- Atau dengan kata lain, merupakan suatu proses mendapatkan suatu keputusan/idea menggunakan kaedah-kaedah tertentu terhadap sesuatu maklumat/data

“VALUE ADDED”

5 langkah utama sebelum sesuatu analisis dijalankan



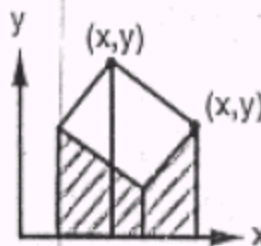
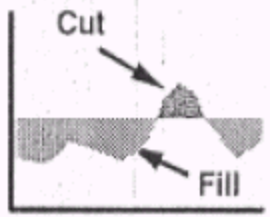
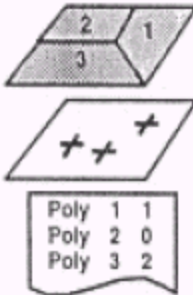

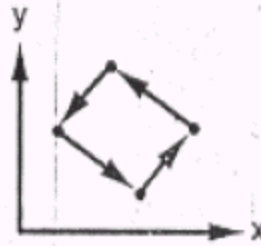
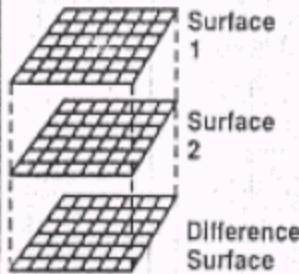




1. Analisis GIS - Pengukuran

- I. Mampu untuk mendapatkan maklumat perimeter, panjang sisi dan luas poligon. Maklumat ini boleh digunakan untuk analisis seterusnya
- II. Fungsi analitikal yang biasa ada dalam perisian GIS adalah seperti Dimension, Length dan Area.
- III. Jenis Analisis Pengukuran:-
 - Pengukuran Jarak:
 - Jarak boleh diukur secara lurus atau pengukuran kompleks iaitu dengan menggunakan fungsi jaringan yang melibatkan parameter
 - Fungsi analitikal yang biasa ada dalam perisian GIS adalah seperti Distance, Length, Shortest path dan optimum
 - Pengukuran Poligon:
 - Mampu untuk mendapatkan maklumat perimeter, panjang sisi dan luas poligon. Maklumat ini boleh digunakan untuk analisis seterusnya

GIS mempunyai fungsi pengukuran dan pengiraan terhadap data titik, garisan, keluasan, jarak dan isipadu.

 <p>Total Number</p>	 <p>Straight</p>	 <p>Area</p>	 <p>Cross Section</p>
 <p>Point-in-Polygon</p>	 <p>Curved</p>	 <p>Perimeter</p>	 <p>Area</p>
<p>Points</p>	<p>Distance</p>	<p>Areas</p>	<p>Volumes</p>

Contoh : Pengukuran Jarak : Perimeter

Calculate Geometry

Property: **Area**

Coordinate System: **Perimeter**

Use coordinate system of Centroid
 X Coordinate of Centroid
 Y Coordinate of Centroid
 PCS: GDM 2000 RSO Peninsular Malaysia

Use coordinate system of the data frame:
 PCS: GDM 2000 RSO Peninsular Malaysia

Units: **Square Meters [sq m]**

Calculate selected records only

[About calculating geometry](#)

OK Cancel

EN	LOT	UPI	STATUS	Perimeter	MI_PRINX	KELUASAN	PA	NOFAILUKUR
62		1601400160000062	6	98	304267	584.043	PA195	PUBLWPP27_2002
64		1601400160000064	6	98	304268	594.995	PA195	PUBLWPP27_2002
65		1601400160000065	6	97	304269	590.913	PA195	PUBLWPP27_2002
67		1601400160000067	6	117	304270	808.704	PA67P	PUBLWPP33_2002
531		1601400160000531	6	73	304247	303.166	PA214	PUBLWPP27_2002
87		1601400160000087	6	159	304282	1207.385	PA70P	PUBLWPP33_2002
88		1601400160000088	6	157	304283	1202.324	PA70P	PUBLWPP33_2002
9		1601400160000009	6	337	304284	5171.741	PA61P	PUBLWPP33_2002
91		1601400160000091	6	146	304285	1091.458	PA71P	PUBLWPP33_2002
92		1601400160000092	6	147	304286	1115.126	PA71P	PUBLWPP33_2002
94		1601400160000094	6	142	304287	1120.225	PA71P	PUBLWPP33_2002
95		1601400160000095	6	137	304288	1121.066	PA71P	PUBLWPP33_2002
97		1601400160000097	6	135	304289	1138.382	PA71P	PUBLWPP33_2002
98		1601400160000098	6	139	304290	1118.851	PA71P	PUBLWPP33_2002
68		1601400160000068	6	96	304271	570.182	PA195	PUBLWPP27_2002
284		1601400160000284	6	77	304313	337.966	PA91P	PUBLWPP33_2002
5		1601400010000005	6	357	304382	7053.49	PA619	PUBLWPP2_2003
254		1601400160000254	6	67	378948	238.175	PA90	
255		1601400160000255	6	72	378949	266.54	PA90	
253		1601400160000253	6	61	378947	168.106	PA90	
4420		1601400110004420	6	55	303773	130.069	PA377	PUBLWPP38_2002-1
4421		1601400110004421	6	61	303774	193.891	PA377	PUBLWPP38_2002-1
4423		1601400110004423	6	55	303775	130.074	PA377	PUBLWPP38_2002-1
4424		1601400110004424	6	55	303776	130.063	PA377	PUBLWPP38_2002-1

0 | (0 out of 10582 Selected)

CONTOH : PENGUKURAN POLIGON: KELUASAN

The screenshot displays a GIS application interface. In the background, a 'Table' window shows a data table with columns: LOT, UPI, STATUS, Perimeter, Keluasan_1, MI_P. The foreground features a 'Calculate Geometry' dialog box with the following settings:

- Property: Area
- Coordinate System:
 - Use coordinate system of the data source:
PCS: GDM 2000 RSO Peninsular Malaysia
 - Use coordinate system of the data frame:
PCS: GDM 2000 RSO Peninsular Malaysia
- Units: Square Meters [sq m]

Buttons: OK, Cancel

A red arrow points from the 'Keluasan' column in the table to the 'Area' property in the dialog box.

LOT	UPI	STATUS	Perimeter	Keluasan_1	MI_P
62	1601400160000062	6	98	0	30
64	1601400160000064	6	98	0	30
65	1601400160000065	6	97	0	30
67	1601400160000067	6	117	0	30
531	1601400160000531	6	73	0	30
87	1601400160000087	6	159	0	30
88	1601400160000088	6	157	0	30
9	1601400160000009	6	337	0	30
91	1601400160000091	6	146	0	30
92	1601400160000092	6	147	0	30
94	1601400160000094	6	142	0	30
95	1601400160000095	6	137	0	30

LOT	UPI	STATUS	Perimeter	Keluasan	MI_PRINX	KELUASAN	PA	NOFAILUKUR	NAMAPEMILI	KEGUNAANTA	ALAMATPEMI
62	1601400160000062	6	98	584	304267	584.043	PA195	PUBLWPP27_2002			8fc40e54c
64	1601400160000064	6	98	595	304268	594.995	PA195	PUBLWPP27_2002			79e8824d
65	1601400160000065	6	97	591	304269	590.913	PA195	PUBLWPP27_2002			49242500t
67	1601400160000067	6	117	809	304270	808.704	PA67P	PUBLWPP33_2002			DA0DB0F7
531	1601400160000531	6	73	303	304247	303.166	PA214	PUBLWPP27_2002			9a84296e
87	1601400160000087	6	159	1207	304282	1207.385	PA70P	PUBLWPP33_2002			7791772E
88	1601400160000088	6	157	1202	304283	1202.324	PA70P	PUBLWPP33_2002			1FBCAE17
9	1601400160000009	6	337	5172	304284	5171.741	PA61P	PUBLWPP33_2002			65E3CA03
91	1601400160000091	6	146	1091	304285	1091.458	PA71P	PUBLWPP33_2002			97FAB13E
92	1601400160000092	6	147	1115	304286	1115.126	PA71P	PUBLWPP33_2002			9E9871F5
94	1601400160000094	6	142	1120	304287	1120.225	PA71P	PUBLWPP33_2002			5396B69A
95	1601400160000095	6	137	1121	304288	1121.066	PA71P	PUBLWPP33_2002			6C9EE1E9
97	1601400160000097	6	135	1138	304289	1138.382	PA71P	PUBLWPP33_2002			B05DFDA4
98	1601400160000098	6	139	1119	304290	1118.851	PA71P	PUBLWPP33_2002			7CE808B0
68	1601400160000068	6	96	570	304271	570.182	PA195	PUBLWPP27_2002			32de221c
284	1601400160000284	6	77	338	304313	337.966	PA91P	PUBLWPP33_2002			387B9711
5	1601400010000005	6	357	7054	304382	7053.49	PA619	PUBLWPP2_2003			565f212c2
254	1601400160000254	6	67	238	378948	238.175	PA90				
255	1601400160000255	6	72	267	378949	266.54	PA90				
253	1601400160000253	6	61	168	378947	168.106	PA90				
4420	1601400110004420	6	55	130	303773	130.069	PA377	PUBLWPP38_2002-1			dbbea806
4421	1601400110004421	6	61	194	303774	193.891	PA377	PUBLWPP38_2002-1			77c86be5
4423	1601400110004423	6	55	130	303775	130.074	PA377	PUBLWPP38_2002-1			030ff650b
4424	1601400110004424	6	55	130	303776	130.063	PA377	PUBLWPP38_2002-1			8aa5e4b7

2. Analisis GIS - Pertanyaan

Kebiasaannya, analisis pertanyaan adalah seperti:

- Memeriksa kualitas dan keputusan analisis
- Mencari hasil yang berkenaan berdasarkan kepada kriteria yang dikenalpasti

Dua jenis pertanyaan –Spatial dan Non-Spatial

- Spatial –Lokasi/kedudukan objek
- Non Spatial –Atribut sesuatu objek

Analisis pertanyaan biasanya adalah proses terakhir setelah pelbagai analisis spatial dilakukan

Contoh :

Pertanyaan :Spatial :-

'Bil bangunan pendidikan di Pahang'

The screenshot shows the ArcMap interface with the following components:

- Table Of Contents:** Shows the 'Bangunan_Pendidikan' layer selected under the 'Negeri' layer.
- Select By Location Dialog:**
 - Selection method: select features from
 - Target layer(s): Bangunan_Pendidikan, Negeri
 - Only show selectable layers in this list:
 - Source layer: Negeri
 - Use selected features: (1 features selected)
 - Spatial selection method for target layer feature(s): Intersect the source layer feature
 - Apply a search distance: (70000.00000 Meters)
- Table:**

FID	Shape *	OBJECTID	FNM	FCD	NAM	BA4	BAG	EDC	EDL	EDS	EDF
300	Point	307	Educational Building	BE001	SK Tanjung Gemek	2662	Paha	Government	Primary	National	Full Board
307	Point	398	Educational Building	BE001	SMK Tanjung Gemek	2662	Paha	Government	Secondary	National	Full Board
408	Point	407	Educational Building	BE001	SK Sarang Tiang	2662	Paha	Government	Primary	National	Full Board
412	Point	413	Educational Building	BE001	SK Piangga	2662	Paha	Government	Primary	National	Full Board
430	Point	431	Educational Building	BE001	SK Seri Jaya	8521	Johor	Government	Primary	National	Full Board
431	Point	432	Educational Building	BE001	SK Janjau	2662	Paha	Government	Primary	National	Full Board
442	Point	443	Educational Building	BE001	SMK Pontian Jaya	2680	Paha	Government	Secondary	National	Full Board
460	Point	461	Educational Building	BE001	SJK(C) Kang Ya	8471	Johor	Government	Primary	Chinese	Full Board
462	Point	463	Educational Building	BE001	SK Pontian	2680	Paha	Government	Primary	National	Full Board
465	Point	468	Educational Building	BE001	SMK Sungai Putri	2660	Paha	Government	Secondary	Technical	Full Board
466	Point	467	Educational Building	BE001	SK Kampong Koiem	2660	Paha	Government	Primary	National	Full Board
473	Point	474	Educational Building	BE001	SMK Rompin	2680	Paha	Government	Secondary	National	Full Board
476	Point	477	Educational Building	BE001	SK Rompin	2680	Paha	Government	Primary	National	Full Board
479	Point	480	Educational Building	BE001	SJK(C) Rompin	2680	Paha	Government	Primary	Chinese	Full Board
508	Point	509	Educational Building	BE001	SK Sungai Puteri	2680	Paha	Government	Primary	National	Full Board
510	Point	511	Educational Building	BE001	SK Indera Shahbandar	2666	Paha	Government	Primary	National	Full Board
514	Point	515	Educational Building	BE001	SMK Sungai Putri	2660	Paha	Government	Secondary	National	Full Board
517	Point	518	Educational Building	BE001	SK Tanjung Batu	2666	Paha	Government	Primary	National	Full Board
528	Point	529	Educational Building	BE001	SMK Nenas	2668	Paha	Government	Secondary	National	Full Board
529	Point	530	Educational Building	BE001	SK Nenas	2668	Paha	Government	Primary	National	Full Board
541	Point	542	Educational Building	BE001	SMK Indera Shahbandar	2666	Paha	Government	Secondary	National	Full Board
548	Point	549	Educational Building	BE001	SK Leban Chondong	2681	Paha	Government	Primary	National	Full Board
549	Point	550	Educational Building	BE001	SK Mierchong Jaya	2668	Paha	Government	Primary	National	Full Board
550	Point	556	Educational Building	BE001	SK Sinar Mutiara	2660	Paha	Government	Primary	National	Full Board

Contoh :

Pertanyaan :Non Spatial:-

'Bil tadika & KOLEJ di SEM. MALAYSIA'

The screenshot displays the ArcMap interface with the following components:

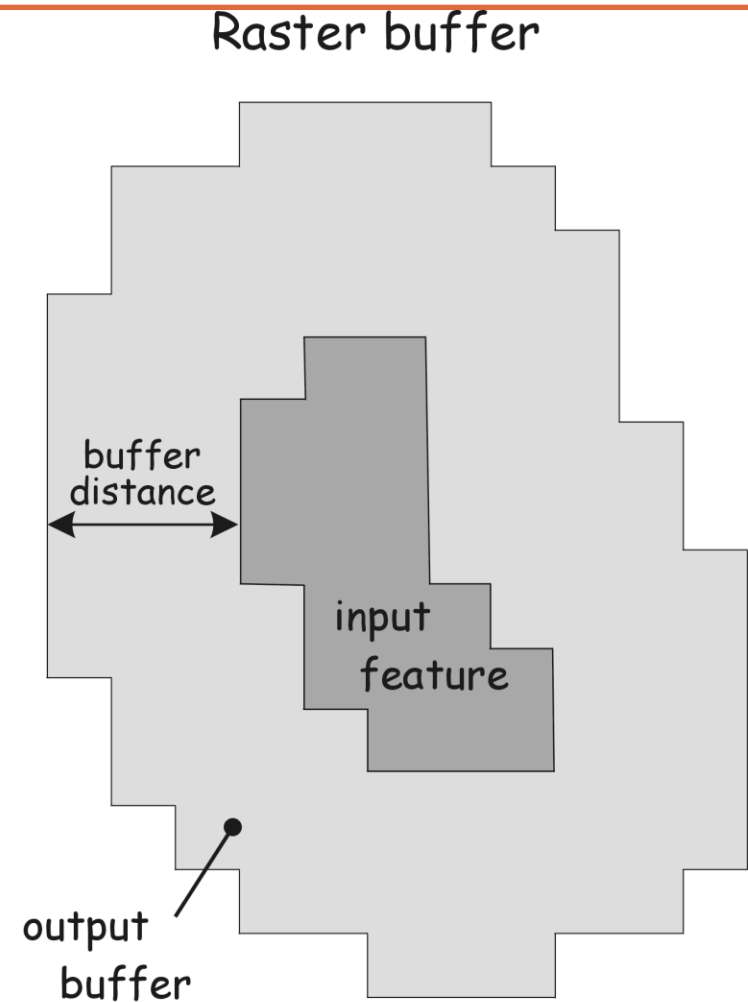
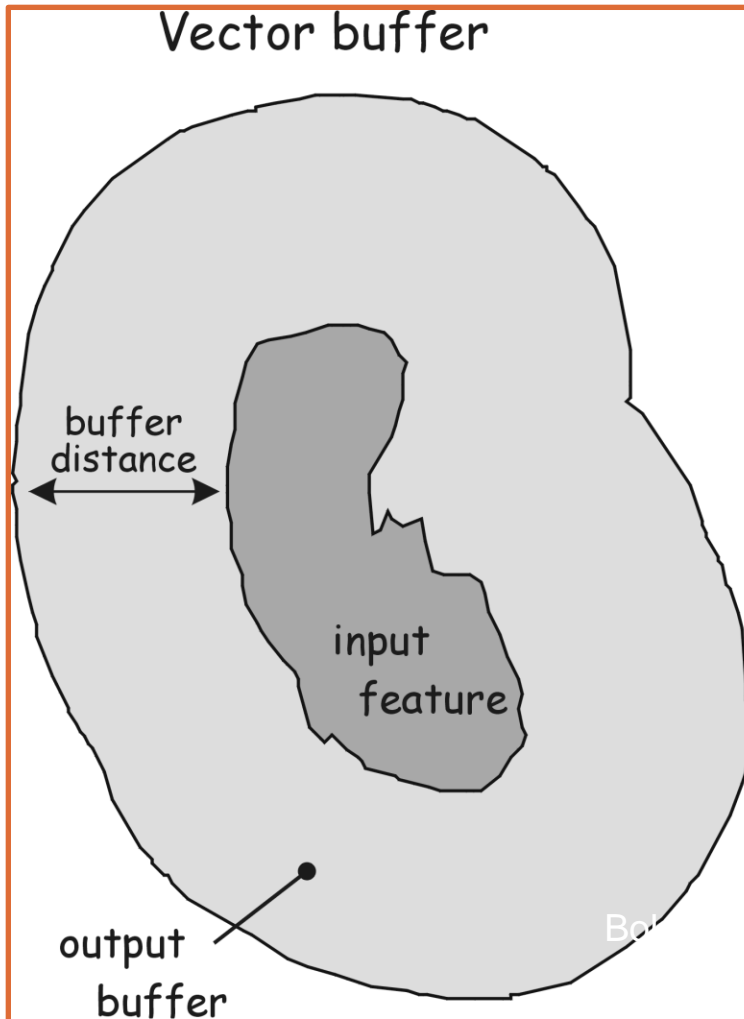
- Table of Contents:** Shows layers for 'Bangunan_Pendidikan' and 'Negeri' (States).
- Table:** A data table for 'Bangunan_Pendidikan' with columns: FID, Shape, OBJECTID, FNM, and F. It lists 6822 rows of educational buildings.
- Map:** A map of Malaysia where different states are color-coded. Educational buildings are plotted as points across the map.
- Select By Attributes Dialog:** A dialog box for selecting features based on attributes. It is set to the 'Bangunan_Pendidikan' layer. The method is 'Create a new selection'. The selection criteria are: "EDL" IN ('College', 'Pre School').

FID	Shape	OBJECTID	FNM	F
6753	Point	6754	Educational Building	BE
6755	Point	6756	Educational Building	BE
6757	Point	6758	Educational Building	BE
6765	Point	6766	Educational Building	BE
6766	Point	6767	Educational Building	BE
6767	Point	6768	Educational Building	BE
6771	Point	6772	Educational Building	BE
6773	Point	6774	Educational Building	BE
6774	Point	6775	Educational Building	BE
6775	Point	6776	Educational Building	BE
6776	Point	6777	Educational Building	BE
6777	Point	6778	Educational Building	BE
6779	Point	6780	Educational Building	BE
6780	Point	6781	Educational Building	BE
6787	Point	6788	Educational Building	BE
6788	Point	6789	Educational Building	BE
6791	Point	6792	Educational Building	BE
6793	Point	6794	Educational Building	BE
6797	Point	6798	Educational Building	BE
6798	Point	6799	Educational Building	BE
6800	Point	6801	Educational Building	BE
6803	Point	6804	Educational Building	BE
6804	Point	6805	Educational Building	BE
6810	Point	6811	Educational Building	BE
6814	Point	6815	Educational Building	BE
6817	Point	6818	Educational Building	BE
6818	Point	6819	Educational Building	BE
6544	Point	6545	Educational Building	BE
6562	Point	6563	Educational Building	BE
6573	Point	6574	Educational Building	BE
6580	Point	6581	Educational Building	BE
6590	Point	6591	Educational Building	BE
6591	Point	6592	Educational Building	BE
6597	Point	6598	Educational Building	BE
6599	Point	6600	Educational Building	BE
6605	Point	6606	Educational Building	BE
6611	Point	6612	Educational Building	BE
6622	Point	6623	Educational Building	BE
6626	Point	6627	Educational Building	BE
6632	Point	6633	Educational Building	BE
6635	Point	6636	Educational Building	BE
6643	Point	6644	Educational Building	BE
6680	Point	6681	Educational Building	BE
6681	Point	6682	Educational Building	BE
6686	Point	6687	Educational Building	BE
6732	Point	6733	Educational Building	BE

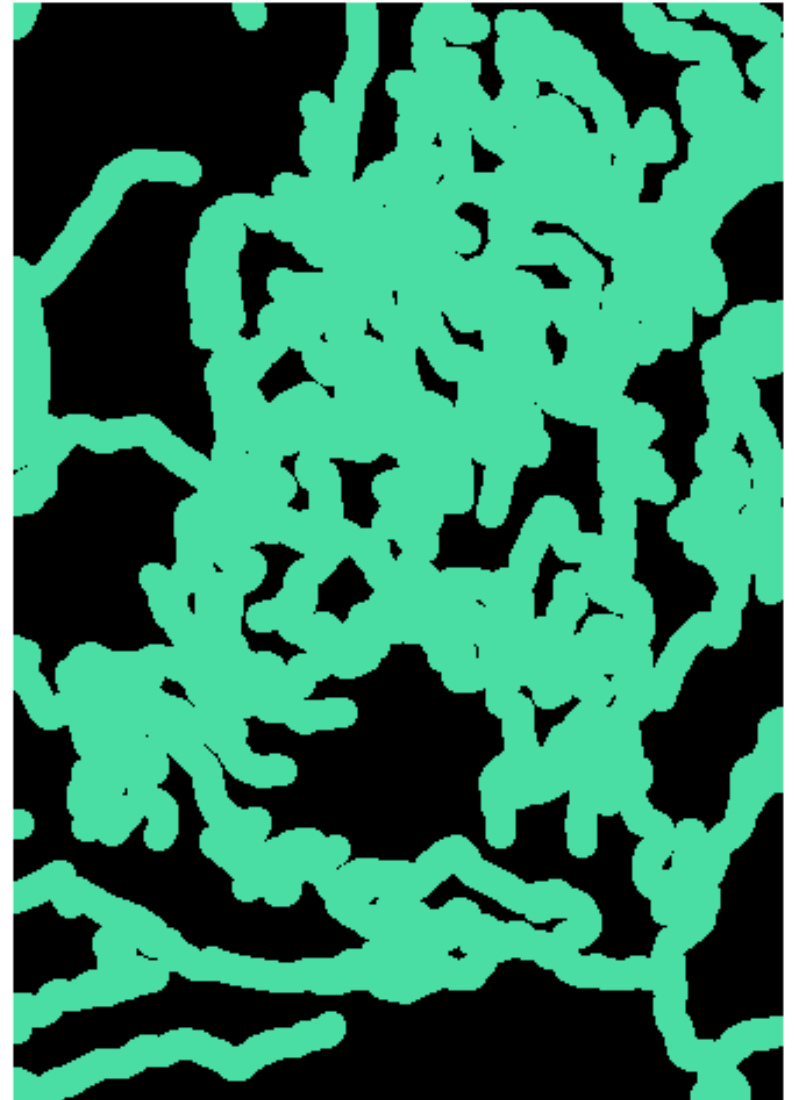
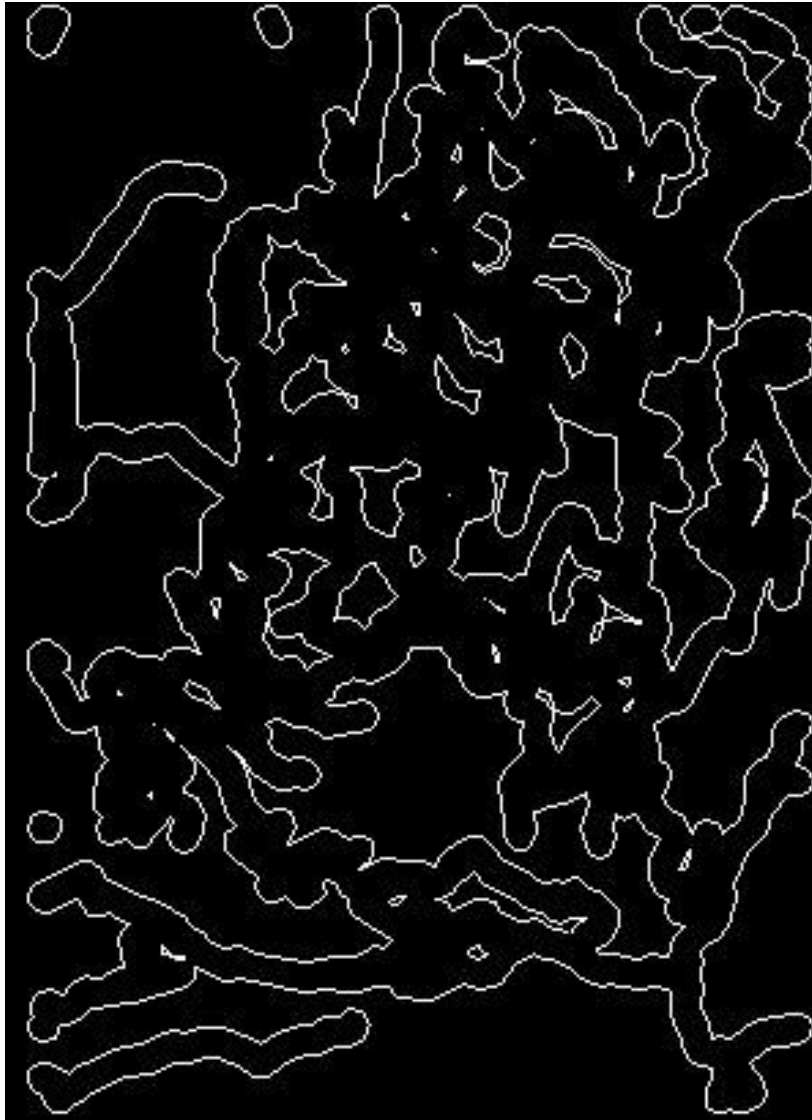
3. Analisis Penimbal (buffer)

1. Operasi 'Buffer' merupakan operasi yang biasa digunakan dalam analisis spasial.
2. Ianya digunakan untuk menghasilkan suatu kekangan kawasan baru yang merangkumi objek-objek seperti titik, garisan, kawasan dan lain-lain.
3. Ianya juga akan menghasilkan kawasan tindihan hasil dari rebakan titik, garisan, kawasan dan sebagainya yang akan memberikan suatu identiti baru bagi tindihan tersebut

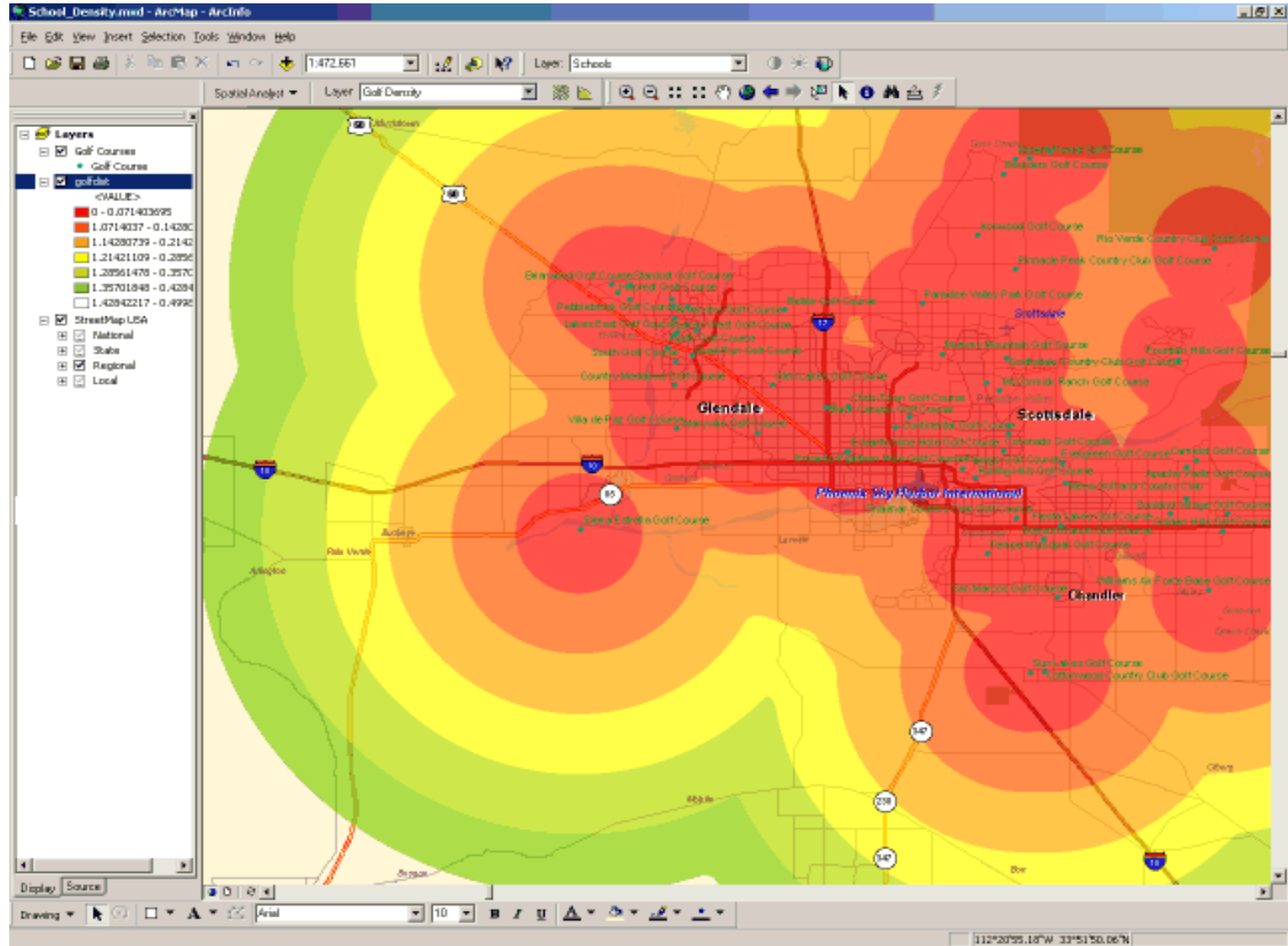
Buffer samb.

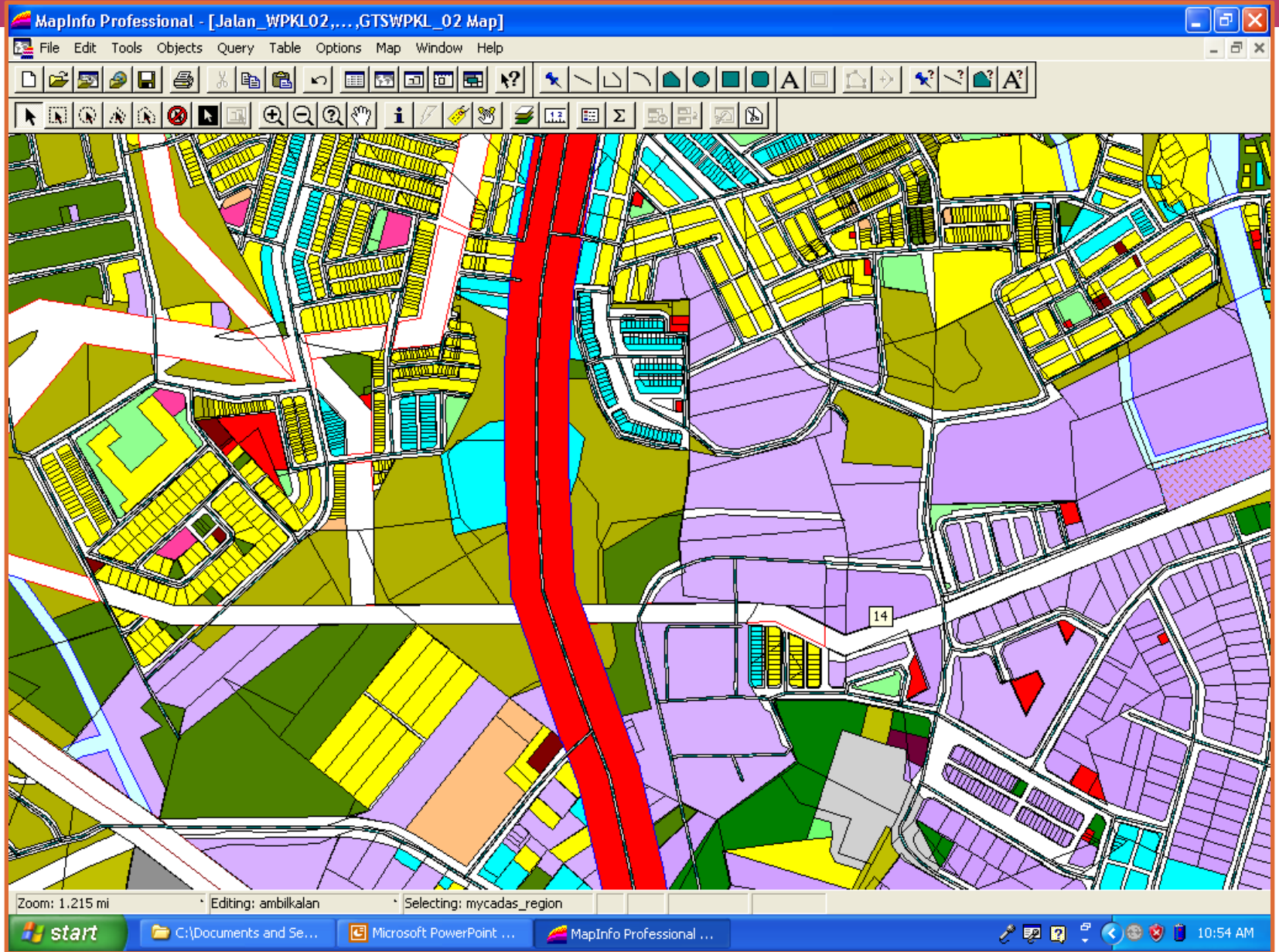


Contoh Buffer



Contoh di bawah adalah untuk menunjukkan suatu objek titik melalui proses Buffer – sebagai contoh titik tersebut mewakili pusat gempa bumi berkadaran dengan jarak. Semakin jauh jarak dari Pusat, semakin berkurangan kesan gegaran dan ini ditunjukkan dengan jelas secara visual.





Contoh di atas adalah apabila suatu objek garisan di 'buffer' kan

SAMPLE CASE 1: HPAI OUTBREAK

ONLY 10 MINUTES
FOR MAKING
DECISION

(Lingkaran 5 km dari lokasi jangkitan)

OUTBREAK
LOCATION
(H5N1)

- Accurate Information
- Speed up decision making process
- Report ready
- Flexible data collection

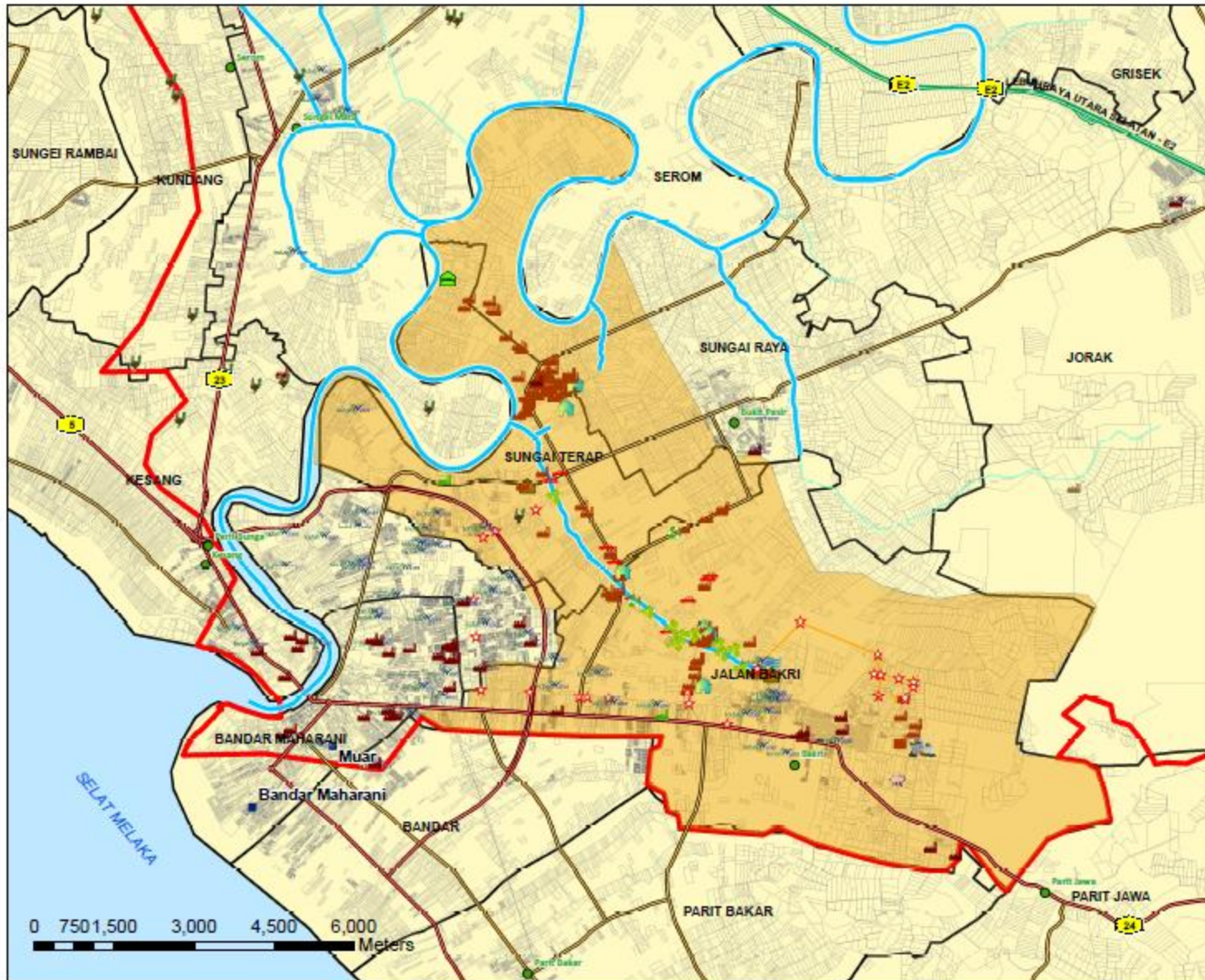
Attributes of ladang08

FID	Shape	OBJECTID_1	OBJECTID	NAMA	ALAMAT	JEHIS	MUKIM	KOD_LA
14	Point	0	0	SEAH HENG LYE	Kuala Tasek	Ayam pedaging	16	
15	Point	0	0	SEAH MOK KHOON	Kuala Tasek	Ayam pedaging	16	
16	Point	0	0	TAN SIAM NAI @ TAN SIAW LAI	Permatang Tinggi	Ayam kampung	14	
17	Point	0	0	GOH AH TEAM	Kuala Tasek	Ayam kampung	14	
18	Point	0	0	GOH SWEE LONG	Kampung Manggis	Ayam kampung	16	
19	Point	0	0	GOH SWEE JOO	Permatang Tinggi	Ayam kampung	14	
20	Point	0	0	LOH HOY SING	Permatang Tinggi	Ayam penelur	14	
21	Point	0	0	GOH TEIK HYE	Permatang Tinggi	Ayam kampung	14	
22	Point	0	0	YAP MUAY HONG	Permatang Tinggi	Ayam kampung	14	
23	Point	0	0	CHAI AH KOW	76, Tingkat Serindit 5, Desa Jawi	Ayam kampung	4	
24	Point	0	0	NG LENG SOOI	1482, Jln Besar, Taman Sri Tasek	Ayam baka	2	
25	Point	0	0	EVER-RAY SDN BHD	972, 973, Mk 2, Jln Prntg Pauh	Ayam pedaging	2	
26	Point	0	0	GOH SWEE LONG	1763, Jln Pasar, Permatang Tinggi	Ayam kampung	2	
27	Point	0	0	TAN CHYE KHOON	1084, Jln Baru, Permatang Tinggi	Ayam kampung	1	
28	Point	0	0	TAN AH BAA	1828, Kepala Gajah, Spg Ampat	Ayam pedaging	1	
29	Point	0	0	TAN AH BAA @ TAN KAI TONG	1475, Jln Megat Harun, Bukit Mertajam	Ayam pedaging	2	

Record: 1 | Show: All Selected | Records (30 out of 40 Selected) | Options

Detailed info on
Farms involved

PETA PUNCA PENCEMARAN SUB LEMBANGAN SG. TERAP



- Petunjuk**
- Pesisir
 - Lintang Agam
 - Lintang Bah
 - Puncu Efluen Perindustrian
 - Puncu Efluen Kiang Dalam
 - Puncu Efluen Industri (Makam Persekutuan (MP))
 - Puncu Efluen Puncu Yang Ditangkap (PUD)
 - Puncu Efluen Kiang Kelapa Bast
 - Bungalow
 - Gubuk
 - Kaki
 - Kiang (Luar Kawasan (LK))
 - Kawasan Tani
 - Cukai
 - Puncu Klorin Berseku
 - Reserai
 - Puncu Puncu Berseku
 - Tumbang
 - Parit
 - Laluan Laluan
 - Jalan Persekutuan
 - Jalan Nagari
 - Lot Kawalan
 - Selangir Sungai Muar

Peta Kunci:



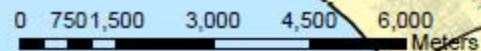
Disediakan Oleh:



Pusat Infrastruktur Data Geospasial Negara (MNCGI)
Kementerian Sumber Asli & Alam Sekitar (NRE)

Penafian:

MNCGI tidak akan bertanggungjawab terhadap sebarang kehilangan atau kerosakan data dalam penggunaan peta ini. Semua maklumat yang diperolehi adalah sesuai digunakan untuk tujuan perancangan dan bukan untuk tujuan perundangan.



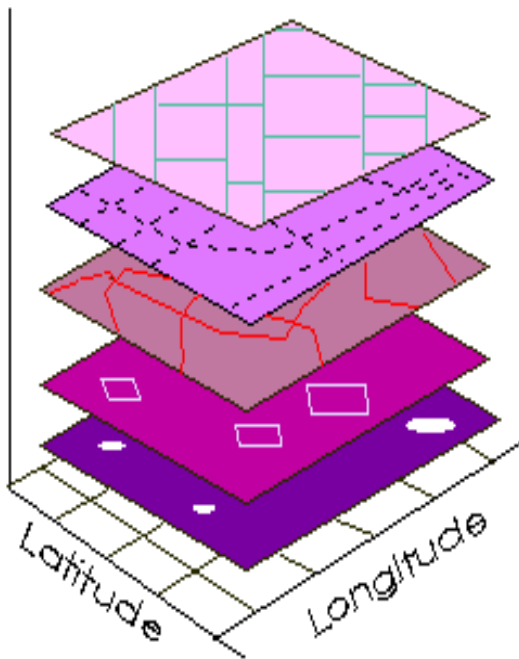
4. Analisis Tindihan

1. Analisis tindihan adalah analisis yang melibatkan multi-lapisan atau multi objek.
2. Operasi analisis dilakukan ke atas multi-lapisan secara serentak.
3. Boleh dilakukan terhadap data raster dan vektor
4. Operasi yang sangat "powerful" dalam perisian GIS kerana ia membolehkan kita membuat manipulasi data yang disusun dalam lapisan yang berbeza dan melihat hubungannya di antara satu sama lain.

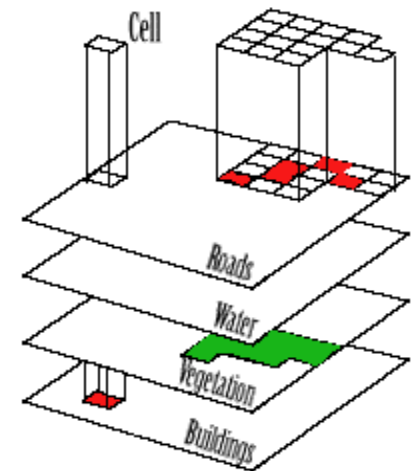
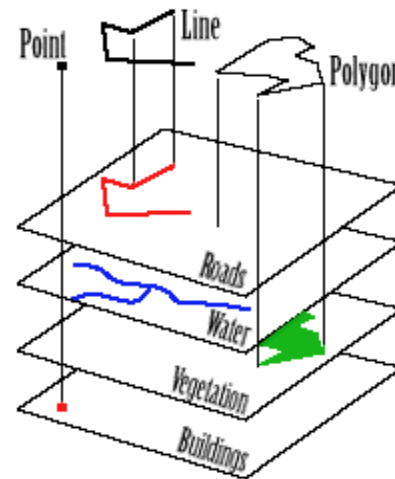
Tindihan (Overlay)

Operasi tindihan:

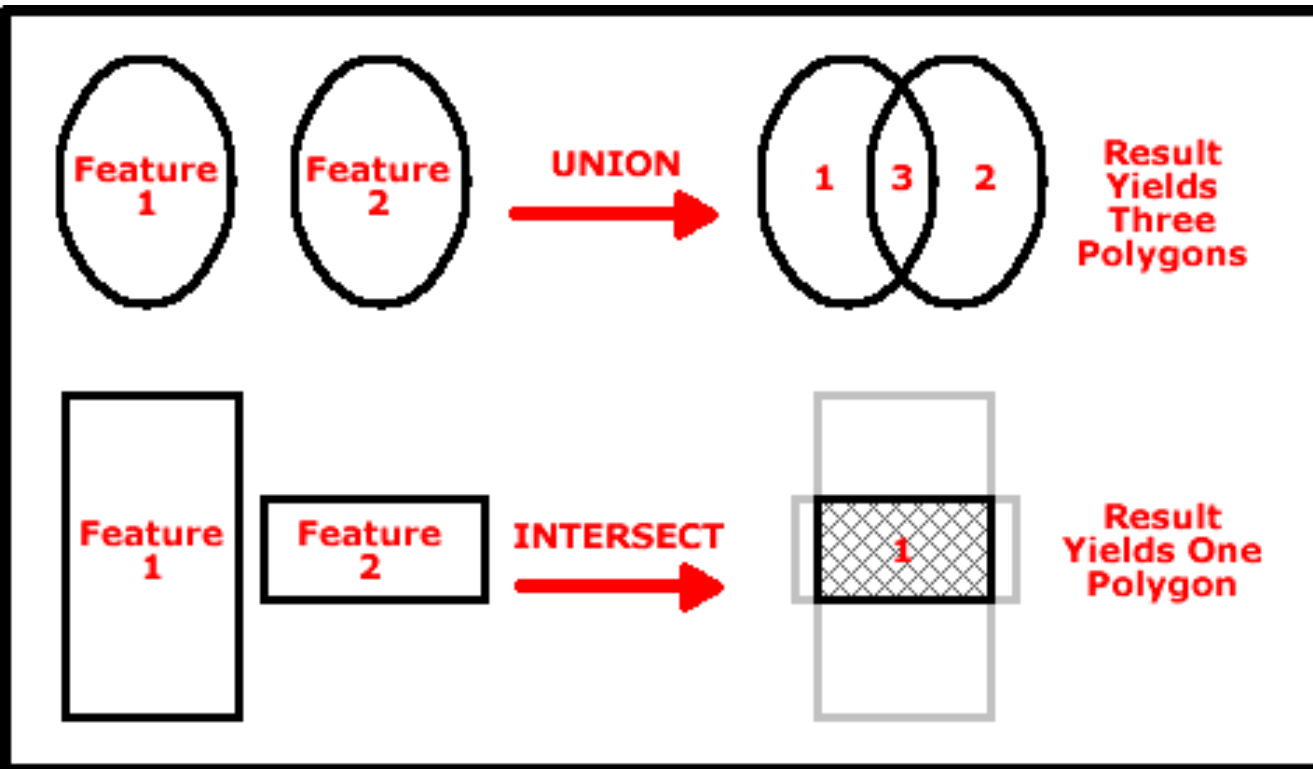
- data vektor -sangat kompleks dan memakan masa
- data raster-mudah dan cepat



Census Tracts
Roads
Bus Routes
Shopping Centers
Industrial Sites



Contoh Overlay

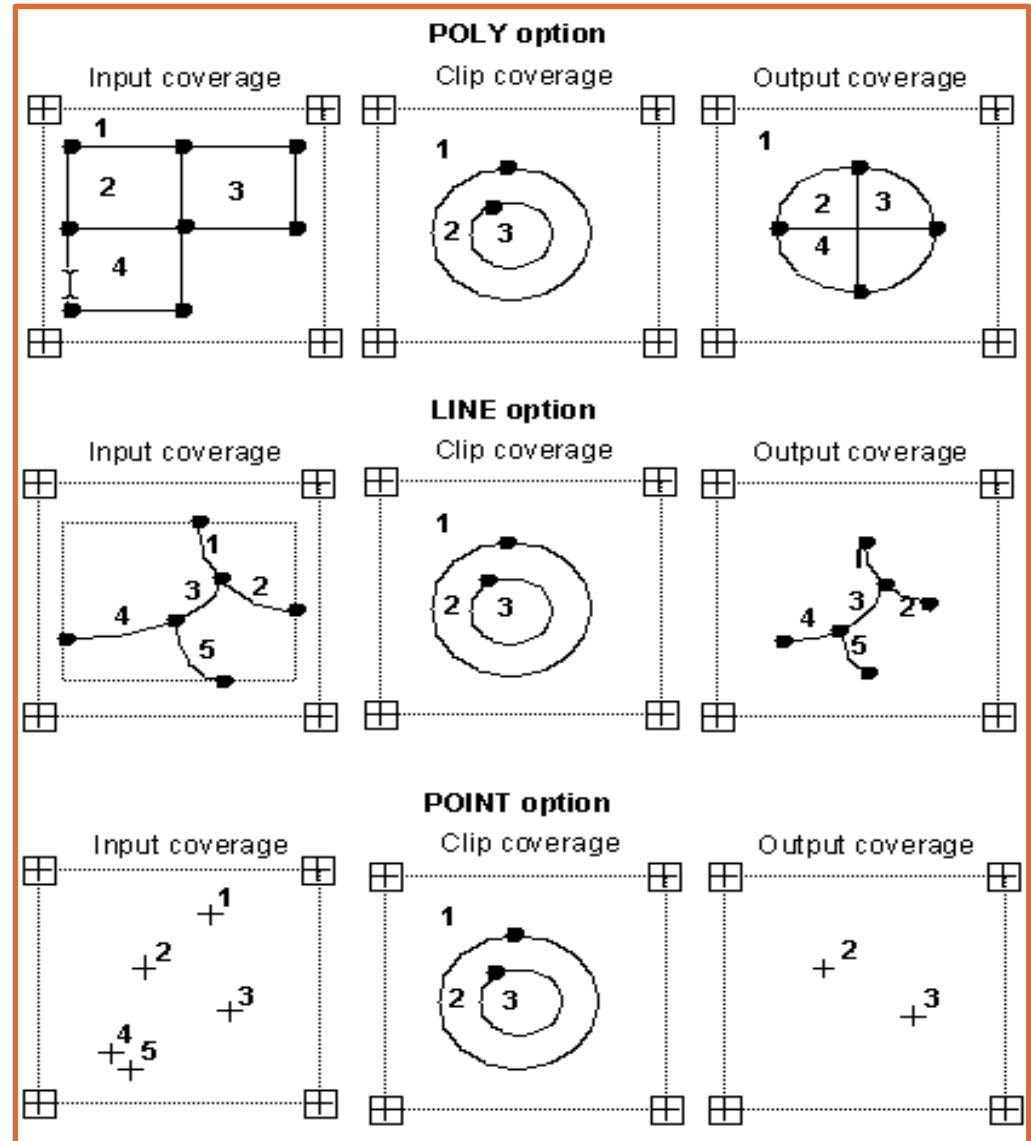


- select Overlay
- Intersect tool

- select Overlay
- Union tool

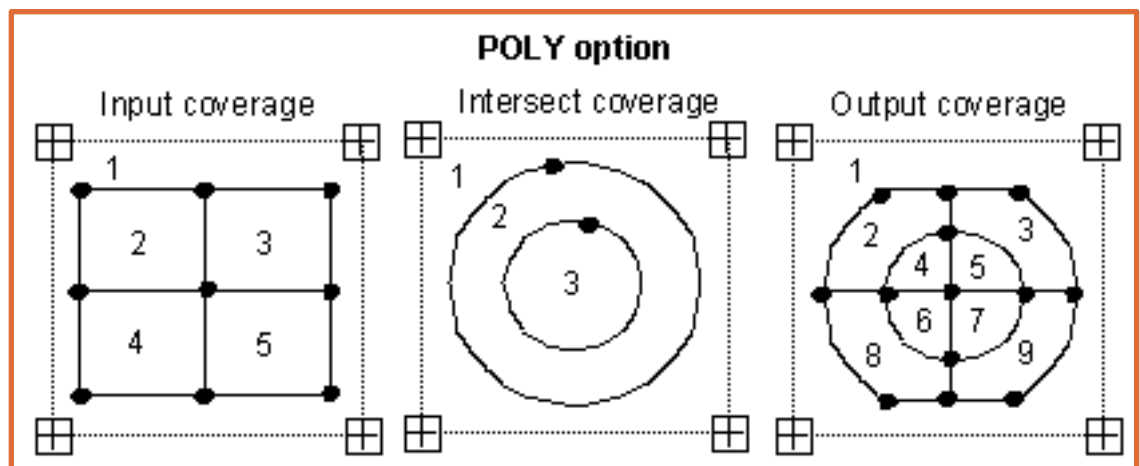
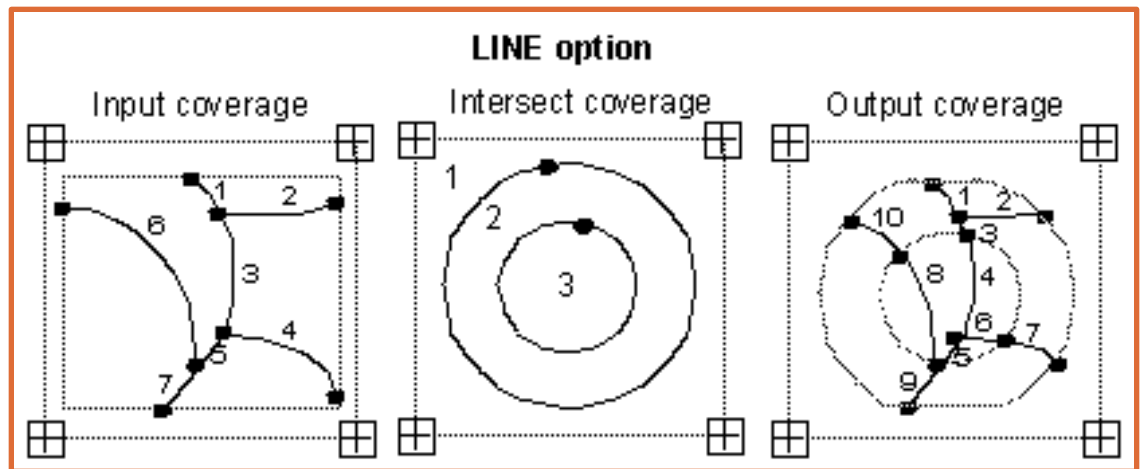
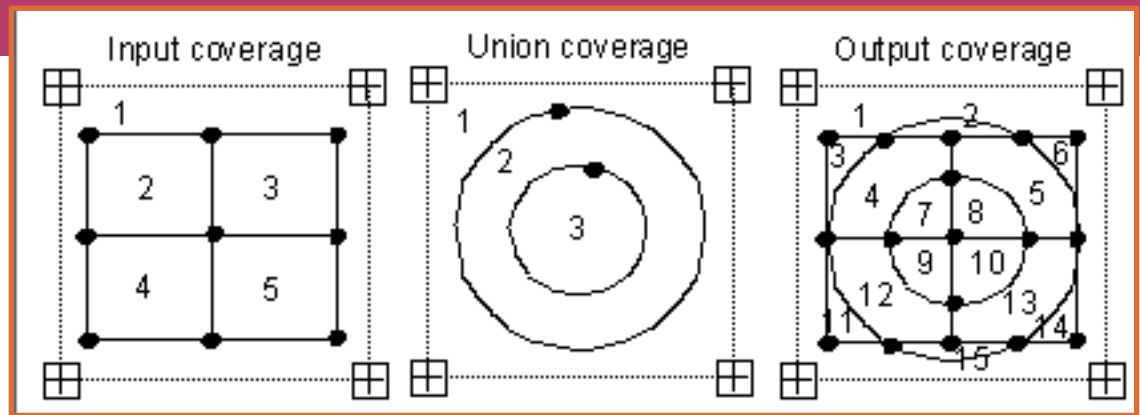
Contoh grafik bagi operasi Tindihan (Overlay)

Fungsi Clip merupakan fungsi asas dalam GIS untuk penganalisaan ke atas suatu objek menghasilkan satu rangkuman atau tindihan dalam kekangan tetapi mengekalkan identiti asal objek.

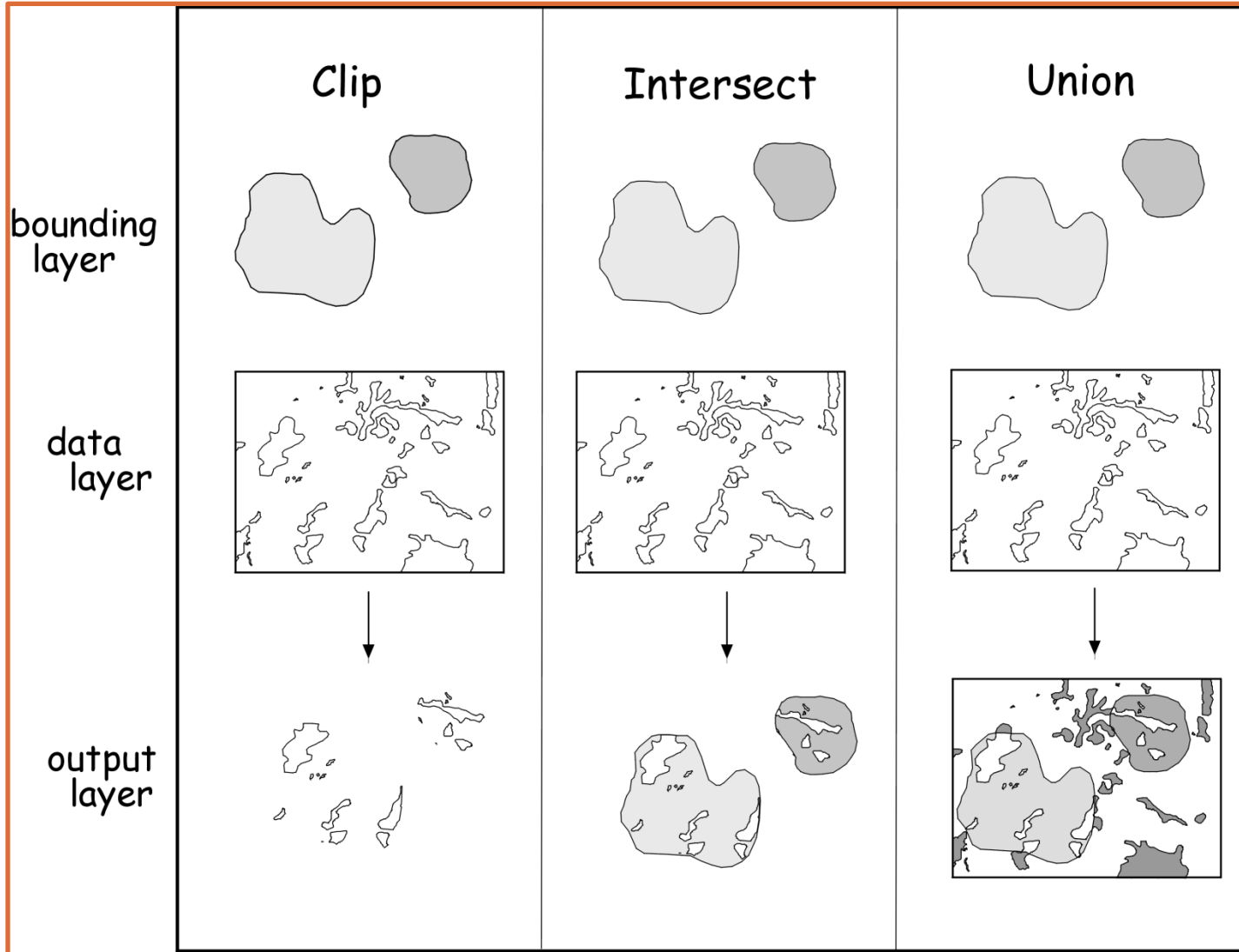


Fungsi UNION atau Penyatuan – gabungan 2 atau lebih objek untuk membentuk pecahan baru.

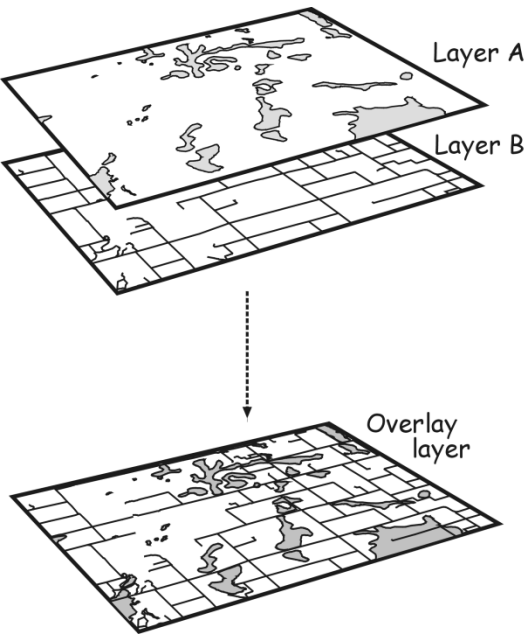
Fungsi INTERSECTION atau Persilangan – menghasilkan suatu tindihan yang di dalam kekangan gabungan objek.



Contoh..



Overlay Example - cont.



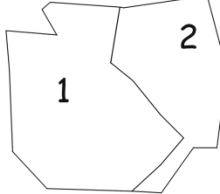
attributes for layer A

attributes for layer B

overlay attributes, combined attributes for layers A & B

Layer 1

geographic data

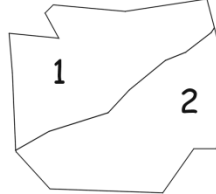


attribute data

ID	Class
1	0
2	100

Layer 2

geographic data



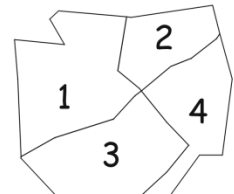
attribute data

ID	Cost
1	10
2	5

overlay

Output layer

geographic data

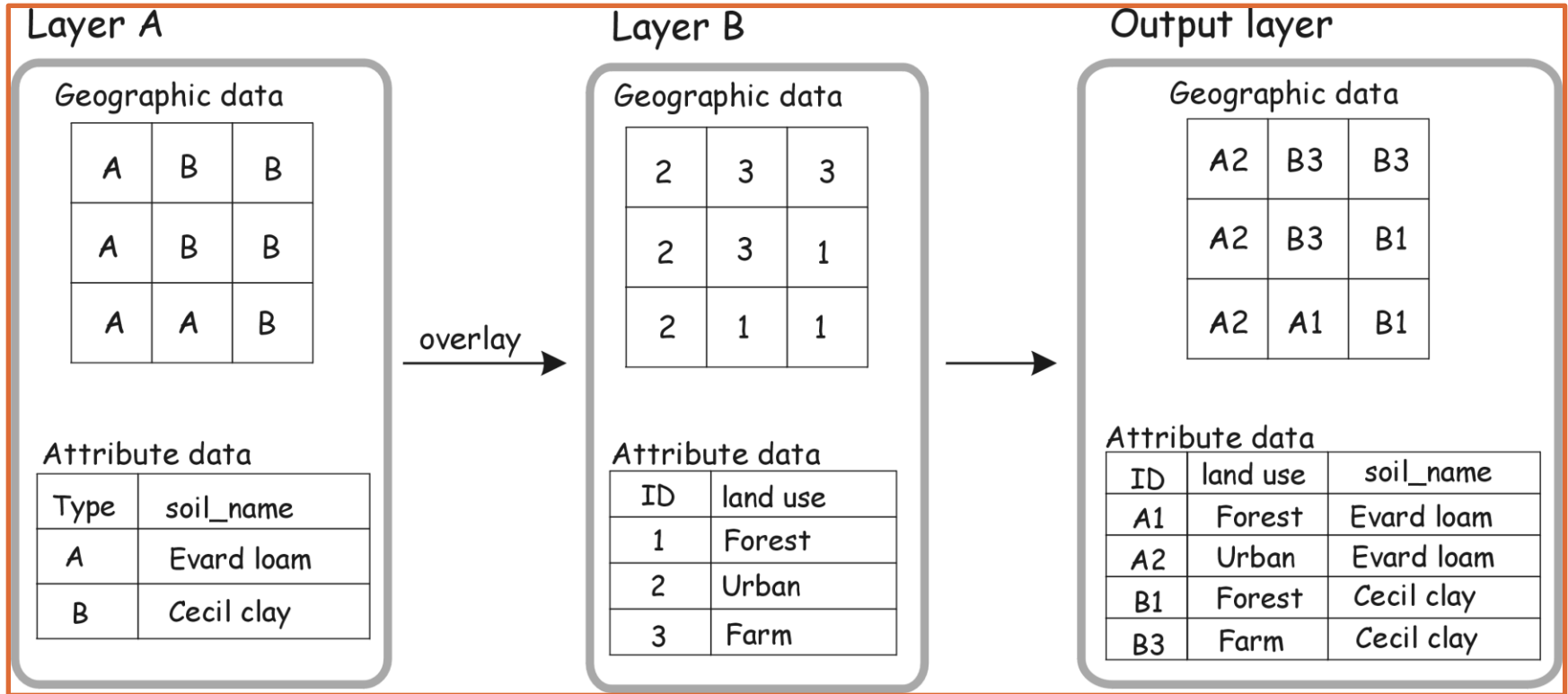


attribute data

ID	Class	Cost
1	0	10
2	100	10
3	0	5
4	100	5

- Vector overlay

Overlay Example - cont.



Raster overlay

5. Analisis Permukaan

Operasi yang melibatkan data-data 3D

- Kontur
- Slope
- Aspek
- Viewshed analysis

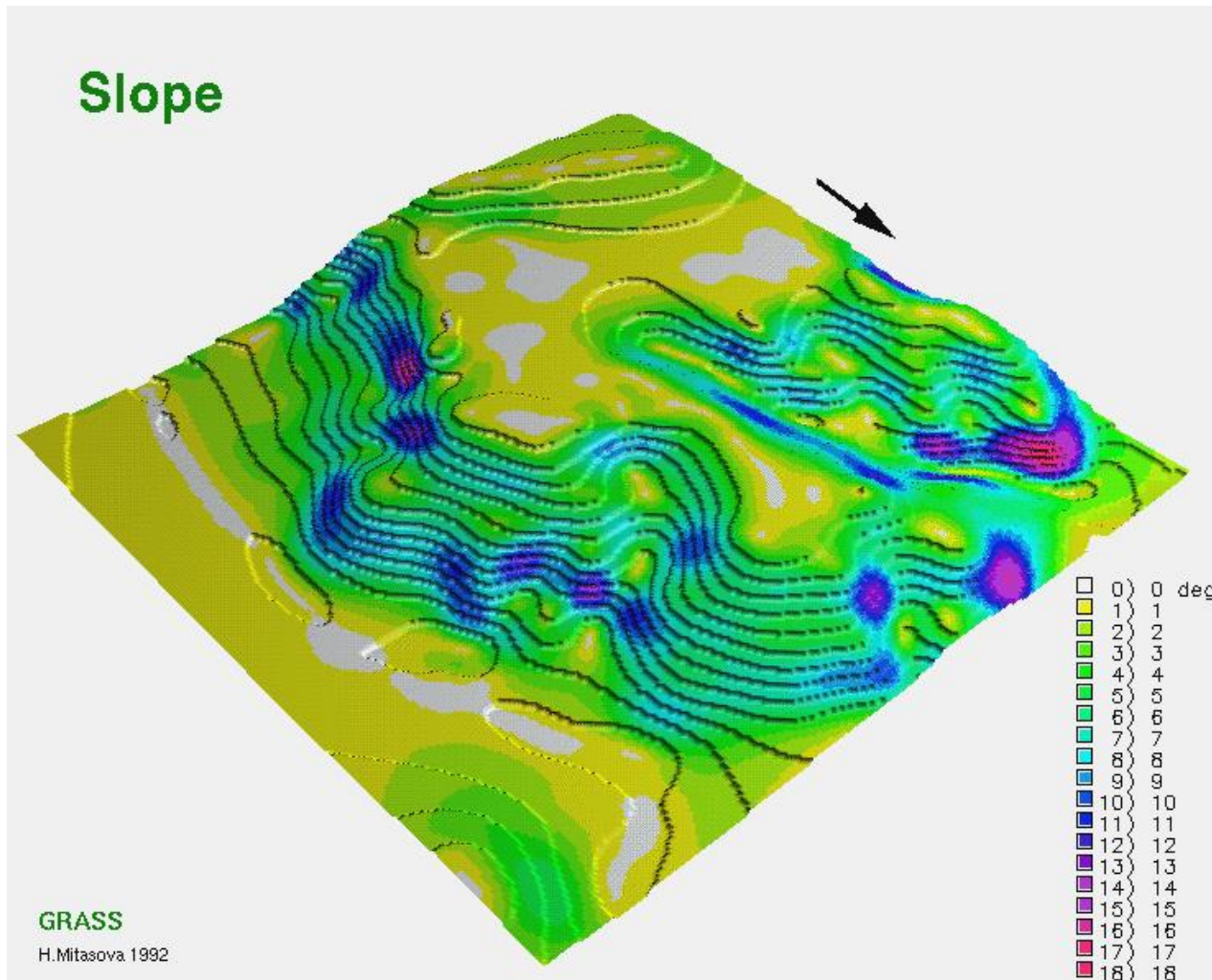
Ia adalah analisis keatas taburan data 3-dimensi

Di samping data koordinat x,y , analisis permukaan melibatkan nilai Z .

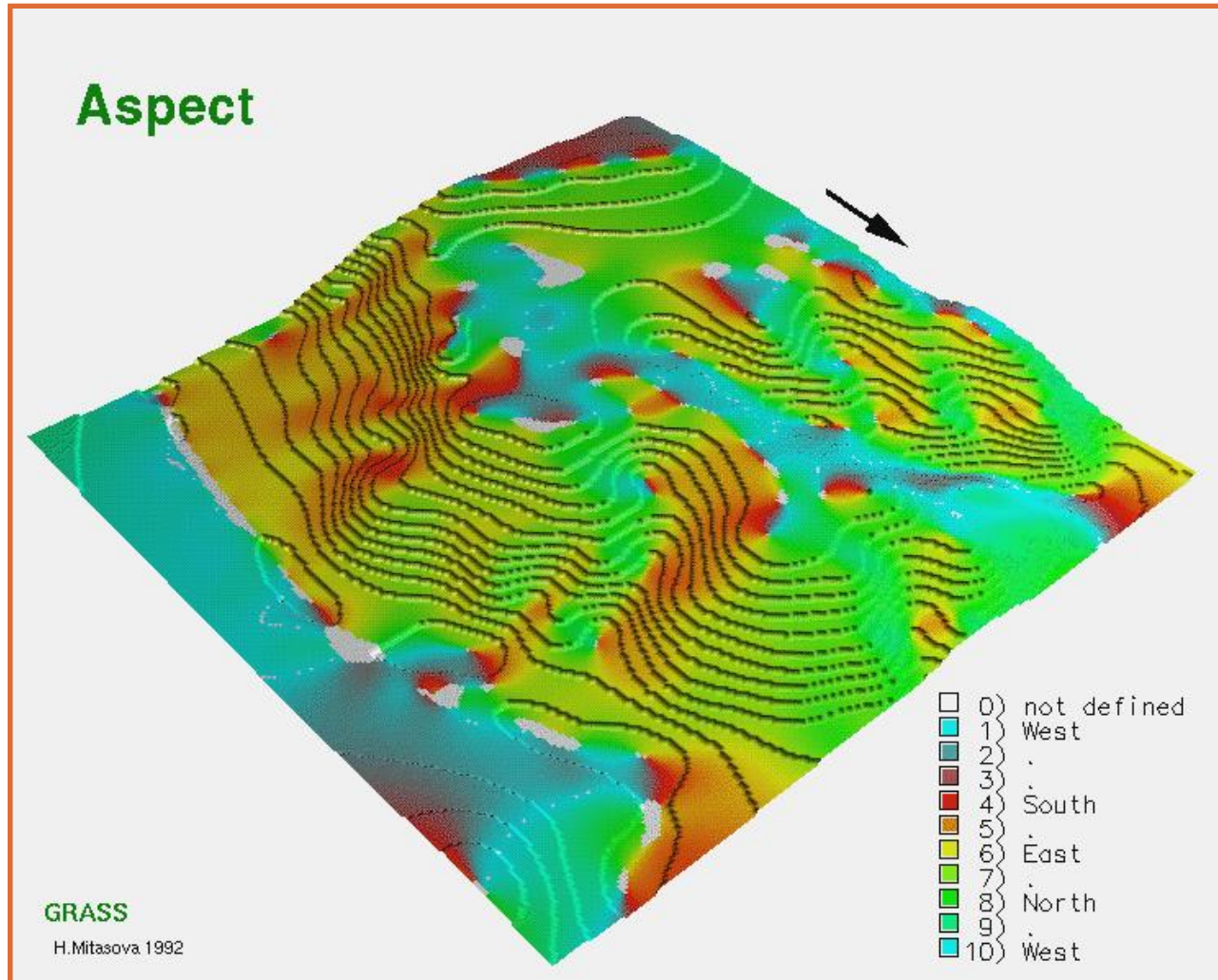
Contoh nilai Z ialah :

- ketinggian, kedalaman, suhu, taburan hujan, pendapatan, nilai pasaran harta tanah, kadar jenayah

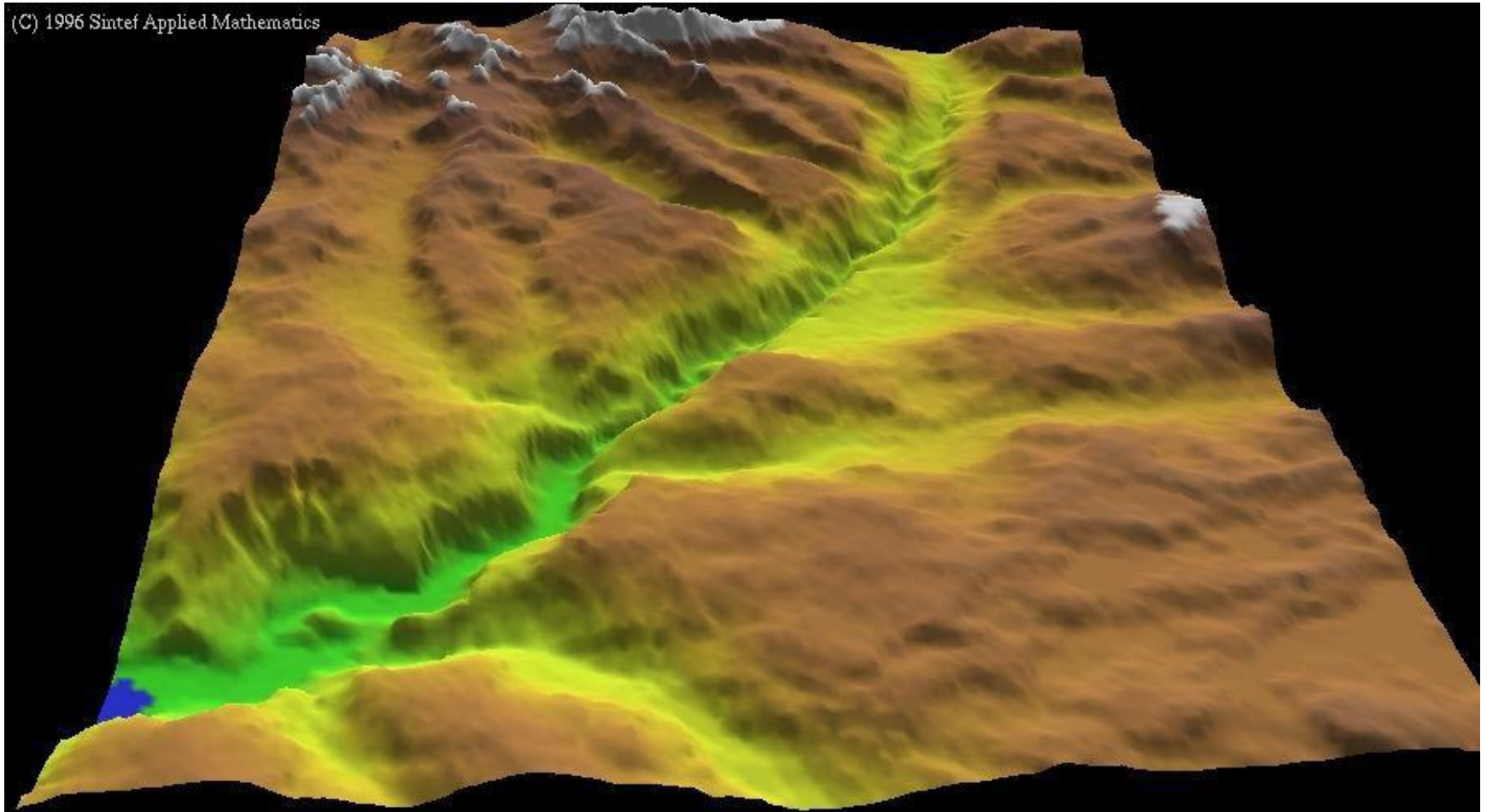
Analysis GIS –(Analysis Slope)



Analisis GIS – Analisis Permukaan (Analisis Aspect)

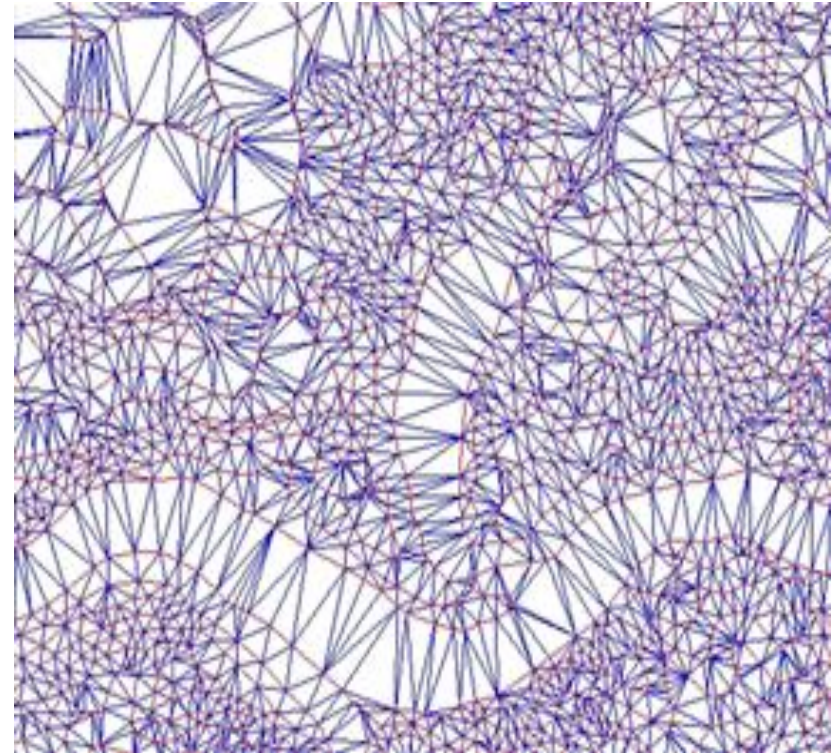


Analisis GIS — Analisis Permukaan (Analisis kontur)

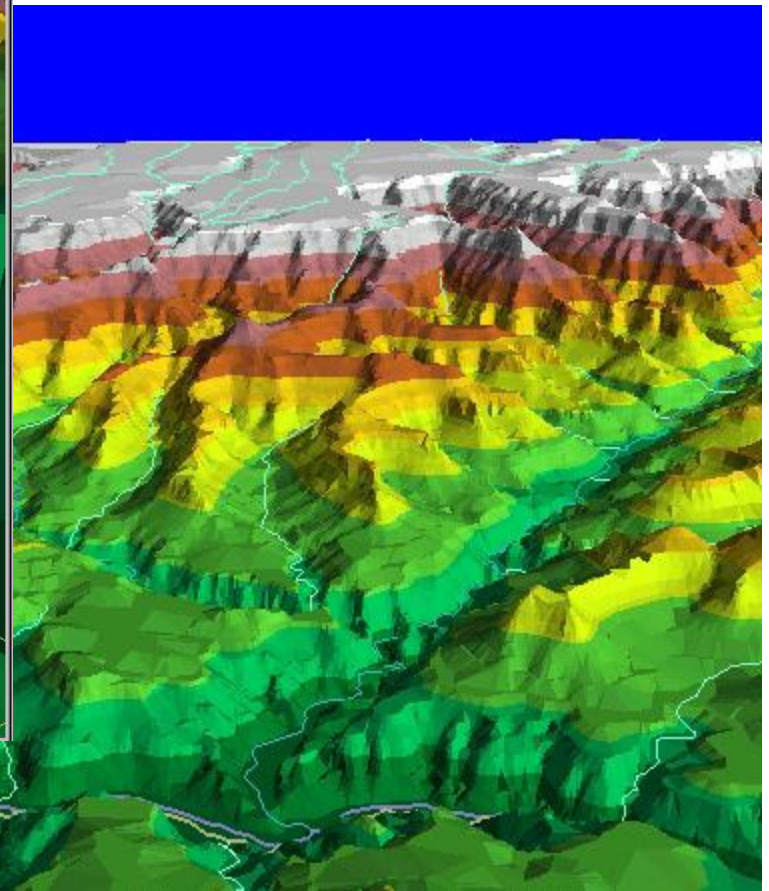
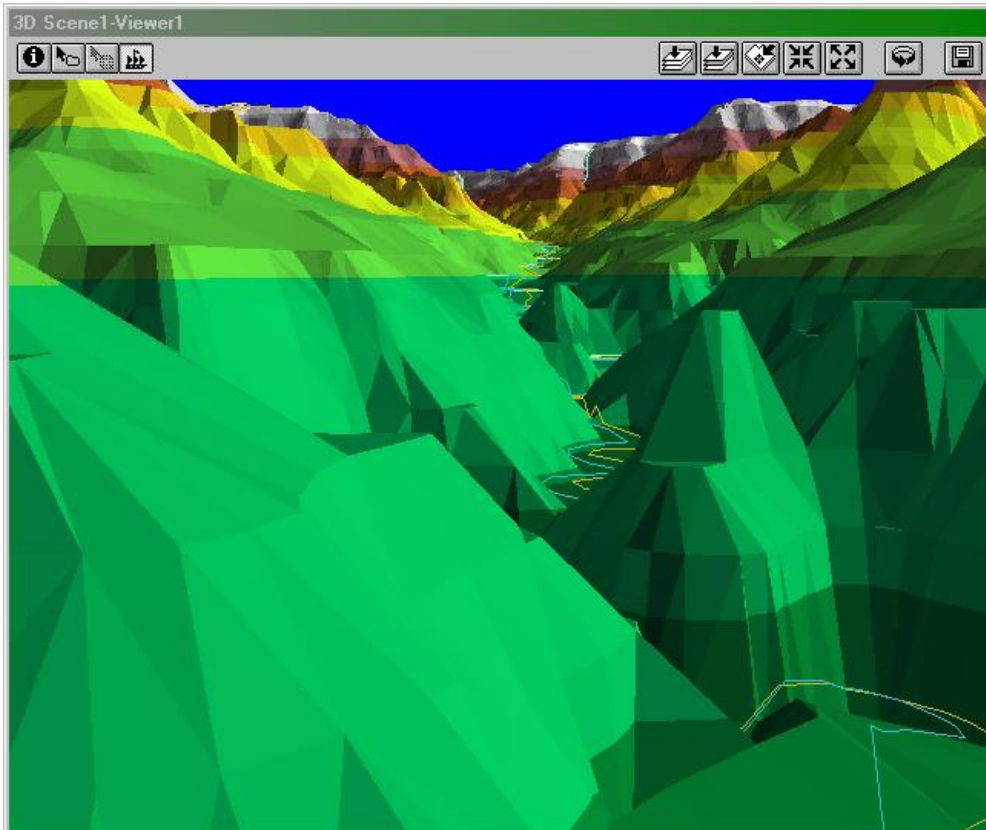


Analisis GIS – Analisis Permukaan

Model Topologi3-D menghasilkan triangulasi jaringan permukaan



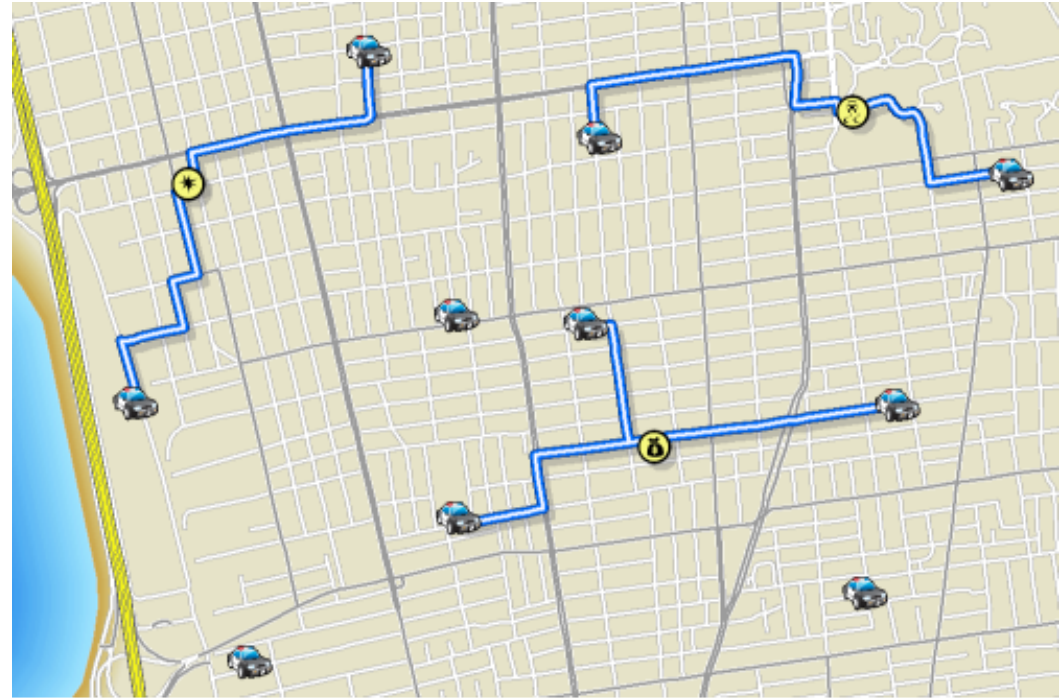
Analisis GIS – Analisis Permukaan



6. Analisis jaringan

- **Maklumat yang berbentuk jaringan seperti jalanraya, sungai, paip utiliti, dan lain-lain sangat sesuai untuk tujuan analisis ini.**
- **Biasanya, sistem jaringan ini digunakan untuk memodelkan butiran atau data spatial yang berbentuk linear dan mempunyai ciri-ciri pergerakan atau pengaliran dari satu tempat ke tempat yang lain, contoh-contohnya seperti jaringan jalan raya, sungai, laluan paip, bekalan tenaga elektrik dan sebagainya.**

Contoh : network analysis



What is the quickest way to get from point A to point B

Which ambulances or patrol cars can respond quickest to an incident

SESI LATIHAN