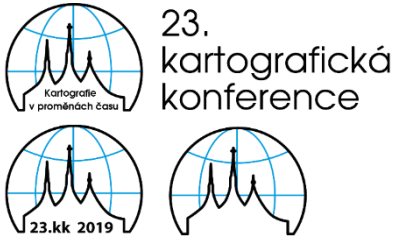


23. kartografická konference

Mapy a metody umělé inteligence

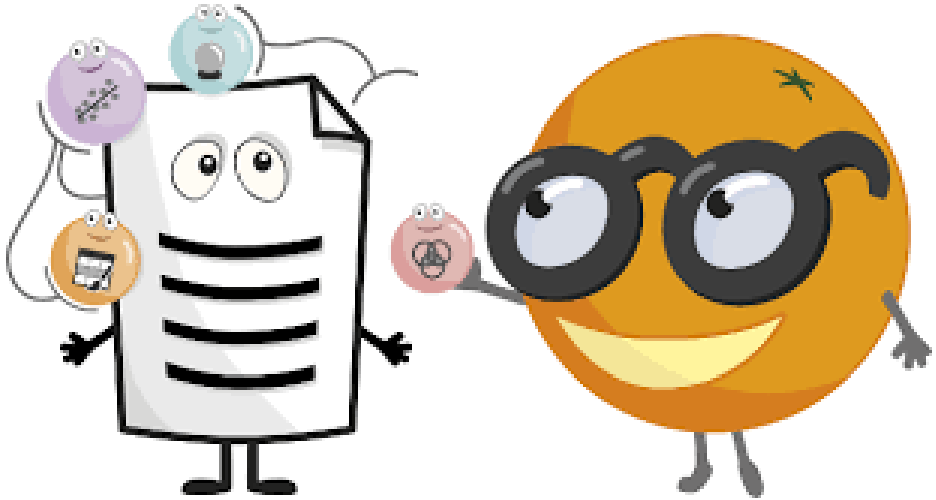
doc. Ing. Zdena DOBEŠOVÁ, Ph.D.

Zvědavost

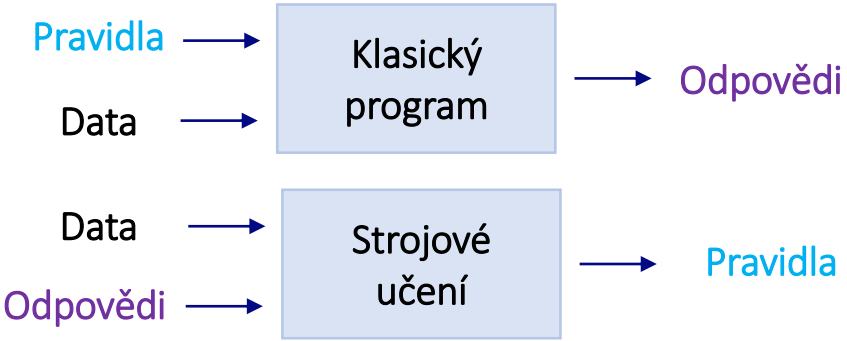
Experimenty

orange

DATA MINING
FRUITFUL&FUN

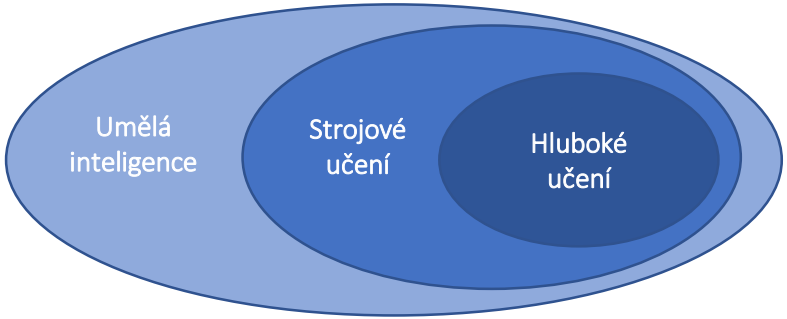


Umělá inteligence

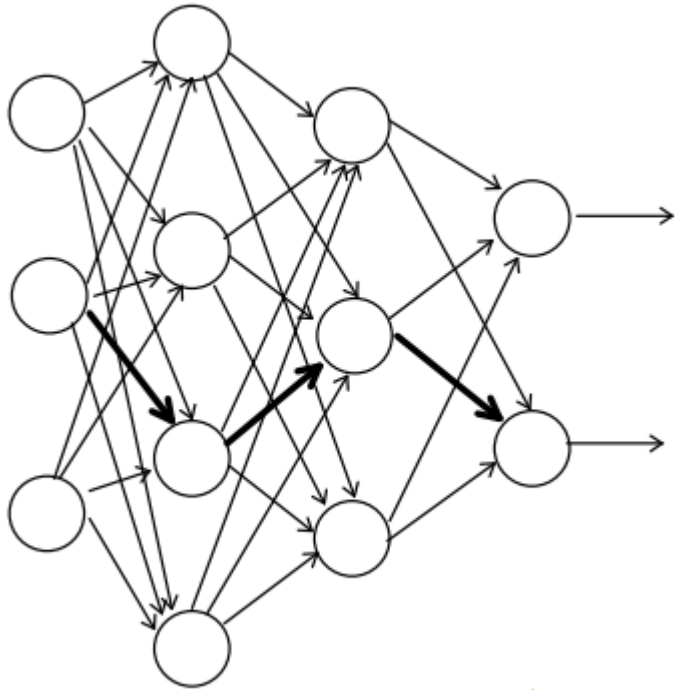


- Nahradit člověka a automatizovaně zpracovat velké množství dat
- Změna programovacího paradigmatu - naučit, natrénovat se z existujících dat
- Rozpoznávání obrazů, řečové systémy
- Bioinspirované algoritmy

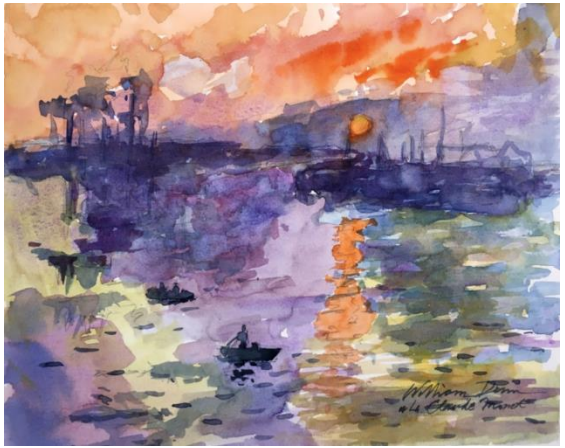
Vztah AI, strojového a hlubokého učení



Neuronové sítě – jak pracuje náš mozek?



Painters



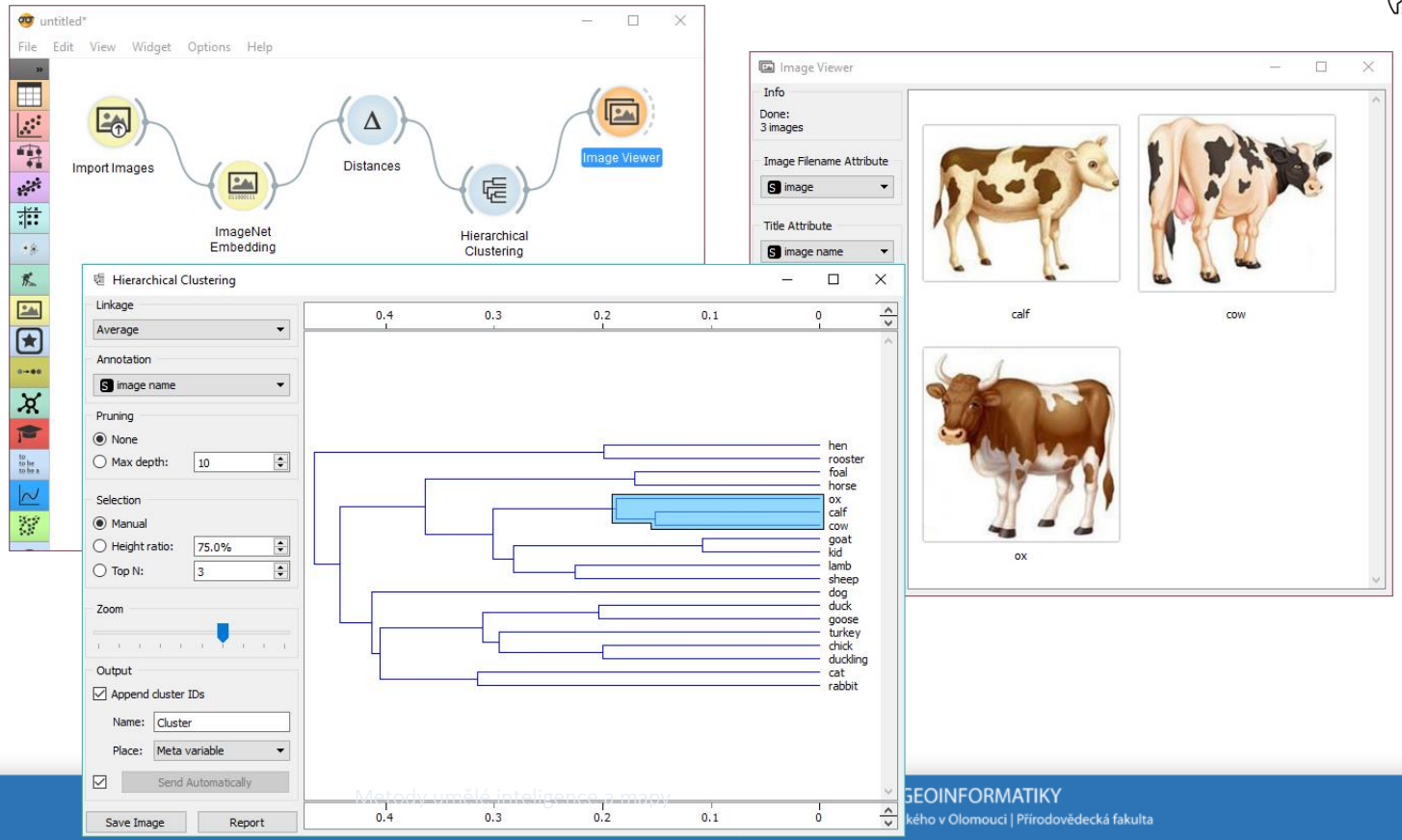
Add-ins Image Analytics
Image embeddinds

- VGG-19 - 19-layer image recognition model trained on ImageNet (10 mil. tag images).
- SqueezeNet
- Inception v3
- VGG-16
- DeepLoc
- Painters

natrénováno na 79 433 instancích obrazů od 1 584 malířů

https://www.youtube.com/watch?v=6srGs5w9x8w

Orange – natrénovaná síť



Mapy.cz

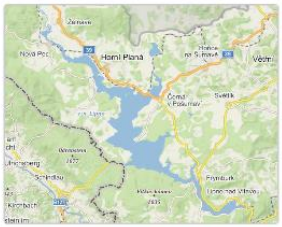
Nejbližší soused

20 výřezů

KarlovyVary

Kolin

LipnikHranice



Lipno

LysaHora

NoveMlyny

Olomouc

Ostrava

Praded

RybnikyTrebon

Snezka

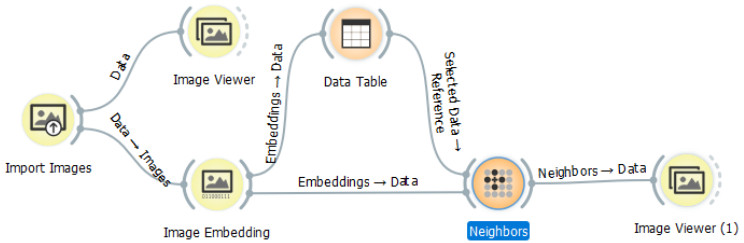
Sumava

Tabor

UstiNadLabem


VranovNadDyjí

Nejbližší soused



Nejbližší


279
Týnec
nad Labem
Kolín
Chvaletic
2
38
Kutná Hora
Žehušice
Miskovice
2
Suchdol
38
Malešov
Čáslav
Křesetice


Lázně
Bohdaneč
36
Břehy
Rybitví
36
Sezemice
2
PARDUBICE
Chrudim
Kočí
Heřmanův
Městec
Slatiňany

2 048 prvkový vektor

23. kartografická konference

Data Table

Info
20 instances (no missing values)
2048 features (no missing values)
No target variable.
5 meta attributes (no missing values)

Variables
- [x] Show variable labels (if present)
- [ ] Visualize numeric values
- [x] Color by instance classes

Selection
- [x] Select full rows

Restore Original Order

- [x] Send Automatically

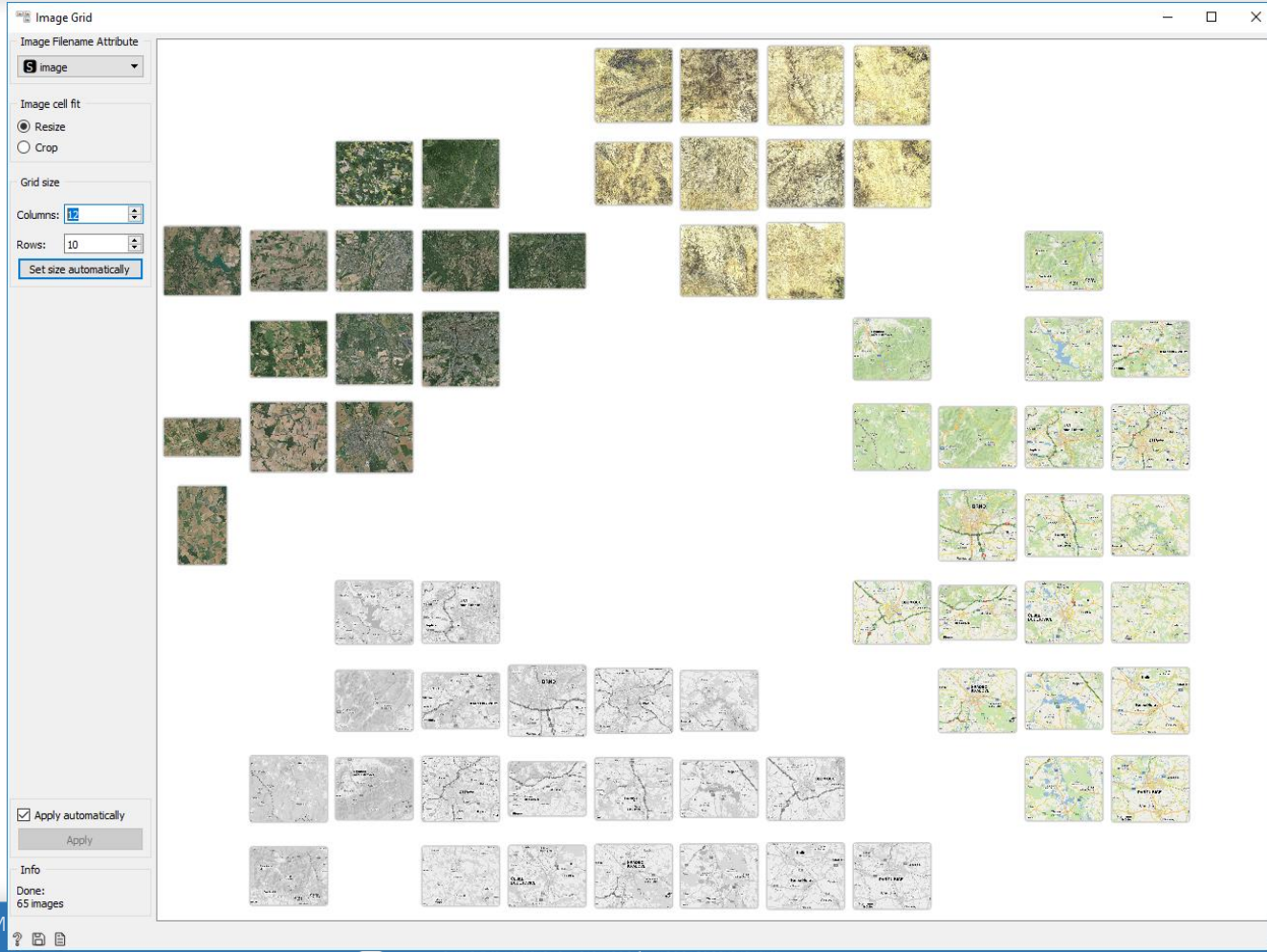
origii type	image name	image C:/Orange image	size	width	height	n0	n1	n2	n3	n4	n5	n6	n7
1	Blanik	Blanik.jpg	29269	538	405	0.102112	0.11499	0.703613	0.0773926	0.229492	0.668945	0.195068	0.385498
2	Brno	Brno.jpg	32153	445	398	0.081604	0.216309	0.671387	0.0547791	0.161011	0.692383	0.153198	0.248901
3	CeskeBudejovice	CeskeBudejovic...	34574	541	419	0.463379	0.0107117	0.11554	0.0794067	0.264648	0.545898	0.384277	0.319092
4	Chrudim	Chrudim.jpg	33827	503	419	0.613281	0.217041	0.112854	0.0632935	0.0906372	0.793457	0.515137	0.376221
5	HradecKralove	HradecKralove.j...	40063	563	451	0.0536194	0.0227356	0.00426483	0.0721436	0.30835	0.692383	0.342529	0.313965
6	KarlovyVary	KarlovyVary.jpg	39159	583	407	0.00352097	0.29126	0.0606079	0.0741577	0.0590515	0.506348	0.0744019	0.251465
7	Kolin	Kolin.jpg	28497	465	388	0.374023	0.250244	0.0754395	0.0715942	0.105835	0.785645	0.357178	0.298096
8	LipnikHranice	LipnikHranice.jpg	35753	581	395	0.00796509	0.14856	0.0283203	0.085083	0.154907	0.759277	0.172852	0.232056
9	Lipno	Lipno.jpg	36766	576	460	0.449219	0.260986	0.0817871	0.0713501	0.116943	0.501953	0.436768	0.103821
10	LysaHora	LysaHora.jpg	23840	475	370	0.151611	0.210571	0.0894775	0.0429077	0.176636	0.401367	0.222778	0.199341
11	NoveMylny	NoveMylny.jpg	27969	513	366	0.254639	0.0925293	0.0778809	0.078064	0.265625	0.76709	0.323975	0.243408
12	Olomouc	Olomouc.jpg	35166	528	419	0.119568	0.0439758	0.0668335	0.0662231	0.171509	0.703613	0.209106	0.278564
13	Ostrava	Ostrava.jpg	62165	654	537	0.217651	0.0864868	0.120117	0.0609436	0.0944824	0.539551	0.355469	0.218872
14	Praded	Praded.jpg	17937	448	343	0.0992432	0.213135	0.462402	0.0587769	0.160767	0.572266	0.119629	0.211548
15	RybnikyTrebon	RybnikyTrebon....	34671	557	449	0.481689	0.143677	0.145996	0.0913696	0.334717	0.64502	0.550781	0.321045
16	Snezka	Snezka.jpg	28501	523	385	0.0567322	0.32666	0.496338	0.0374451	0.556641	0.387939	0.481201	0.162109
17	Sumava	Sumava.jpg	21764	498	416	0.0718384	0.361328	0.0402527	0.0483398	0.132446	0.445801	0.140991	0.132568
18	Tabor	Tabor.jpg	34235	541	424	0.54248	0.177002	0.105469	0.081665	0.162109	0.706543	0.316162	0.265381
19	UstiNadLabem	UstiNadLabem....	38863	542	418	0.00201607	0.294434	0.0174103	0.0628052	0.0646973	0.512207	0.0174103	0.307373
20	VranovNadDvií	VranovNadDvií....	30154	531	403	0.241211	0.13562	0.112671	0.0831909	0.182373	0.657227	0.310791	0.230713

Klasifikace

trénovací data - 60

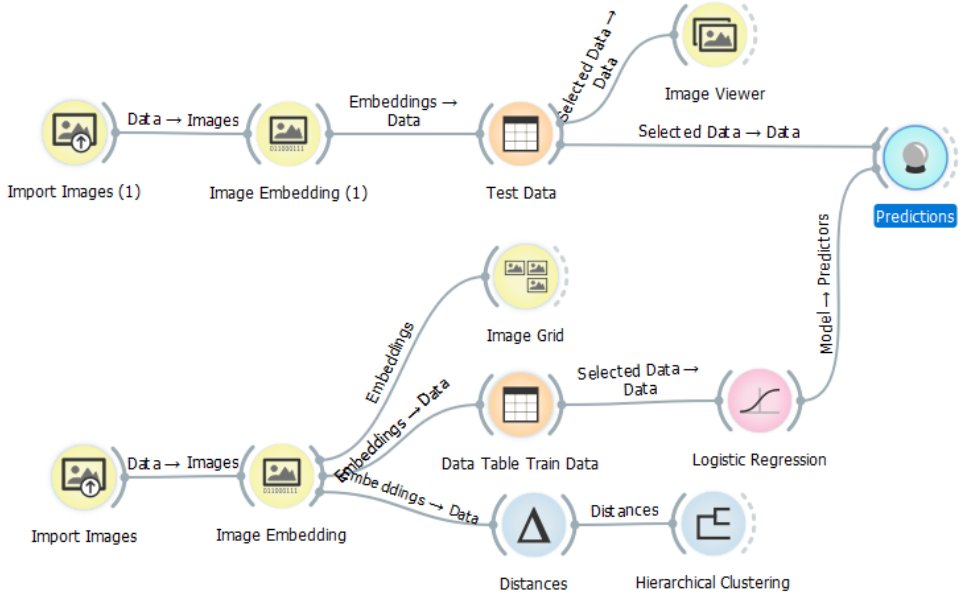
- letecké snímky
- historické snímky,
- základní mapy
- černobílé mapy

Image Grid

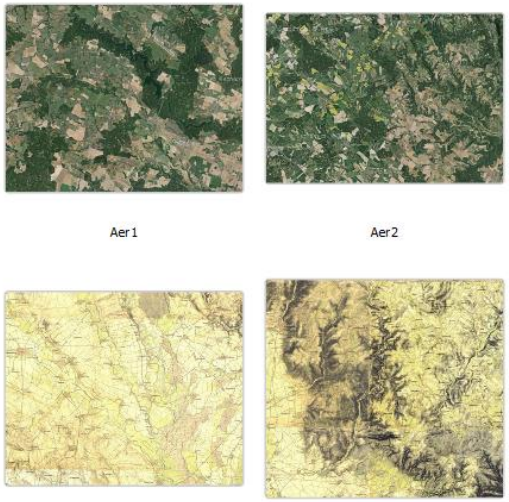


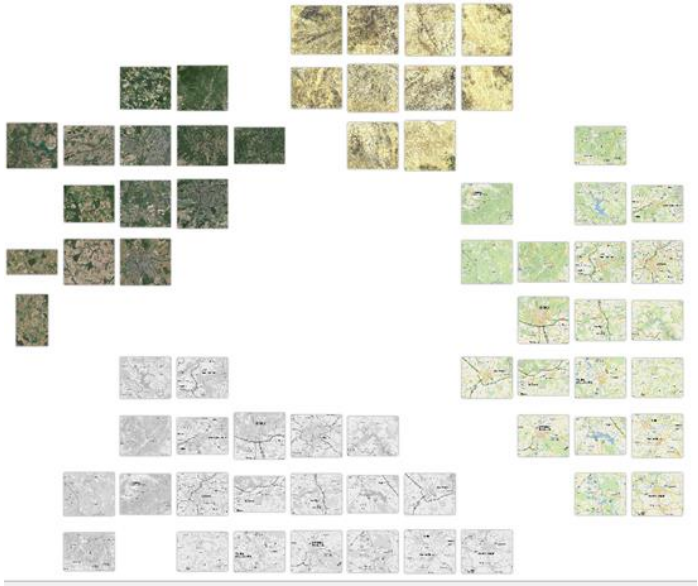
Predikce na základě kategorií

trénovací data, testovací data, logistická regrese



Predikce kategorie





Predictions

Info

Data: 4 instances.
Predictors: 1
Task: Classification

Restore Original Order

Show

	Logistic Regression
1	0.00 : 0.00 : 0.00 : 0.00 : 1.00 : 0.00 → Aerial
2	0.00 : 0.00 : 0.00 : 0.00 : 0.99 : 0.00 → Aerial
3	0.00 : 0.00 : 0.95 : 0.00 : 0.00 : 0.05 → Hist
4	0.00 : 0.00 : 0.99 : 0.00 : 0.01 : 0.00 → Hist

image name	image	size	width
Aer1	Aer1.jpg	143534	451
Aer2	Aer2.jpg	162454	475
Hist1	Hist1.jpg	172759	478
Hist2	Hist2.jpg	223540	494

European Urban Atlas – 100 měst

- 11100: Continuous Urban fabric (S.L. > 80%)
- 11210: Discontinuous Dense Urban Fabric (S.L.: 50% - 80%)
- 11220: Discontinuous Medium Density Urban Fabric (S.L.: 30% - 50%)
- 11230: Discontinuous Low Density Urban Fabric (S.L.: 10% - 30%)
- 11240: Discontinuous very low density urban fabric (S.L. < 10%)
- 11300: Isolated Structures
- 12100: Industrial, commercial, public, military and private units
- 12210: Fast transit roads and associated land
- 12220: Other roads and associated land
- 12230: Railways and associated land
- 12300: Port areas
- 12400: Airports
- 13100: Mineral extraction and dump sites
- 13300: Construction sites
- 13400: Land without current use
- 14100: Green urban areas
- 14200: Sports and leisure facilities
- 21000: Arable land (annual crops)
- 22000: Permanent crops
- 23000: Pastures
- 24000: Complex and mixed cultivation patterns
- 25000: Orchads
- 31000: Forests
- 32000: Herbaceous vegetation associations
- 33000: Open spaces with little or no vegetations
- 40000: Wetlands
- 50000: Water

Pisa, Itálie

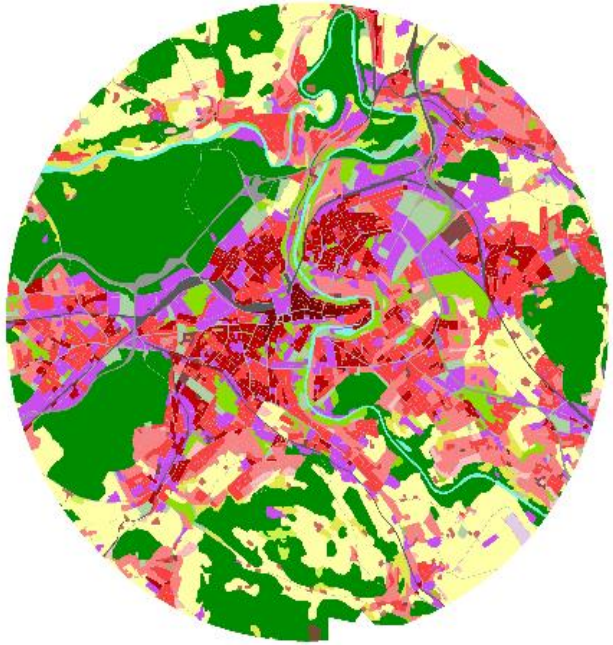
Dobesova, Z. *The Similarity of European Cities Based on Image Analysis*, Conference proceedings CoMeSySo 2019, book series Advances in Intelligent Systems and Computing, Springer

Podobná města

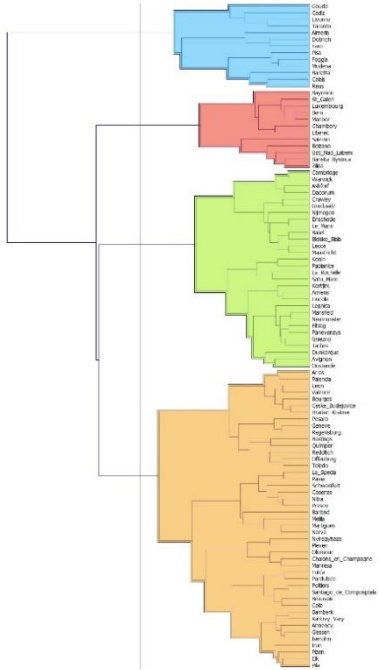
23. kartografická konference

23.kk 2019

Bern

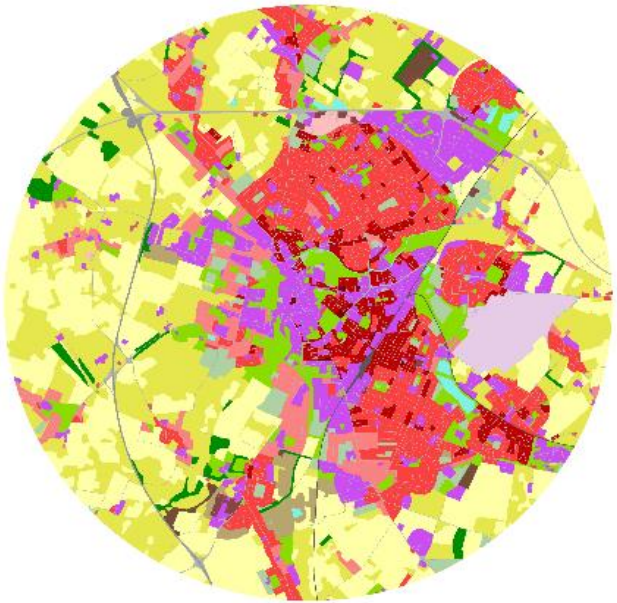


Maribor

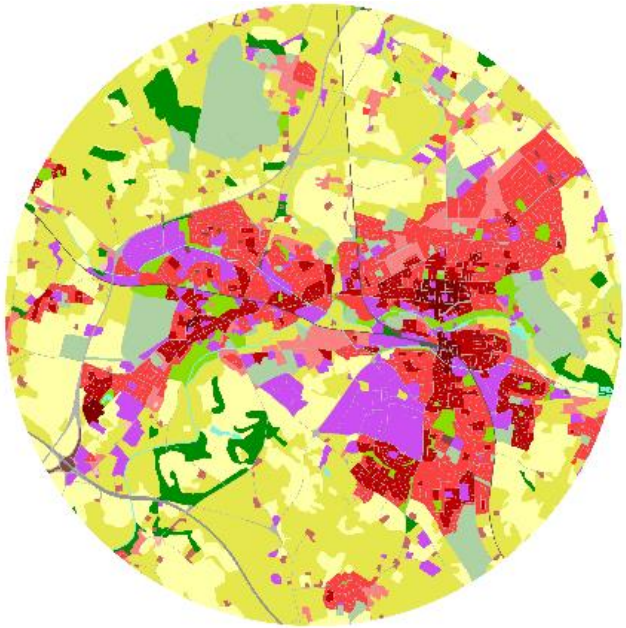


Podobná města

Cambidge



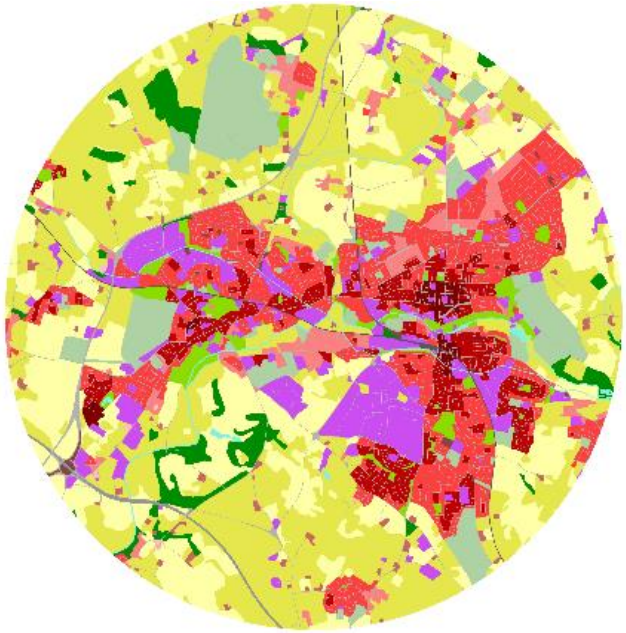
Wawrick



Podobná města

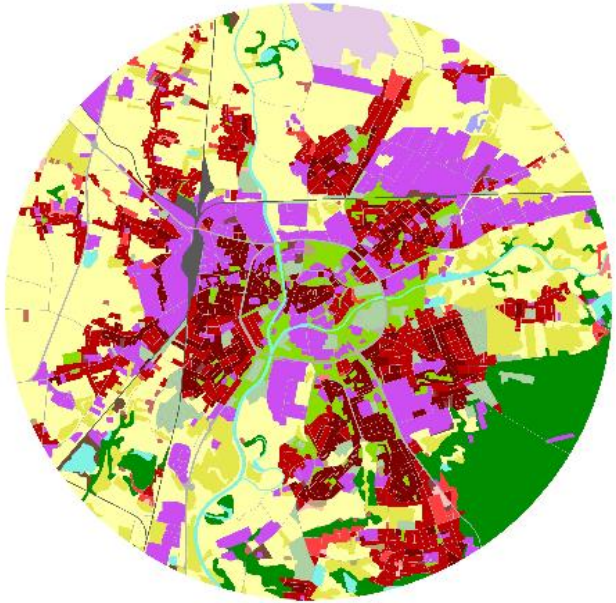
Le Mans

Enschede

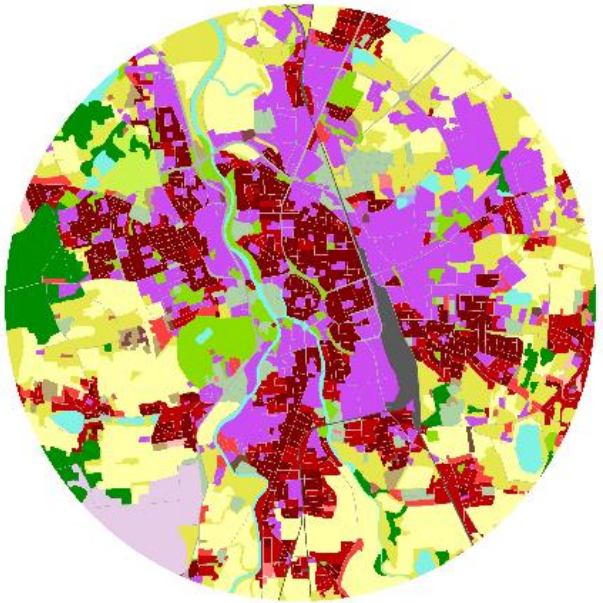


Podobná města

Hradec Králové

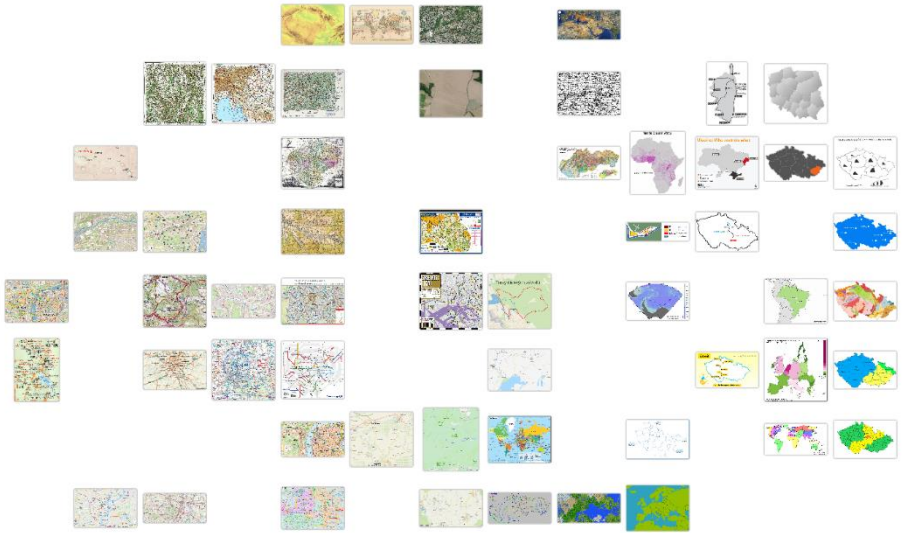


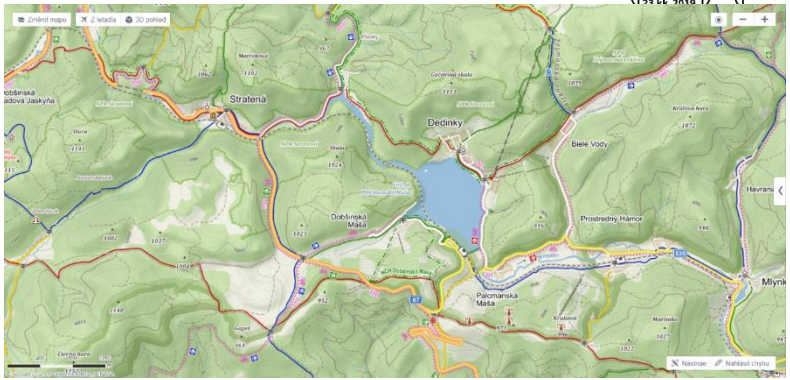
České Budějovice

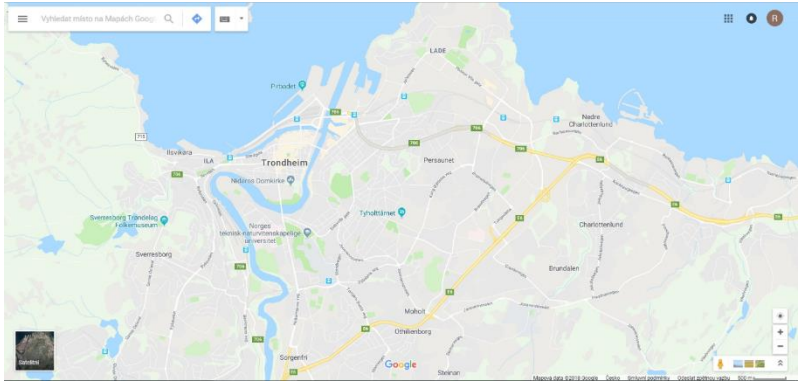


Náplň mapy: vysoká x nízká

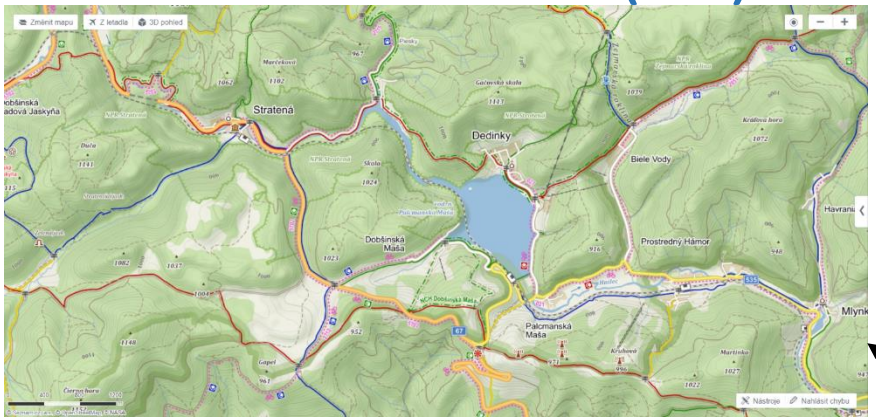
Trénovací data - 2 třídy (30 + 30)

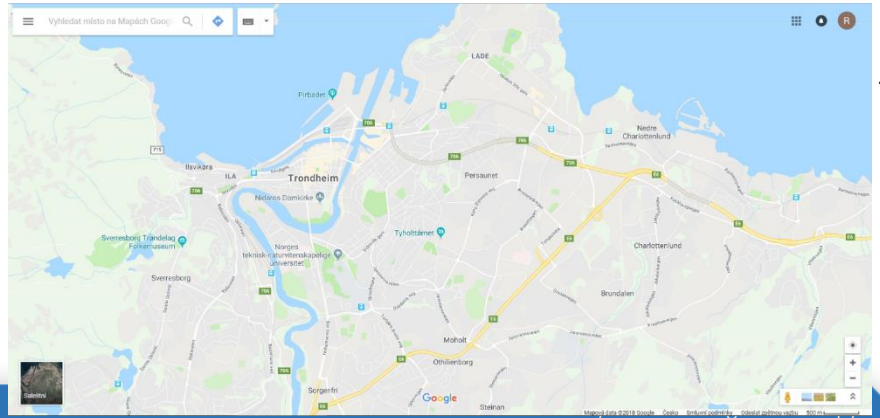






Testovací data (30)





	Logistic Regression	image
1	0.16 : 0.84 → vysoka_napln	02
2	0.93 : 0.07 → nizka_napln	05

celkově výsledky nic moc

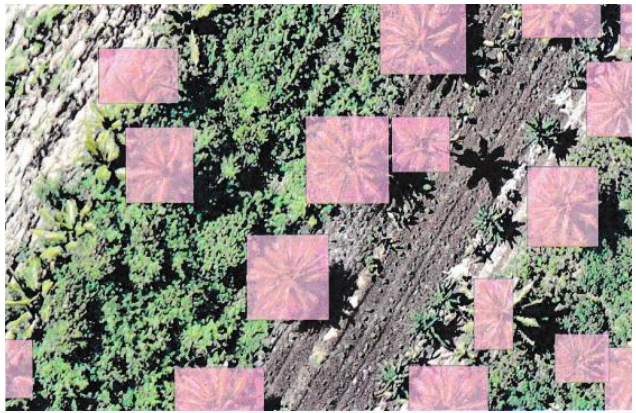
jiné nastavení logistické regrese

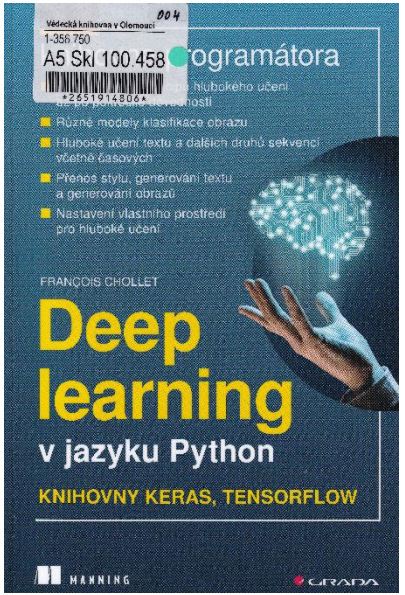
lepší? trénovací data

Hluboké učení

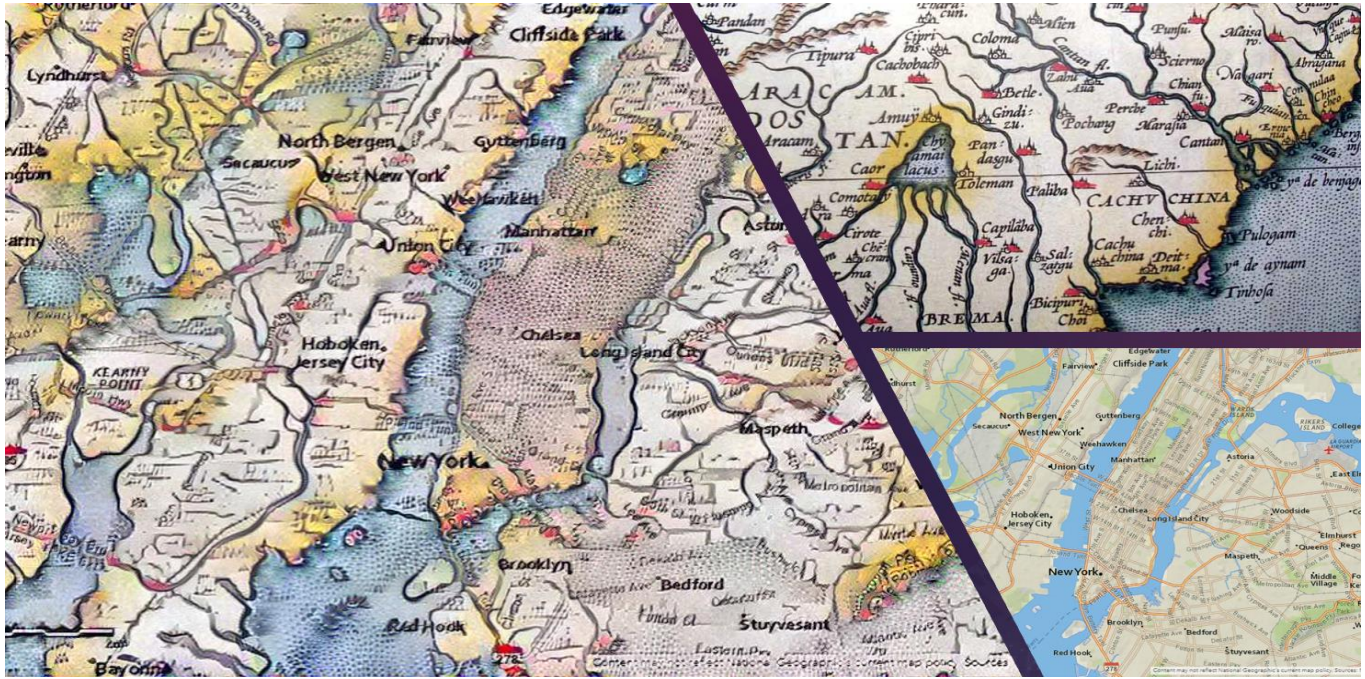
knihovny Tensorflow, Keras, Torch, ArcReview 3/2019

Detekce objektů
pomocí strojového učení
Vladimír Holubec, ARCDATA PRAHA, s.r.o.





GeoAI - Transfer kartografického stylu



Rychle se vyvíjející oblast

Rohit Singh (Esri R&D center in New Delhi, focused on AI and Deep Learning): Catrographic style transfer: Applying the style of **Ortelius** from the first world atlas in the 15th century (top right) to a map of New York city (bottom right) shows **New York** as a **swamp** (left) which it apparently was at that time!
Zdroj https://medium.com/geoai/integrating-deep-learning-with-gis-70e7c5aa9dfe

Děkuji za pozornost

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zdena.dobesova@upol.cz