Douglas-Peucker revisited

Stephane Winnepenninckx

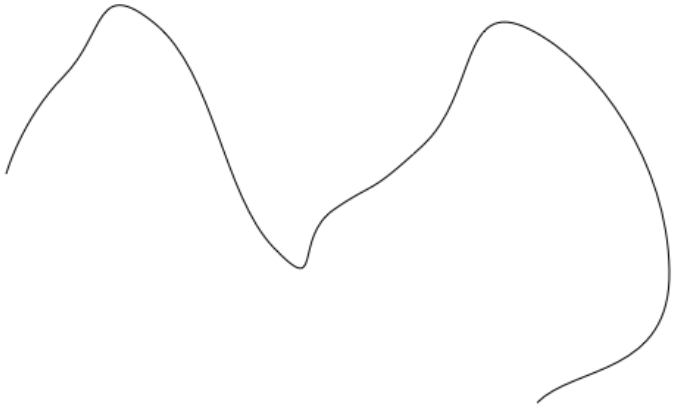
DP used for ...

- reducing the # points needed to represent a Polyline.
- but without changing the shape of the Polyline.

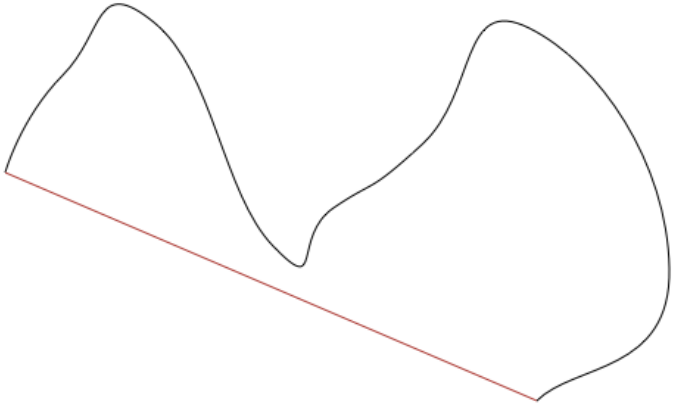
DP algorithm

- draw a 'baseline' between start & end points.
- Search for the point @ max distance of the baseline. Keep that point.
- do the same with left & right part.

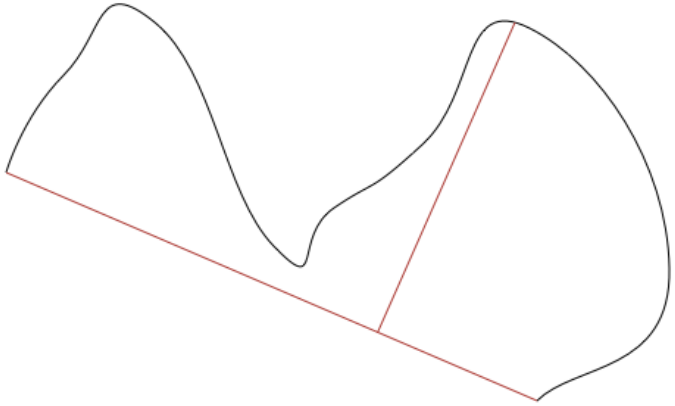
example



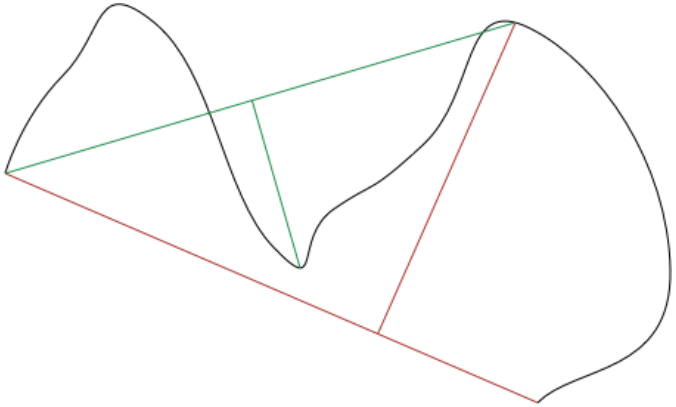
example



example



example



DP ends when ...

- ... # points = max allowed points
- ... distance <= max allowed error, in each segments

DP problem

- algorithm is applied when last point is known.

DP results

- pretty good (the best?)
- quality equals handmade solution

? update DP

- I can't wait until the end point
- I can't store all of them
- I can't compute fast enough
- I have to transmit the data over slow or costly network.

example

- geo data must be transmitted over mobile (gsm) network.
- I can't afford the cost of transmitting every geo data.
- I can wait only a little bit.

DPW

- essential point : must be conserved
- observation point : can be promoted to essential point, if not :
- obs points are doomed to be dumped.

DPW

- first obs point is promoted
- same as DP

DPW

- wait ...
- ... until you have two obs points

DPW

- draw a baseline between last essential point and the last obs point.
- is there an obs point further than the max allowed error? promote it to essential
- all obs points behind the new essential one are doomed to be dumped.

DPW

- need to transmit : new essential point
- transmit at regular interval (even when there is nothing to report)

DPW

- repeat ...
- ... for each new obs point

DPW

- need to have a max buffer size
- you never know you are between LA and Las Vegas
- the last obs point is promoted, empty buffer.

DPW results

- not much more points as DP
- nearly the same quality
- not a surprise, cannot see into the future (yet)
- can be extended to non-geo data

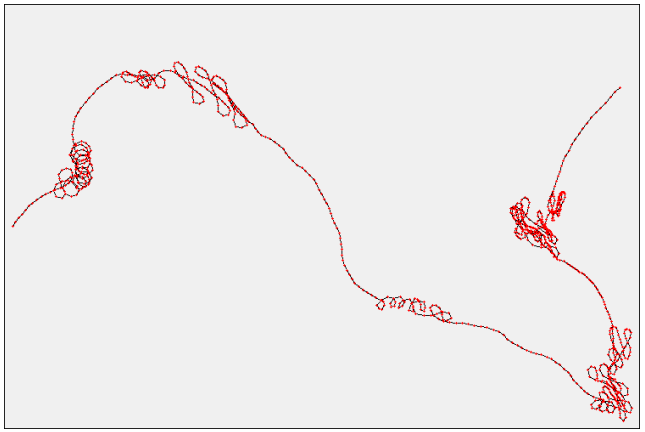
DPW problems

- beware of straight lines
- only max error criteria
  max # points is not available.

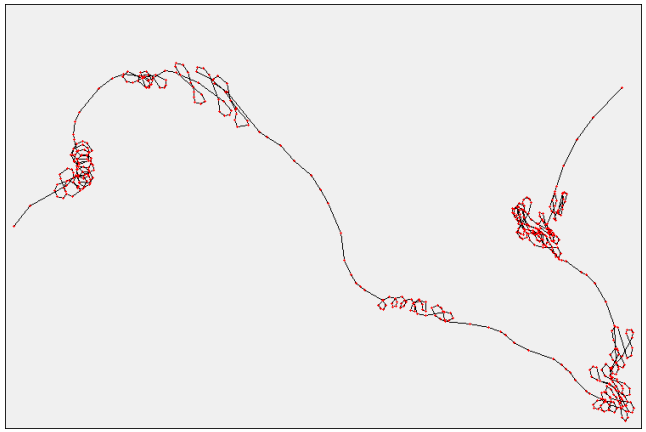
DPW demo

- real gps track of a swiss paraglider

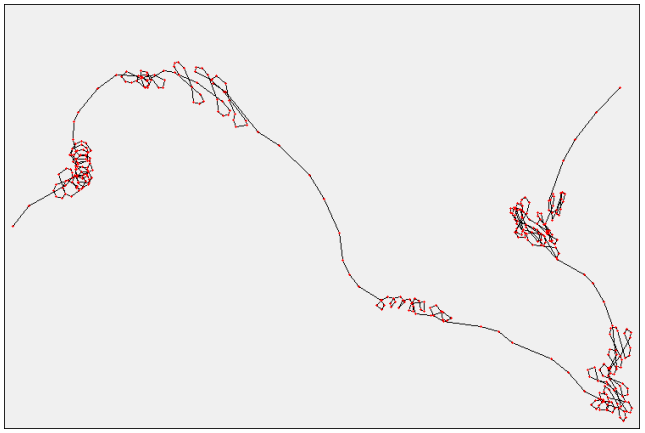
all points (899)



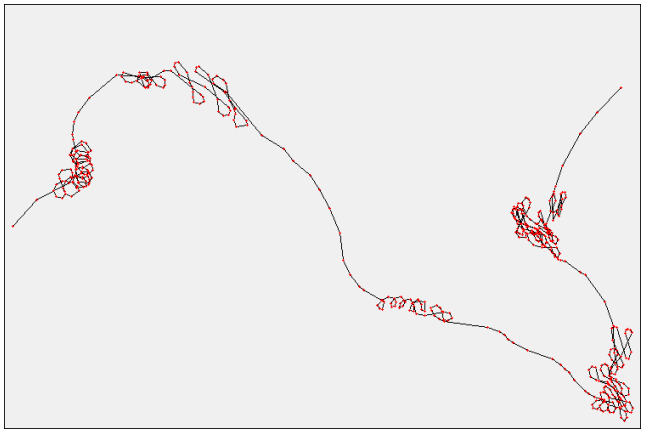
DP 2D (347/899)



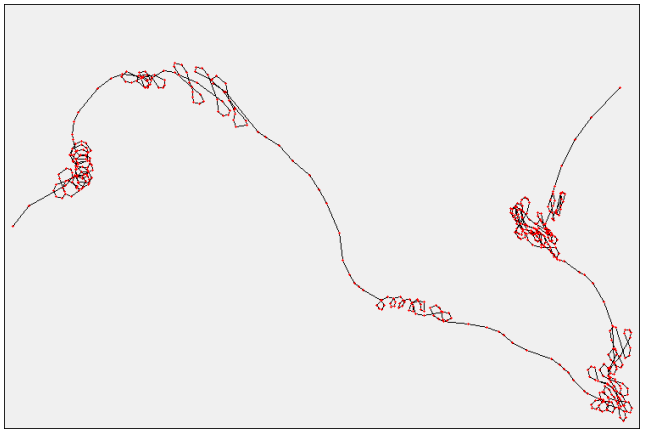
DPW 2D (375/899)



DP 3D (488/899)



DPW 3D (492/899)



results

899 points max err 10 m

name	#pts	Δ
DP 2D	347	
DPW 2D	375	+8 %
DP 3D	488	
DPW 3D	492	< +1 %

Questions

- Thank you to be here
- Hope to see you FOSDEM16
  - DPW on non-GEO data

stephane@winnepenninckx.com