

# APLIKACE PROSTOROVÉ A TVAROVÉ METRIKY PRO HODNOCENÍ (SUB)URBANIZACE

Sylvie HARTMANNOVÁ

Vedoucí práce: Mgr. Vít PÁSZTO

StantGis Team

Reg. č.: CZ.1.07/2.3.00/20.0170



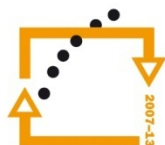
evropský  
sociální  
fond v ČR



EVROPSKÁ UNIE



MINISTERSTVO ŠKOLSTVÍ,  
MLÁDEŽE A TĚLOVÝCHOVY



OP Vzdělávání  
pro konkurenceschopnost

INVESTICE  
DO ROZVOJE  
VZDĚLÁVÁNÍ



# CÍLE

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- Aplikace metody prostorové a tvarové metriky při hodnocení (sub)urbanizace
- Najít prostorové vzory uspořádání, tvaru a podoby urbanizovaných ploch
- Shrnutí dostupných metod prostorové a tvarové metriky a jejich využití
- Zhodnocení softwarových možností výpočtu metrik

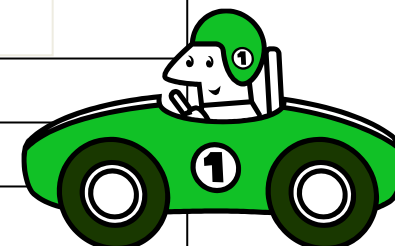
# METRIKY

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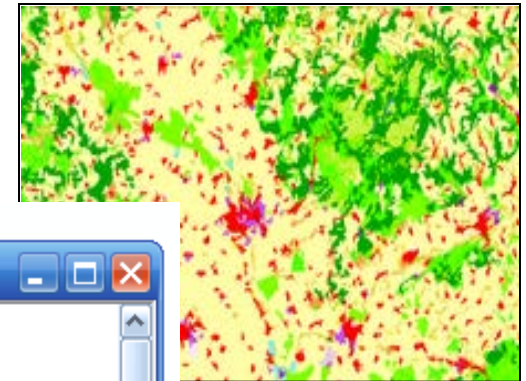
- Informace o prostorové skladbě a konfiguraci krajinných prvků
- 100 různých metrik
- Velikost, tvar, početnost, hustota, různorodost krajinných prvků
- Neustálé spekulace o využití
- Užítí v dalších odvětvích: hodnocení tvarů měst



Shape metrics	Shape metrics	
Area index	Normalized Girth index	
Circumscribing index	Interior index	
Cohesion index	<div> </div>	
Normalized Cohesion		
Contiguity index		
Core index (for 50, 20)		
Core Area Index (for		
Number of Core Area		
Dispersion index		
Normalized Dispersion		
Depth index		
Normalized Depth index		
Detour index		
Normalized Detour index		
Exchange index		Normalized Spin index
Normalized Exchanged index		Traversal index
Girth index	Normalized Traversal index	



# POSTUP



Shape Metrics

Input feature class: helsinki\_obrys

Metrics

Select the metric(s) to be analyzed. The

unnamed1

File Analysis Help

New Open Save Save as Run

Input layers Analysis parameters

Batch management

Layers

C:\mestaeu\bratislavar

File type : ---

Row count : ---

Column count : ---

Cell size : ---

Background value : ---

Band : ---

Add layer...

Edit layer info...

Remove layer

Remove all layers

Export batch

Import batch

Patch metrics

Class metrics

Landscape metrics

Results

Area - Edge Shape Core area Contrast Aggregation

Select all De-select all

Class-Level Deviations

Standard Deviation (CSD) Percentile (CP5)

Landscape-Level Deviations

Standard Deviation (LSD) Percentile (LPS)

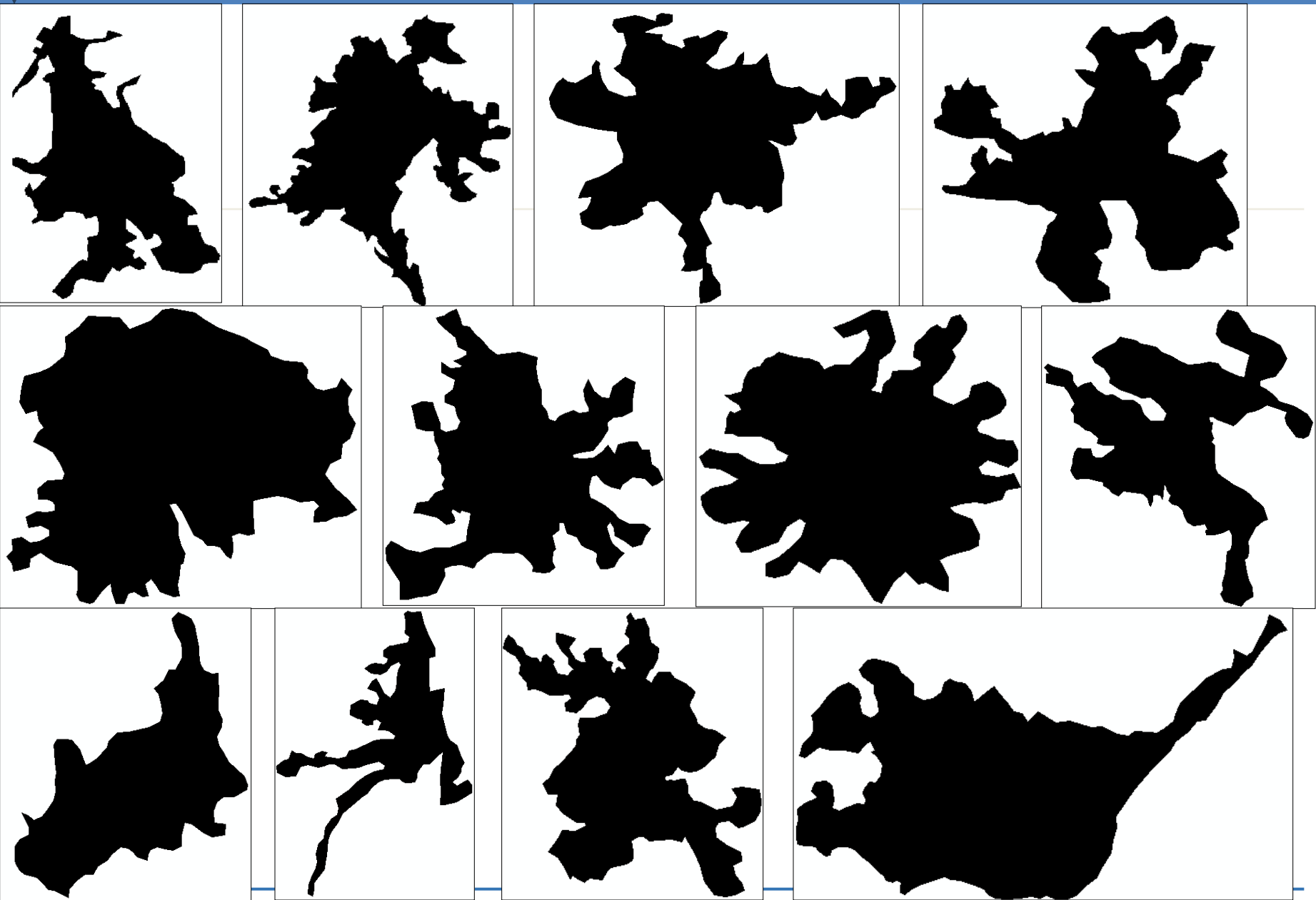
Patch Area (AREA)

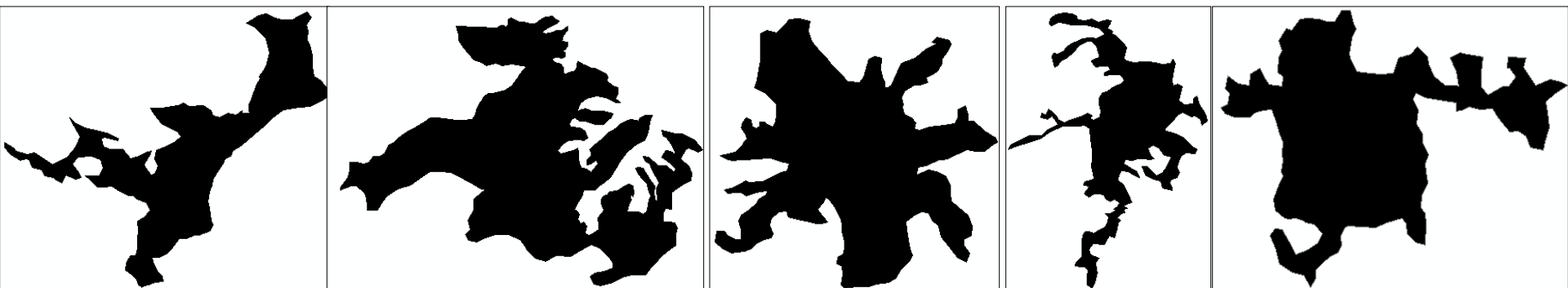
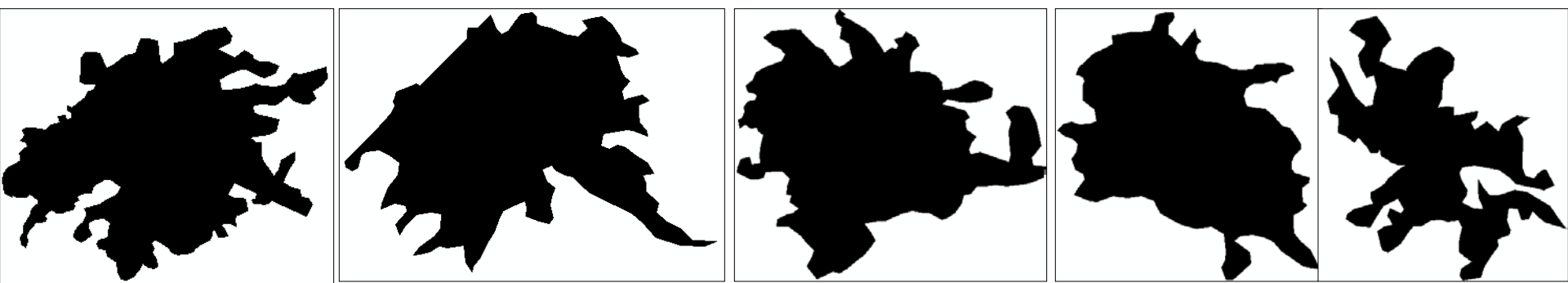
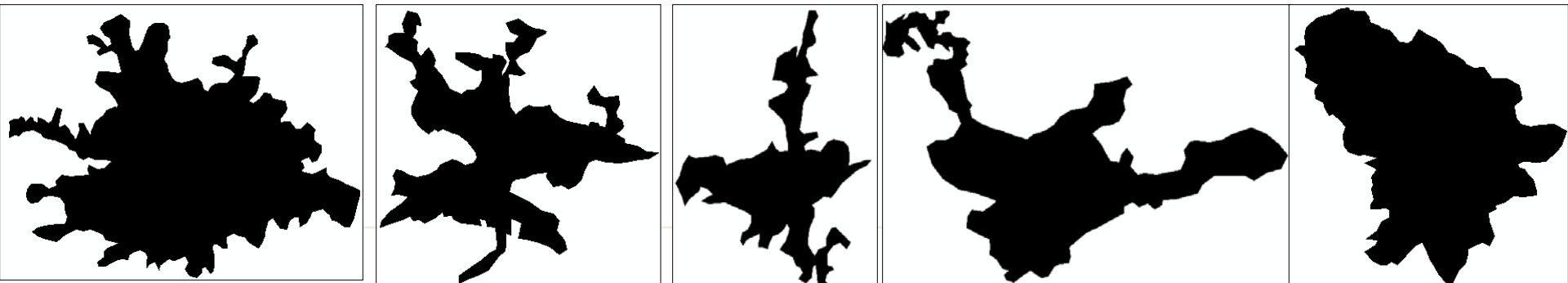
Patch Perimeter (PERIM)

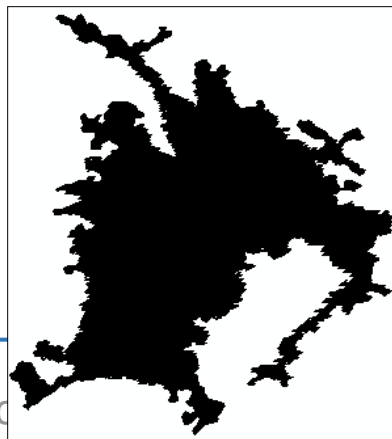
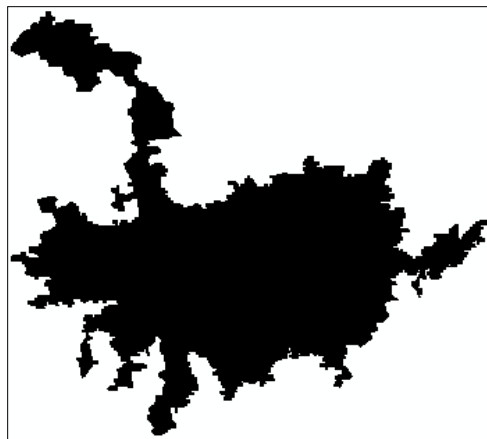
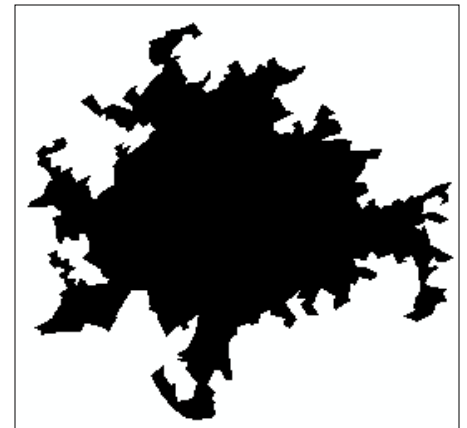
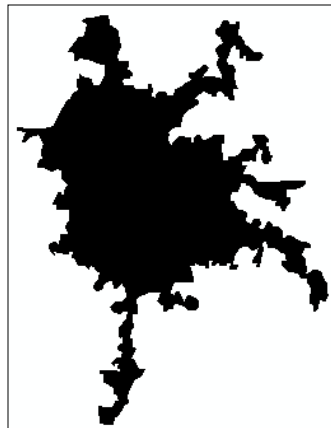
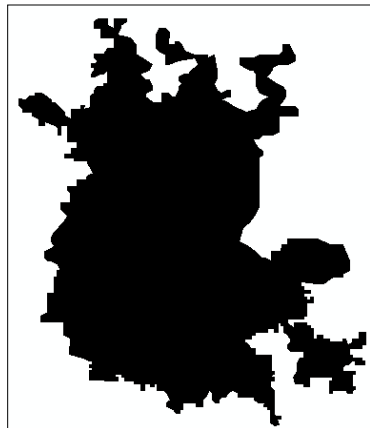
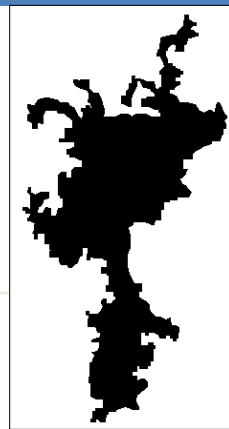
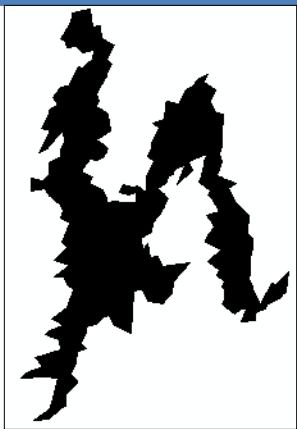
Radius of Gyration (GYRATE)

centered on the polygon's centroid.

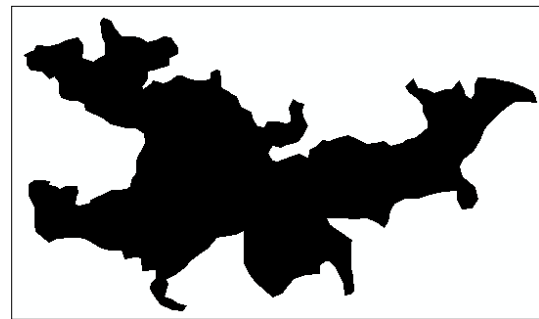
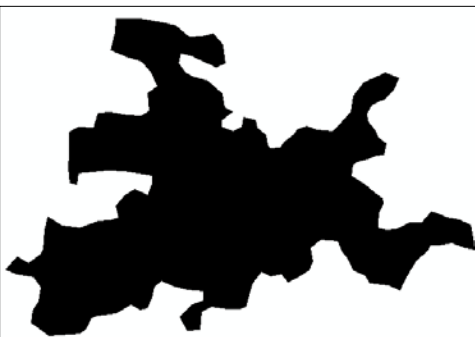
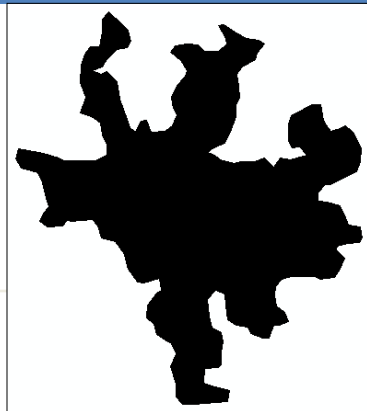
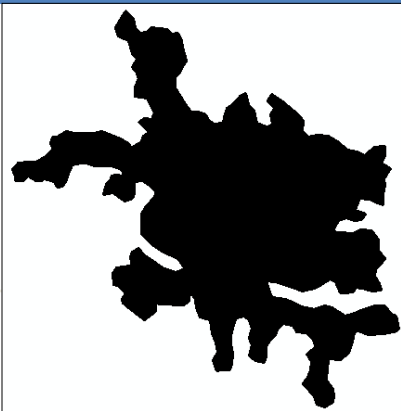
OK Cancel Environments... << Hide Help Tool Help











# VÝSLEDKY

Název	nDepth	Girth	nGirth	Dispers	nDispers	Range	nRange	Detour	nDetour	Cohesion	nCohesion	Traversal	nTraversal
Bombaj	0,286287	4416,8322	0,38832	12728,609	0,647301	45646,477	0,49836	125279,27	0,570455	14867,78669	0,692652	21739,558	0,666162
Káhira	0,387301	8959,2525	0,521344	20951,095	0,70205	75418,678	0,455719	217106,14	0,497341	22035,44011	0,706098	28643,178	0,763898
Los Angeles	0,490478	23888,185	0,530962	56415,483	0,739227	182240,65	0,493746	453511,79	0,623319	51352,2557	0,793232	75642,696	0,75729
Chicago	0,514759	78936,451	0,58606	154375,62	0,756841	433117,96	0,621954	1223535,7	0,691669	145405,7011	0,838675	206477,99	0,83056
Sao Paolo	0,496235	16024,142	0,579014	30851,375	0,759511	95150,954	0,581704	262194,54	0,663195	30850,24887	0,812207	42373,462	0,831575
Nairobi	0,513635	4673,5675	0,589454	8975,0857	0,763641	26258,826	0,603883	70715,521	0,704471	8761,273162	0,819353	11908,332	0,847729
Moskva	0,498176	13361,105	0,621851	24337,137	0,77247	79388,547	0,541287	236548,93	0,570709	23089,39212	0,842527	33341,901	0,820494
Tokio	0,451439	21097,056	0,537515	41575,96	0,806658	121746,63	0,644768	371870,64	0,66316	41278,23428	0,860894	61940,881	0,806795
Peking	0,5249	13790,019	0,662969	22249,167	0,829188	61600,924	0,675326	193874,29	0,67411	20732,23561	0,908375	30193,461	0,877139
Mexico City	0,560369	44851,101	0,628947	77051,083	0,835419	212173,49	0,672198	680172,31	0,658748	71260,04823	0,906051	101052,49	0,898507

## Footprint

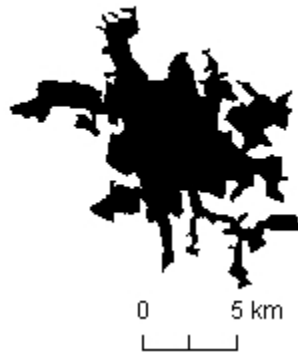
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- Ide
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Název	AREA	PERIM	GYRATE	PARA	SHAPE	FRAC	CIRCLE	CONTIG	C100	NC100
Praha	31 018	317 400	7364,2455	10,2328	4,4958	1,154	0,6383	0,9709	28789	5
Ostrava	11 207	154 000	4424,0005	13,7414	3,6321	1,1393	0,5334	0,961	10128	7
Liberec	3 083	68 000	2276,2248	22,0564	3,0357	1,1298	0,6069	0,9373	2611	4
Brno	7 648	177 400	3895,242	23,1956	5,0686	1,1789	0,6531	0,9338	6391	6
Pardubice	2 286	56 800	2217,3267	24,8469	2,9583	1,1285	0,6666	0,9284	1874	4
Plzeň	4 061	109 600	2903,4948	26,9884	4,2813	1,1665	0,6679	0,9226	3278	5
České Budějovice	2 082	56 600	1932,9393	27,1854	3,0761	1,1343	0,5728	0,9235	1695	3
Ústí nad Labem	2 429	69 600	2463,728	28,6538	3,5152	1,1484	0,7427	0,919	1951	7
Olomouc	2 726	78 800	2214,6206	28,9068	3,7524	1,1551	0,5902	0,9195	2200	7
Hradec Králové	3 013	98 800	2447,5388	32,7912	4,4909	1,1747	0,703	0,9064	2320	10

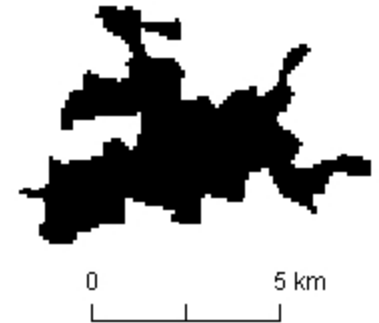
# VÝSLEDKY CLC 1990

## Fractal Dimension Index

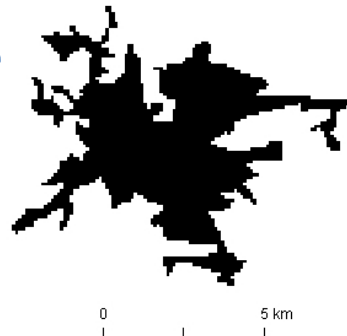
– Brno  
(1,179)



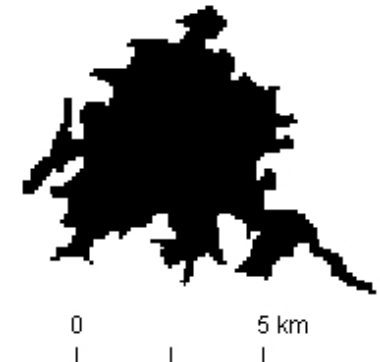
– Pardubice  
(1,129)



– Hradec Králové  
(1,175)



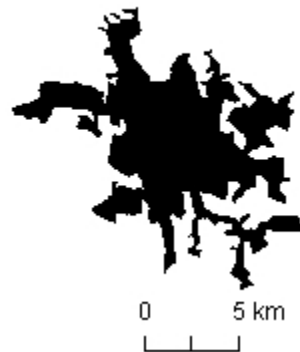
– Liberec  
(1,130)



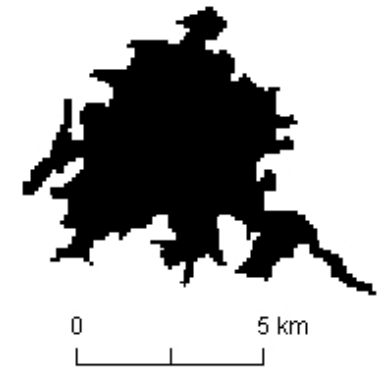
# VÝSLEDKY CLC 1990

## Depth Index

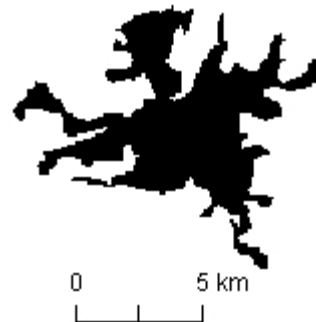
– Brno  
(0,338)



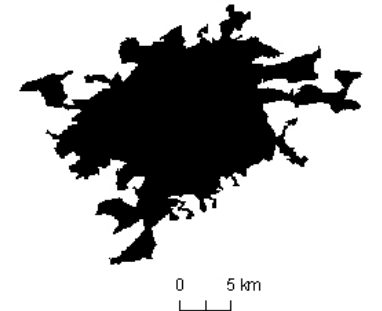
– Liberec  
(0,522)



– Plzeň  
(0,346)



– Praha  
(0,510)



# VÝSLEDKY

## CLC 1990, 2006 srovnání

- Brno

- Shape Index (5,0686, 3,2083)
- Fractal Dimension Index (1,1789, 1,1274)

$$SHAPE = \frac{.25 p_{ij}}{\sqrt{a_{ij}}} \quad \begin{array}{l} p_{ij} = \text{obvod plošky} \\ a_{ij} = \text{rozloha plošky} \end{array}$$

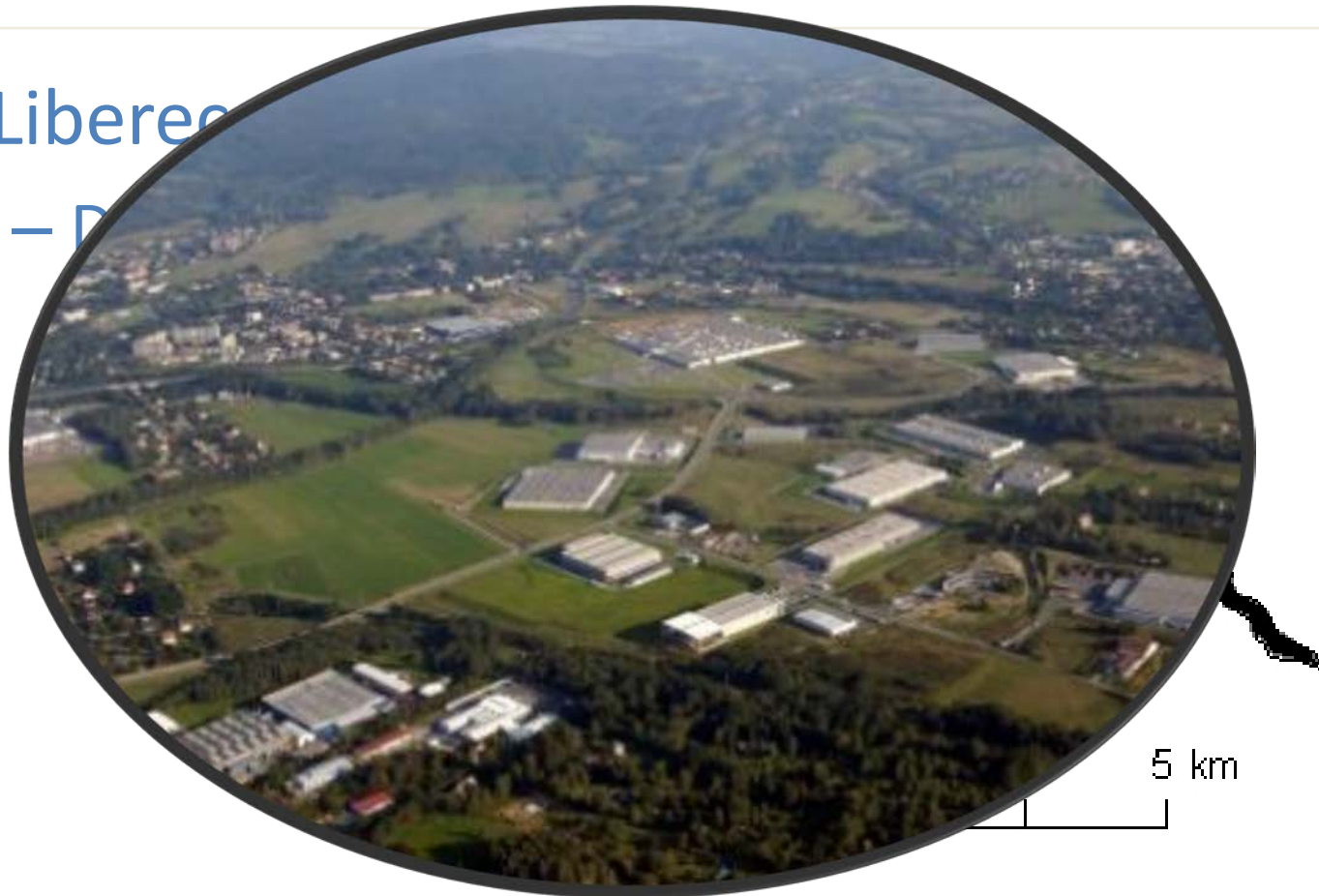




# VÝSLEDKY

## CLC 1990, 2006 srovnání

- Liberec
- D

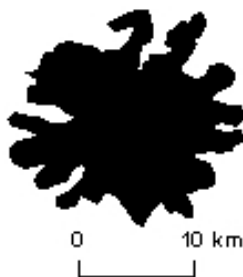


# VÝSLEDKY

## Města EU (Urban Atlas)

- CIRCLE Index

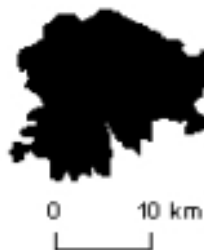
– Bukurešť  
(0,354)



– Kodaň  
(0,829)



– Brusel  
(0,442)



– Vídeň  
(0,783)



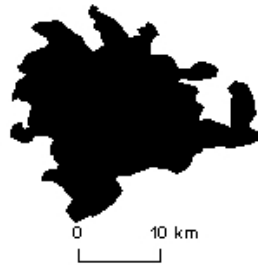
# VÝSLEDKY

## Města EU (Urban Atlas)

- Girth Index

– Řím

(0,698)



– Lublaň

(0,364)



– Sofie

(0,682)



– Dublin

(0,372)



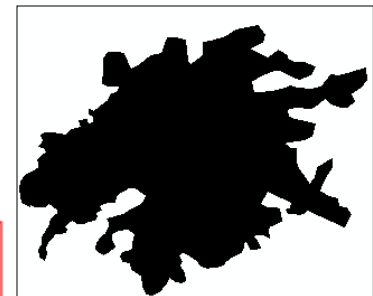
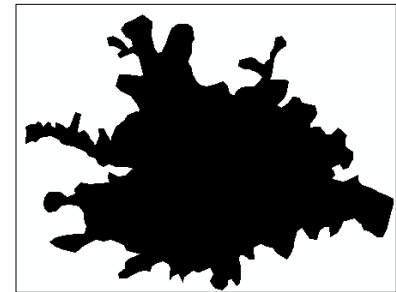
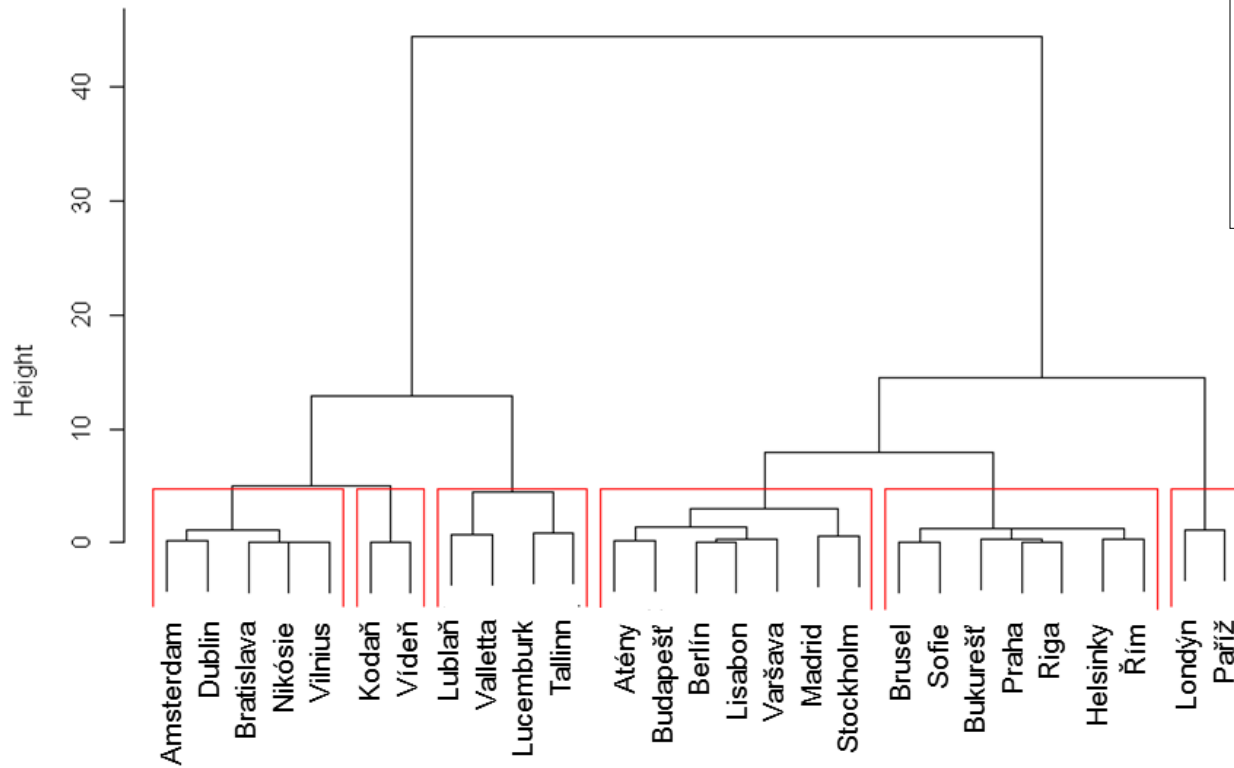
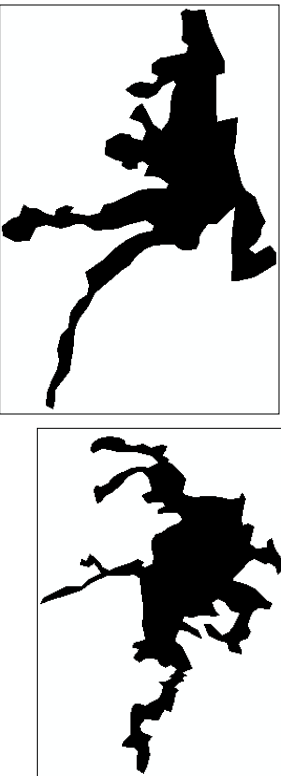


# VÝSLEDKY

## Města EU (Urban Atlas)

- Shluková analýza

Cluster Dendrogram



# VÝSLEDKY

## Města světa (Universe of Cities)

- Dispersion index

– Mexico City  
(0,835)



0 20 km

– Peking  
(0,829)



0 20 km

– Bombaj  
(0,647)



0 20 km

– Káhira  
(0,702)



0 20 km

# CELKOVÉ ZHODNOCENÍ

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- Metriky vhodné pro kvantitativní hodnocení urbanizovaných ploch
- Obtížná (subjektivní) interpretace
- Na základě výsledných hodnot použitých prostorových a tvarových metrik srovnání s dalšími přístupy hodnotící urbanizační procesy

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# Děkuji za pozornost

