Watershed Algorithm

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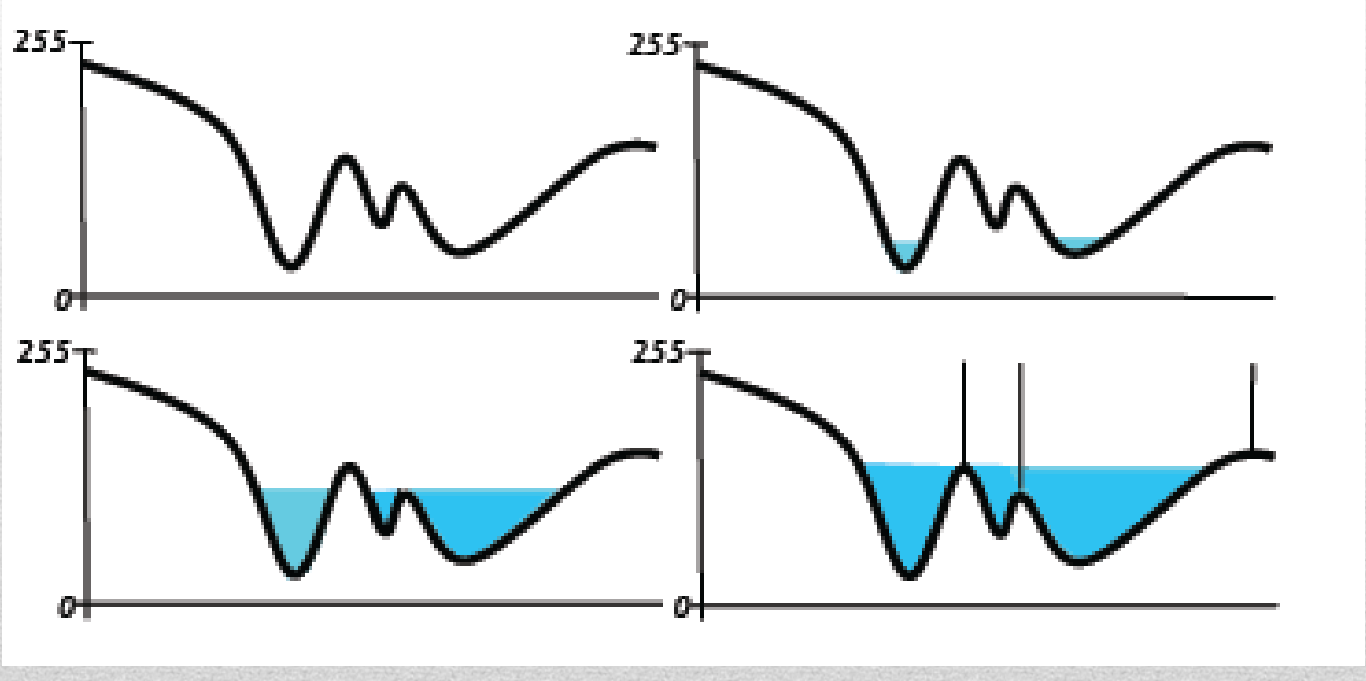
The Watershed

- The Watershed Transformation:
  - Any grey-tone image can be considered as a topographic surface
  - If we flood this surface from its minima and, if we prevent the merging of the waters coming from different sources, we partition the image into two different sets: the catchment basins and the watershed lines

The Watershed

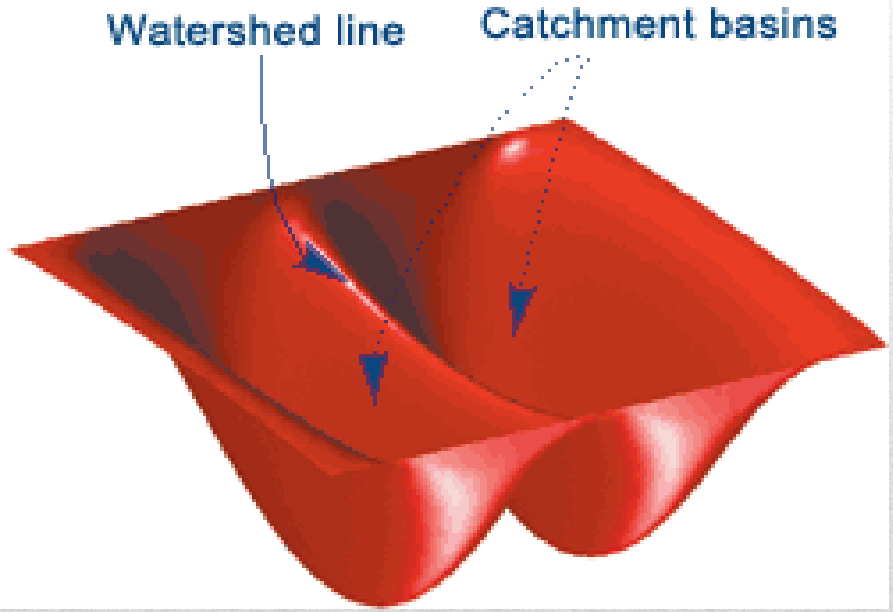
- The Watershed Transformation:



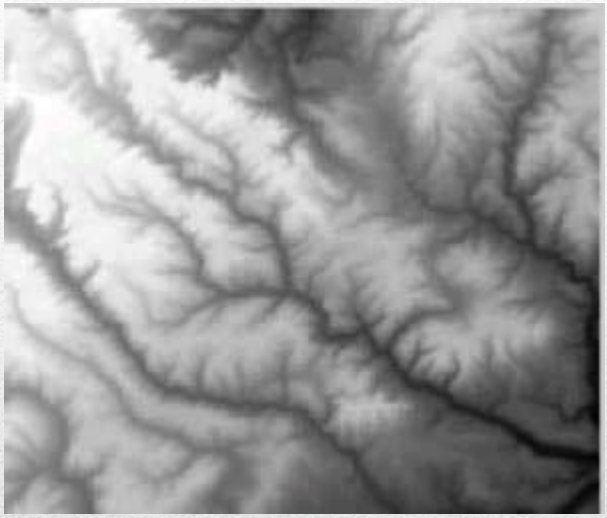
The Watershed

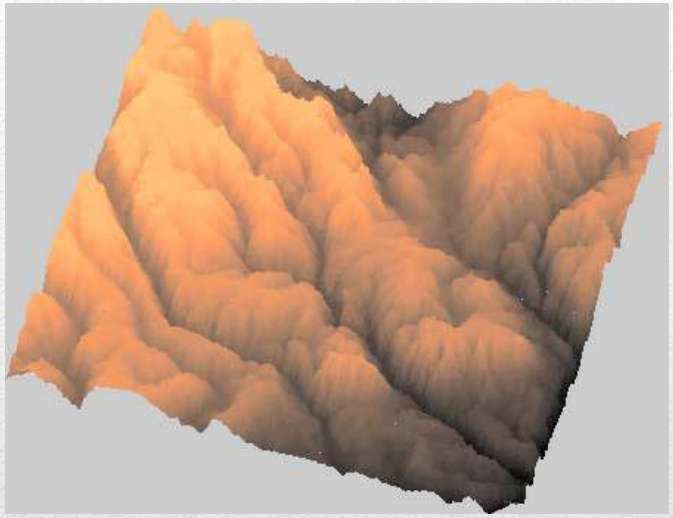
- The Watershed Transformation:
  - If we apply this transformation to the image gradient, the catchment basins should theoretically correspond to the homogeneous grey level regions of this image
  - However, in practice, this transform produces an important over-segmentation due to noise or local irregularities in the gradient image
    - Many initial local minima

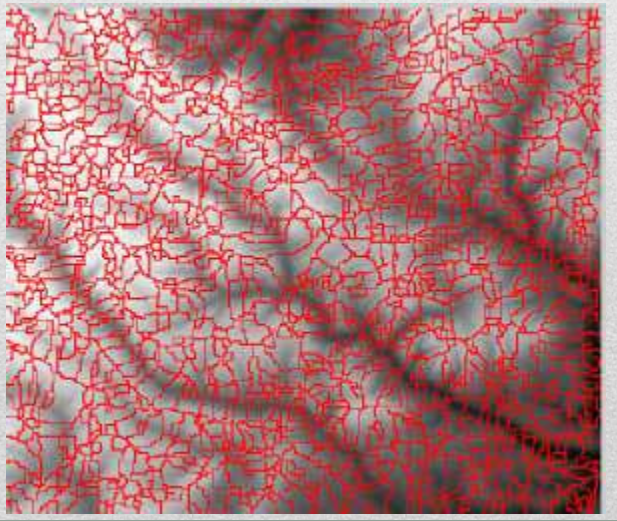
The Watershed



The Watershed







Marker-controlled watershed

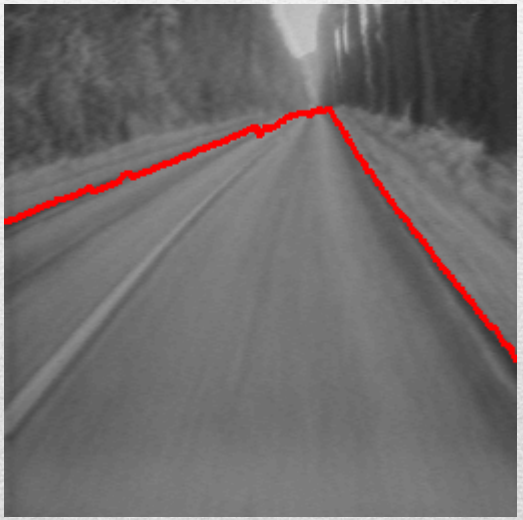
- A major enhancement of the watershed transformation consists in flooding the topographic surface from a previously defined set of markers

- Doing so, we prevent any over-segmentation

Marker-controlled watershed

- markers have been introduced by hand





Practice 1

- Perform a watershed with seeds using coffee_grains and coffee_grains_markers available in TestImages.zip

```
WatershedVincentSoille1991 watershed =
                    FactorySegmentationAlg.watershed(ConnectRule.FOUR);

watershed.process(input,label);
 GrayS32 output = watershed.getOutput();
```

References

- Adams, R.; Bischof, L., "Seeded region growing,", IEEE Transactions on Pattern Analysis and Machine Intelligence, vol.16, no.6, pp.641,647, Jun 1994

  http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=295913&isnumber=7321

- Beucher tutorial on Watershed transformation

  http://cmm.ensmp.fr/~beucher/wtshed.html

- Intelligent Vision Systems, Auckland University

  http://www.cs.auckland.ac.nz/courses/compsci773s1c/lectures/