

Web Processing - Standardized GIS Analyses for Cable Route Planning

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March 24, 2023

Review & Topics

Review

- ▶ Rasterisation
- ▶ Cost Raster
- ▶ Cost Paths
- ▶ PyWPS (Start)

Topics

- ▶ Web Processing Service (Concluded)
- ▶ From Cost Raster to Least Cost Path
- ▶ Comparing Paths
- ▶ Speed-Up
 - ▶ Clipping
 - ▶ Down Sampling
 - ▶ Super Position Medium Resolution
 - ▶ Validation

Web Processing Service (Concluded)

The screenshot shows a terminal window with several tabs open. The active tab contains Python code for a Web Processing Service (WPS) application. The code imports `pywps` and defines a function `main`. It reads a cost raster and starts at a specified feature, then prints the resulting geojson. It then prints the name of the feature and downloads it. The code includes a check for the main module and a call to `app.run()`. Below the code, environment variables are listed: `FLASH_APP`, `FLASH_ENV`, and `FLASH_DEBUG`. The command `flask run` is shown at the bottom.

```
20 result = pywps.read('costRaster_raster',
21                      startFeature,
22                      endFeature)
23
24 print(result.get(name=True)[0]) # print the geojson
25
26 f_name = str(result.get(name=True)[0])
27 print(f_name)
28 download.get(f_name, path='.', segment=False)
29
30
31 if __name__ == '__main__':
32     app.run()
```

```
FLASH_APP = arc/wps/flask/pywps Flask
FLASH_ENV = development
FLASH_DEBUG = 0
In [1]: cd /home/sebastian/Dokumente/Basti/Studien/#Harz/#Mittwoch/Arbeiten/WebProcessing-StandardisedGISAnalysesforCableRoutePlanning
In [2]: source /home/sebastian/anaconda/envs/WebProcessing-StandardisedGISAnalysesforCableRoutePlanning/bin/activate
In [3]: python -m flask run
```

Reminder: Sampling Resolution

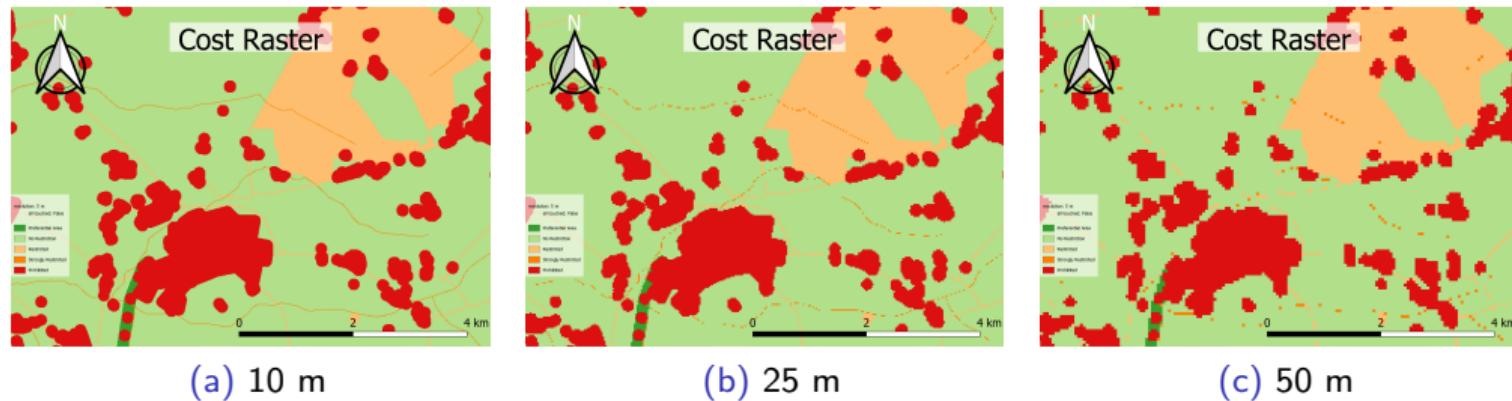


Figure: Maps of the cost raster for all touched set to False for different resolutions.

Reminder: Sampling Resolution

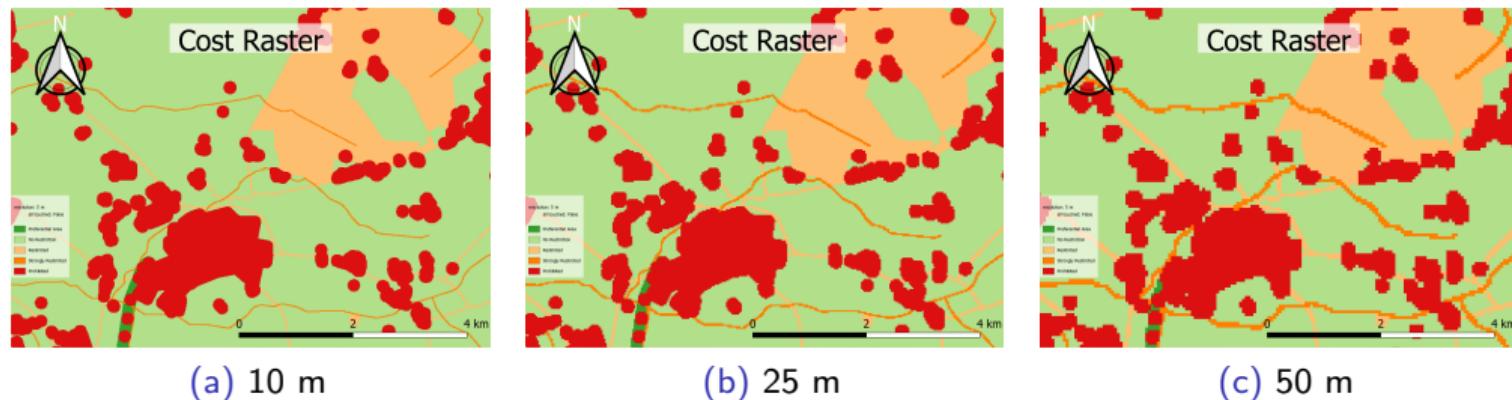
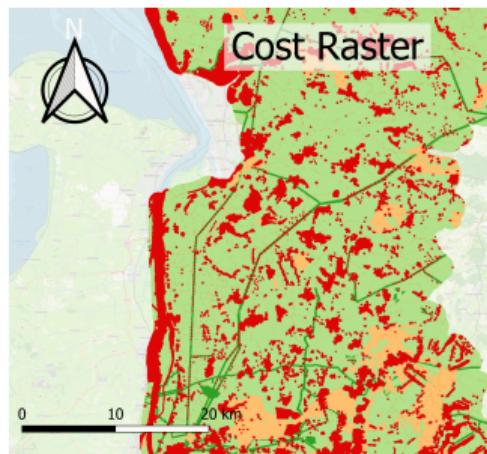


Figure: Maps of the cost raster for all touched set to True for different resolutions.

From Cost Raster to Least Cost Path



(a) Cost Raster.



(b) Aggregated Cost Raster.



(c) Least Cost Path.

Figure: Figures of the cost raster and the resulting aggregated costs and the Least Cost Path for a resolution of 50 m, all touched set to False.

Comparing: Map



(a) all touched False.



(b) all touched True.

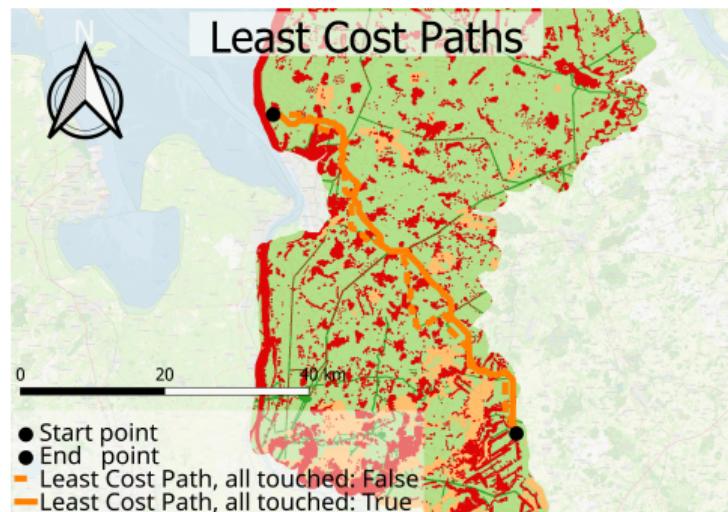
Figure: Figures of the Least Cost Paths, depending on the parameter all touched. All touched False: dashed lines, True: continuous lines. Higher resolutions: green, lower resolutions: red.

Comparing: Costs

Table: Least Cost Paths: length (l) for the different resolutions (res), including the mean minimum distance (d_{mean}), agg. costs and the agg. costs per resolution.

res /m	$l_{al=f}/m$	$l_{al=t}/m$	d_{mean} /m	agg. costs $_{al=f} \times m$	agg. costs $_{al=t} \times m$
5	76136.3	78002.0	126.0	93329.6	97584.8
10	75430.1	77936.6	277.9	89312.5	97311.8
25	75422.9	78422.9	313.8	83871.7	96816.4
50	76135.0	70620.0	1140.0	70451.2	115003.7
100	76283.8	74120.7	1946.4	64051.6	167226.8

Speed-Up: Clipping



(a) 50 m.



(b) 5 m, Clipped.

Figure: Figures of the Least Cost Paths, on the cost raster with 50 m resolution and the computed paths, used to clip the high resolution raster.

Speed-Up: Medium Resolution

bi-linear down sampling

- ▶ 59.3 m average distance
- ▶ closer to path from all touched True
- ▶ independent from cost ratios

weighted average cost raster

- ▶ best ration 4:1 False:True
- ▶ 40.1 m average distance
- ▶ closer to path from all touched True
- ▶ Optimum: depends on cost ratio

Speed-Up:Validation

clipping

- ▶ best path: 3 times
- ▶ Speed-Up: Unpredictable

bi-linear down sampling

- ▶ distance worse, than from original medium resolution
- ▶ Speed-Up: square of resolution

Conclusion AND Outlook

Conclusion

- ▶ provide Least Cost Path with WPS
- ▶ studied algorithmic Speed-Up
 - ▶ clipping
 - ▶ medium resolution

Outlook

- ▶ non algorithmic Speed-Up
- ▶ set of possible paths
- ▶ stability: perturbation