

MATHEMATICAL MORPHOLOGY: FSCNs

B.S. DAYA SAGAR

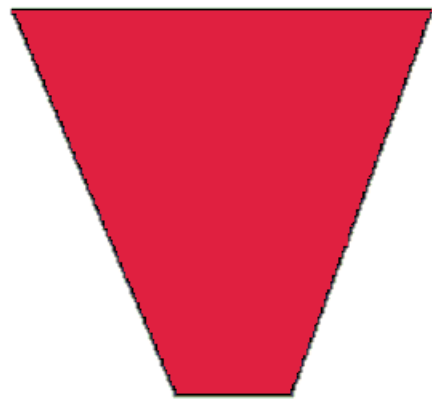
<http://www.isibang.ac.in/~bsdsagar>

Systems Science and Informatics Unit (SSIU)
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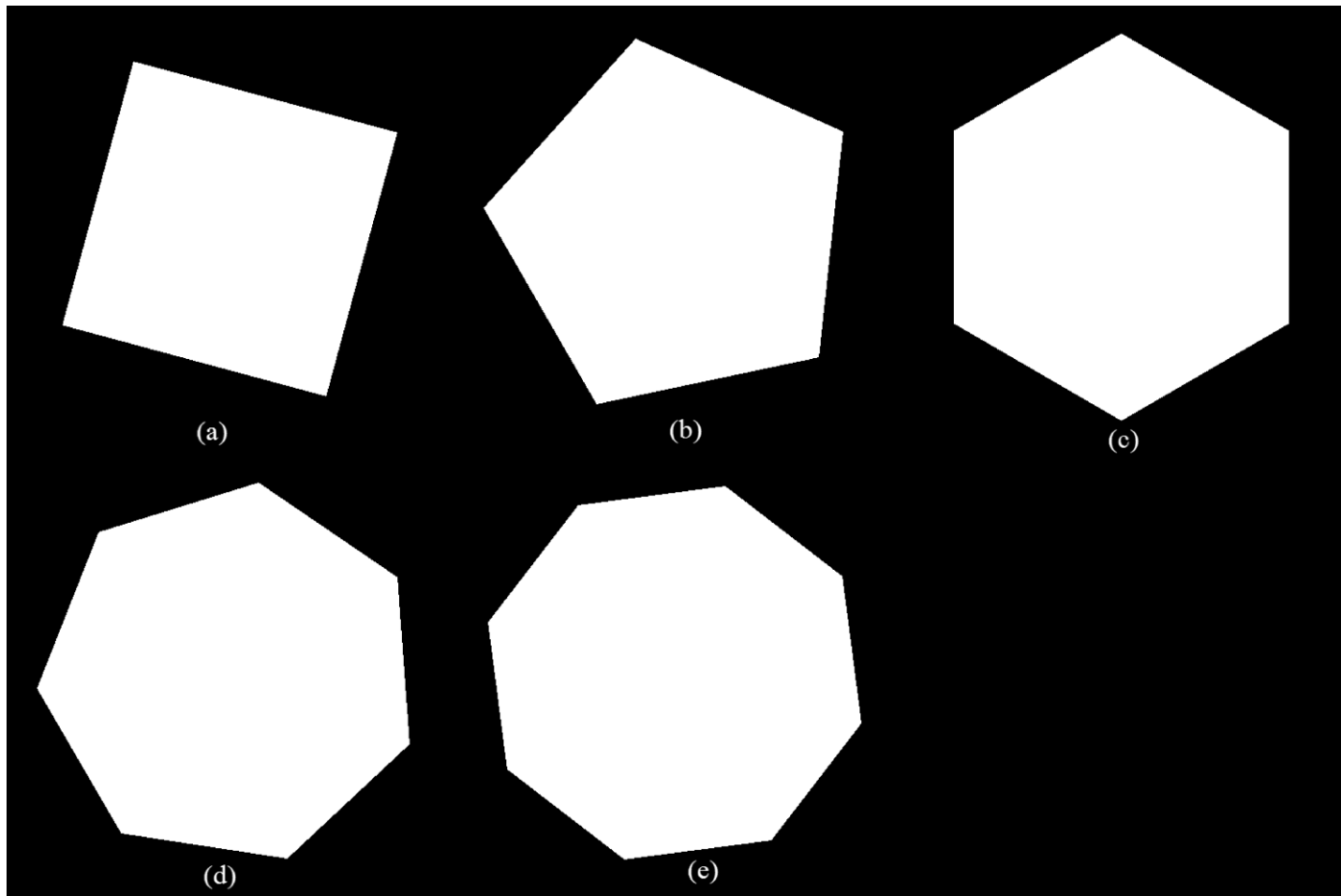
FRACTAL SEKELTAL- BASED CHANNEL NETWORK MODELS

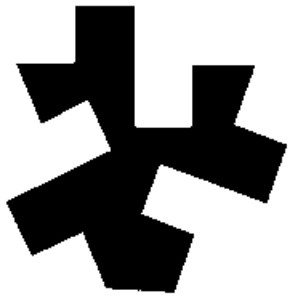


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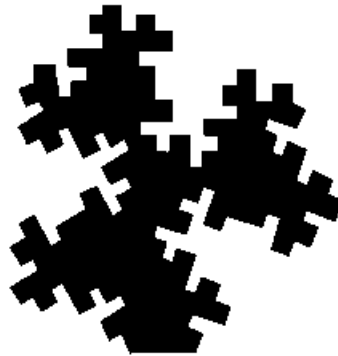


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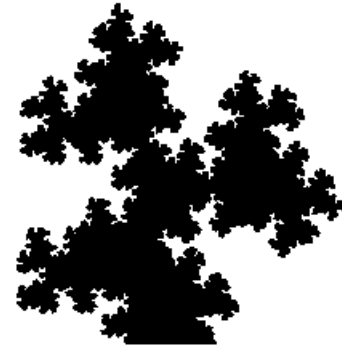




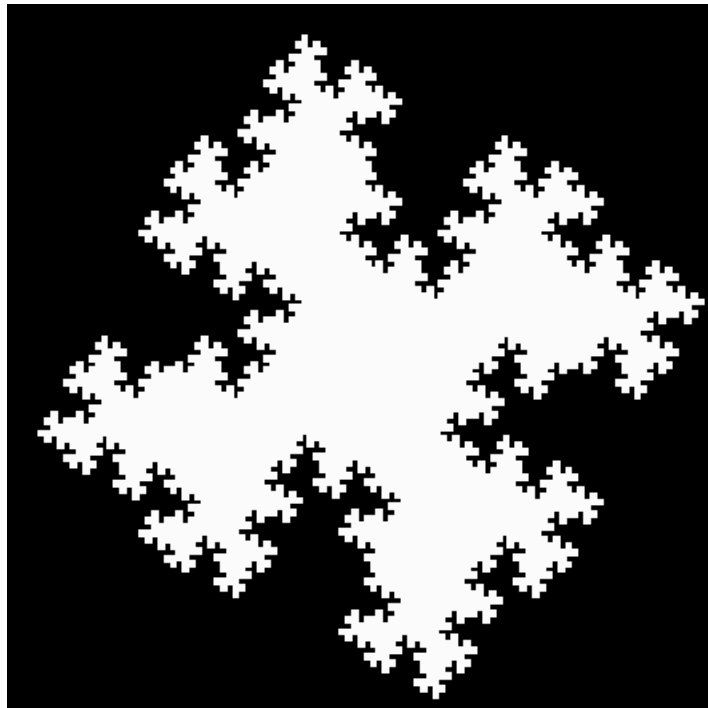
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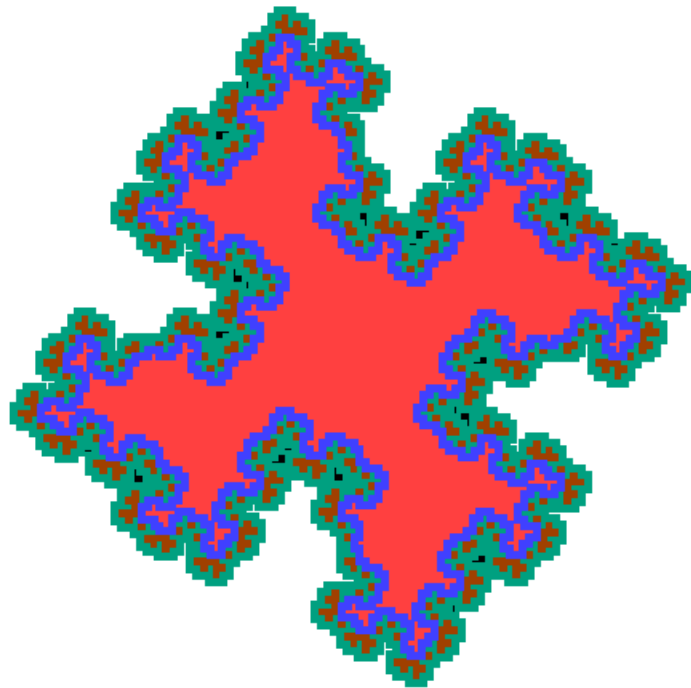
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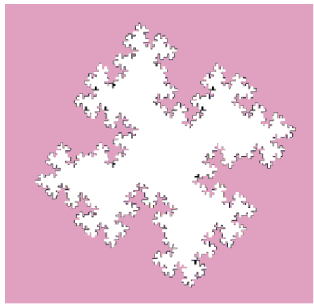
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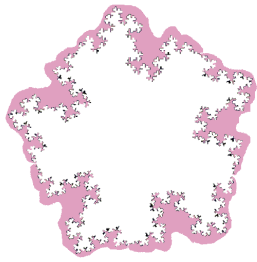
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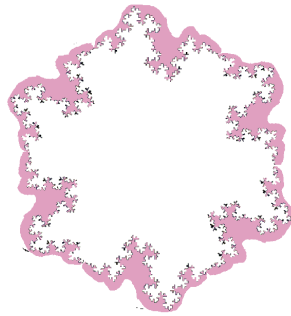
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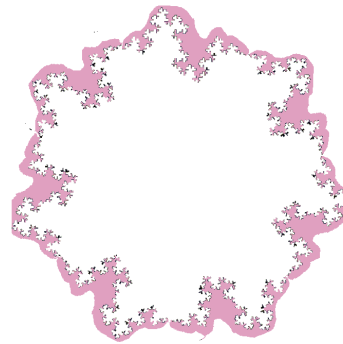
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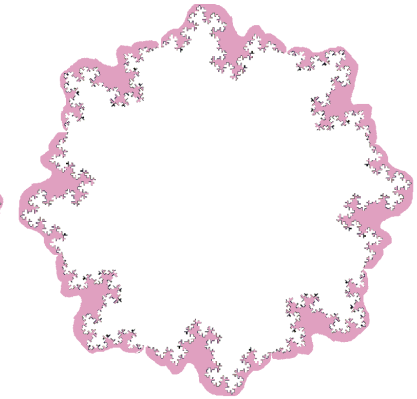
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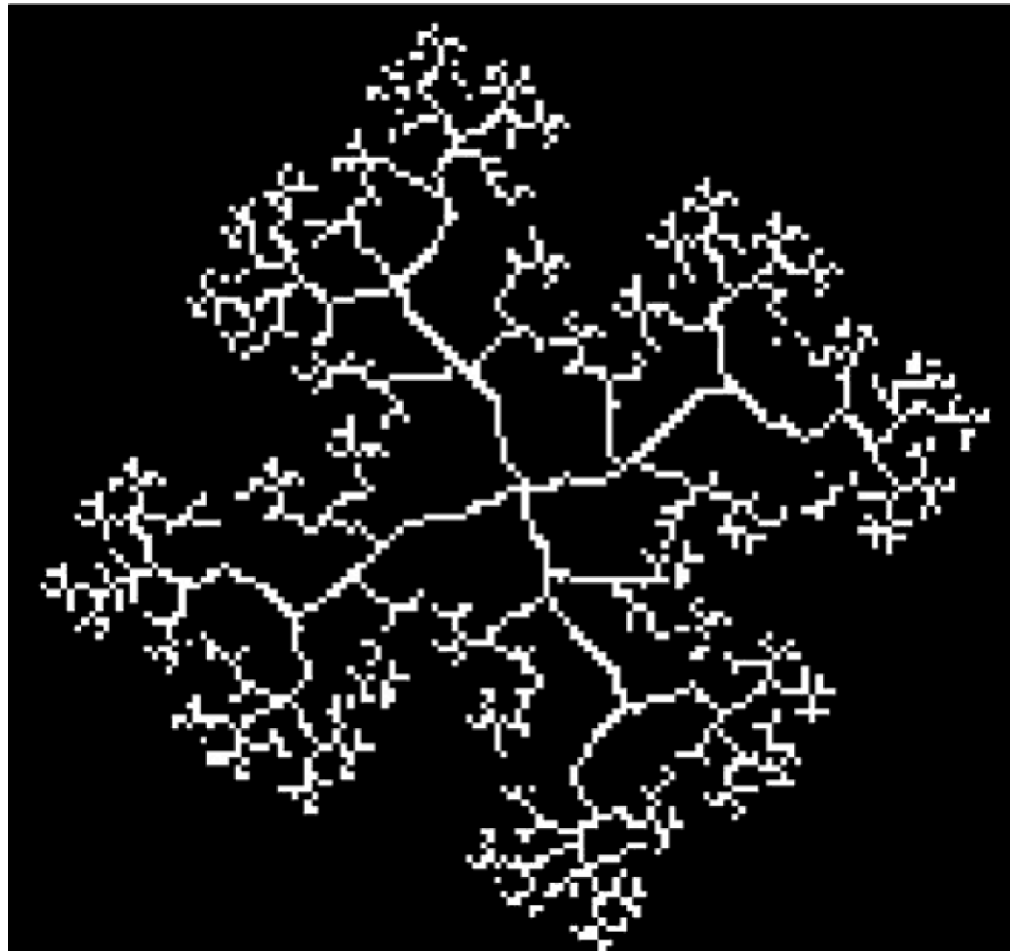
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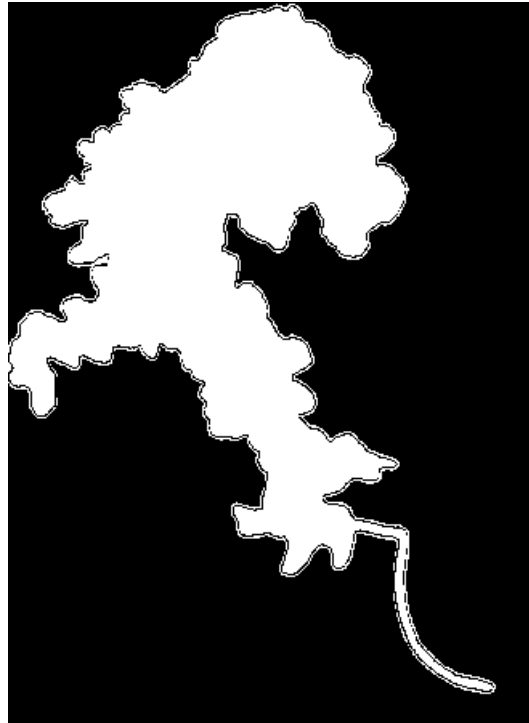


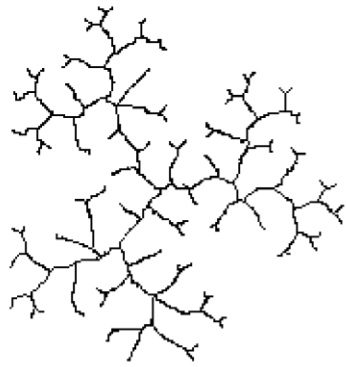
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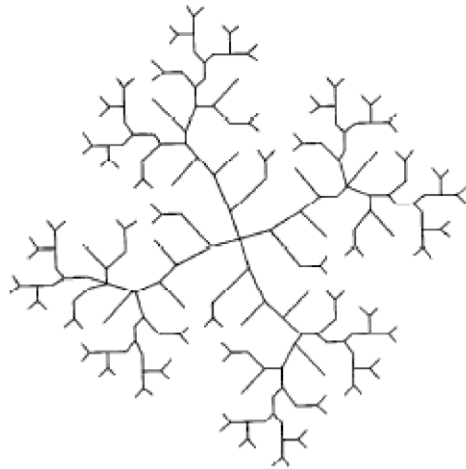
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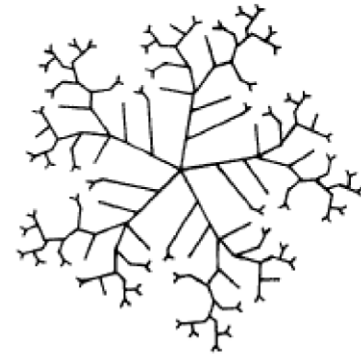




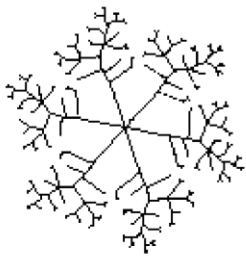
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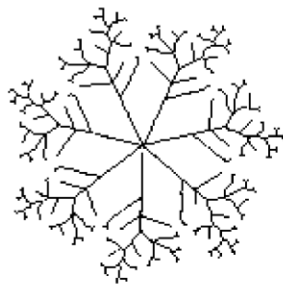
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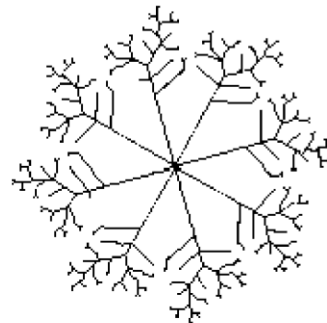
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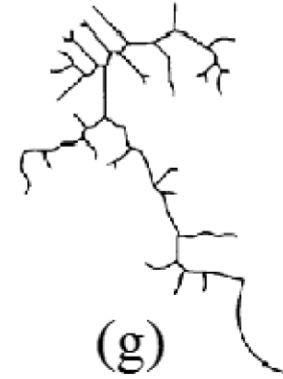
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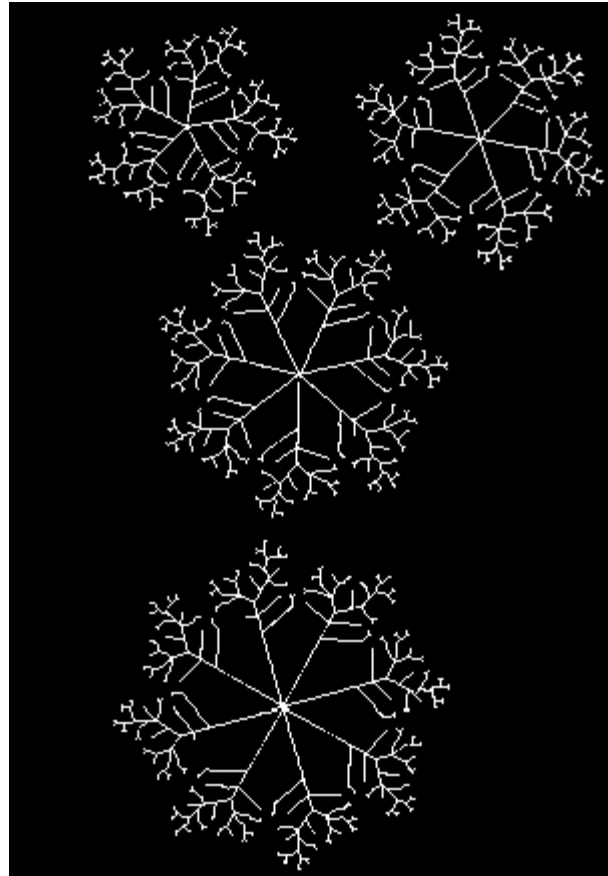
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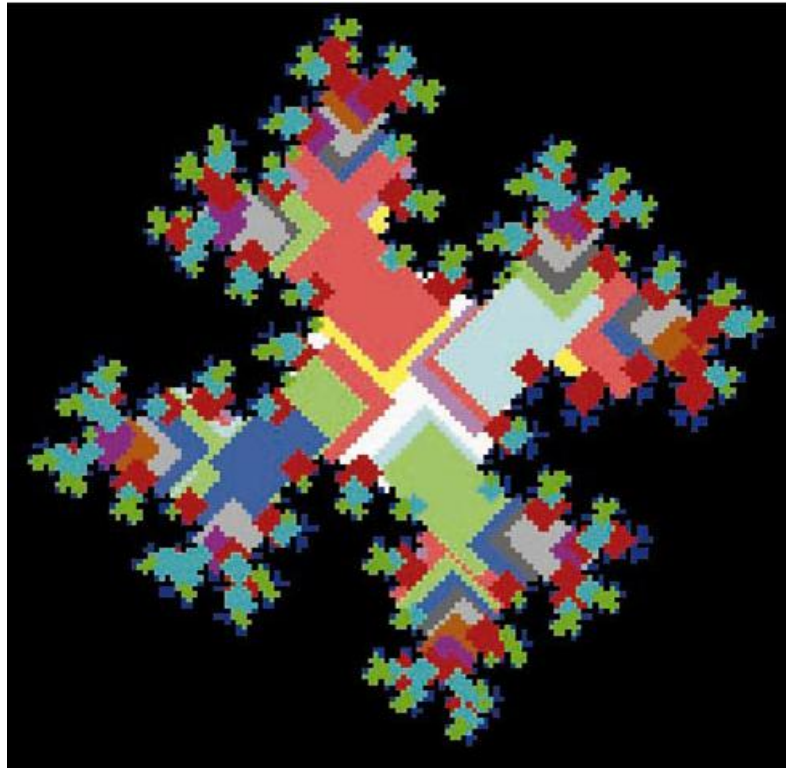


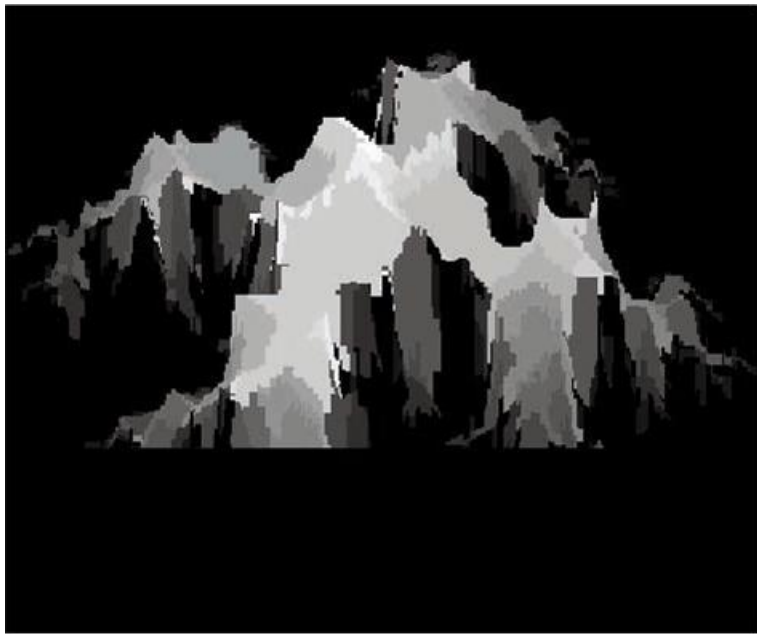
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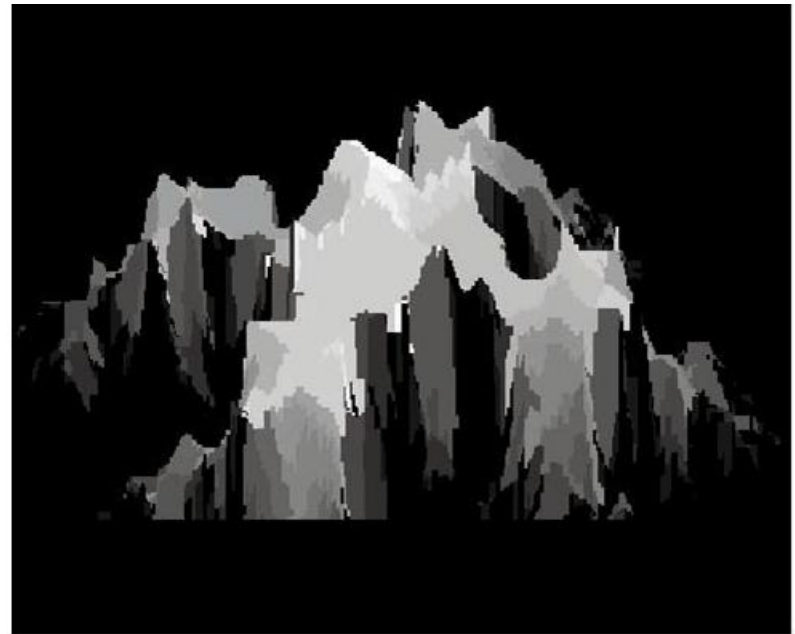
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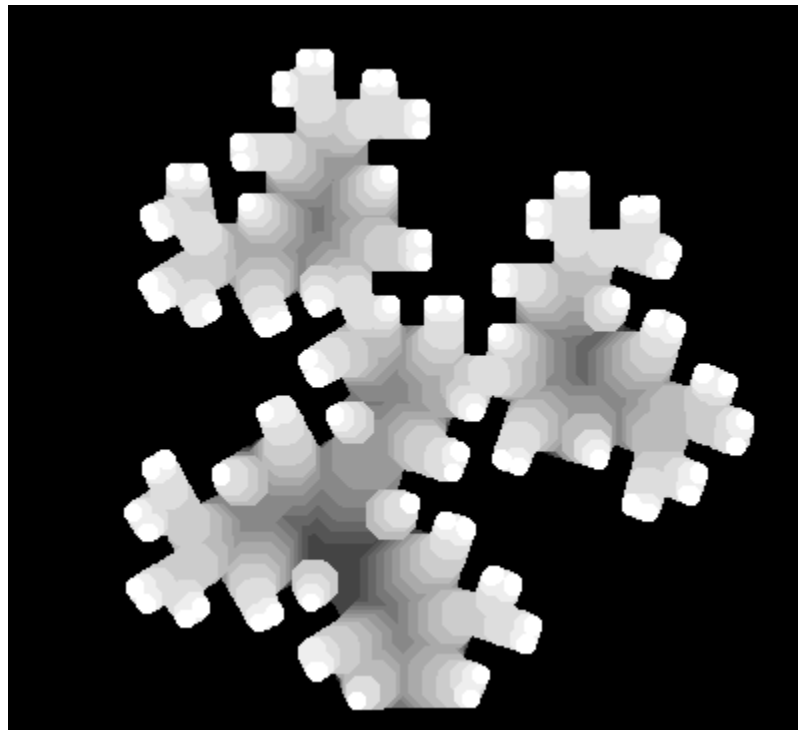


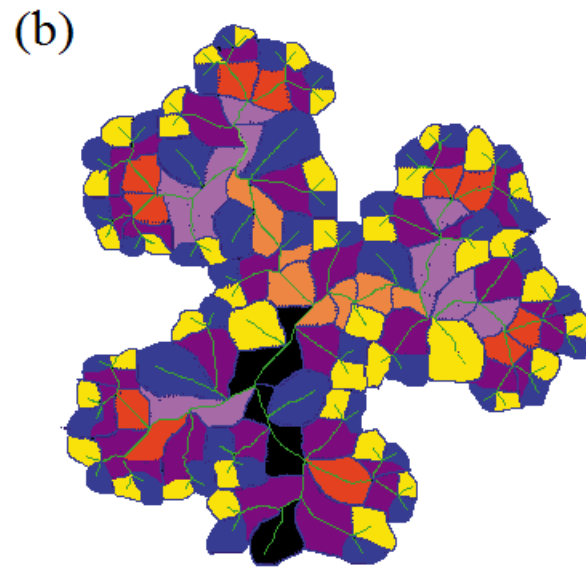
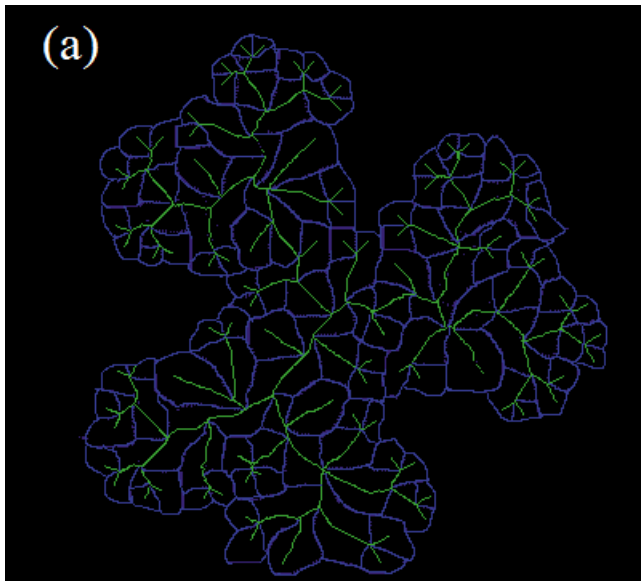


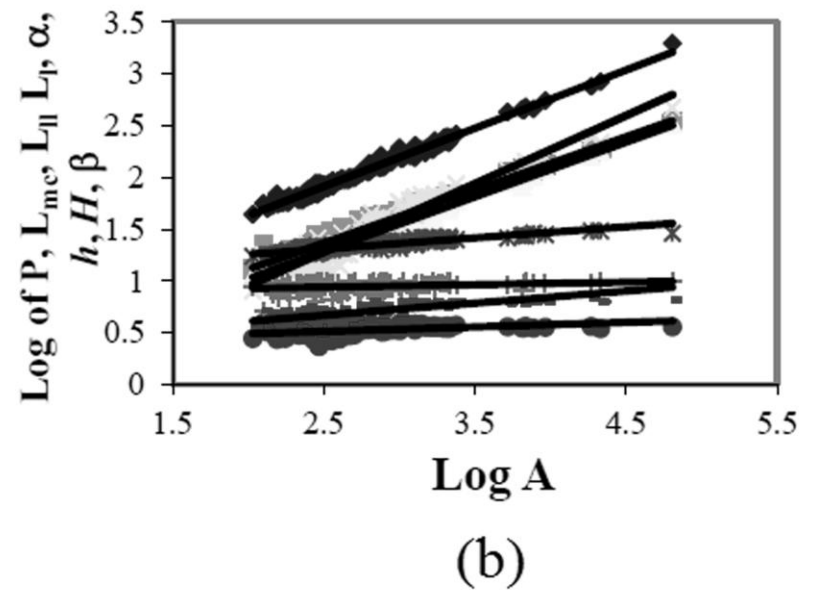
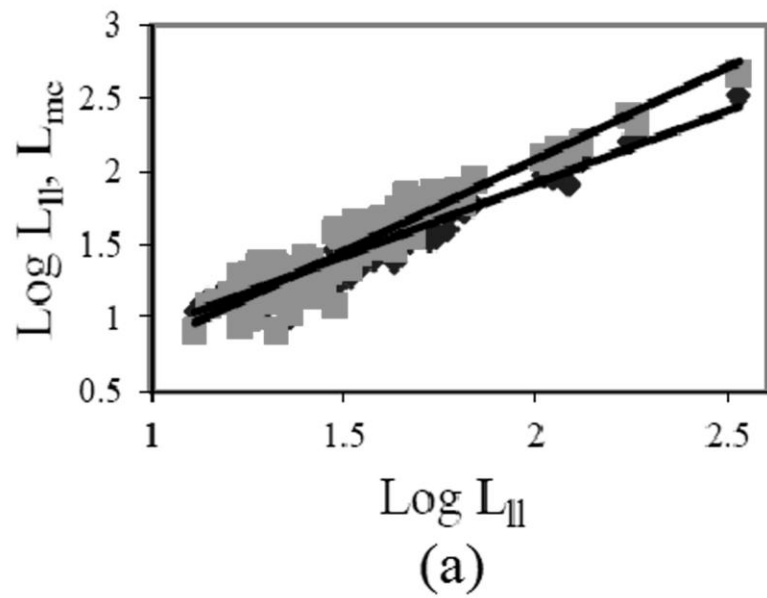
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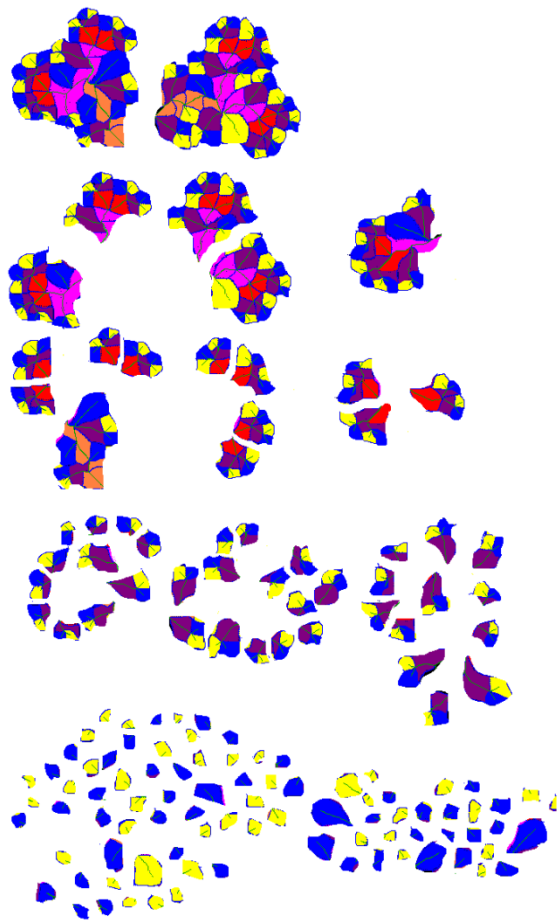


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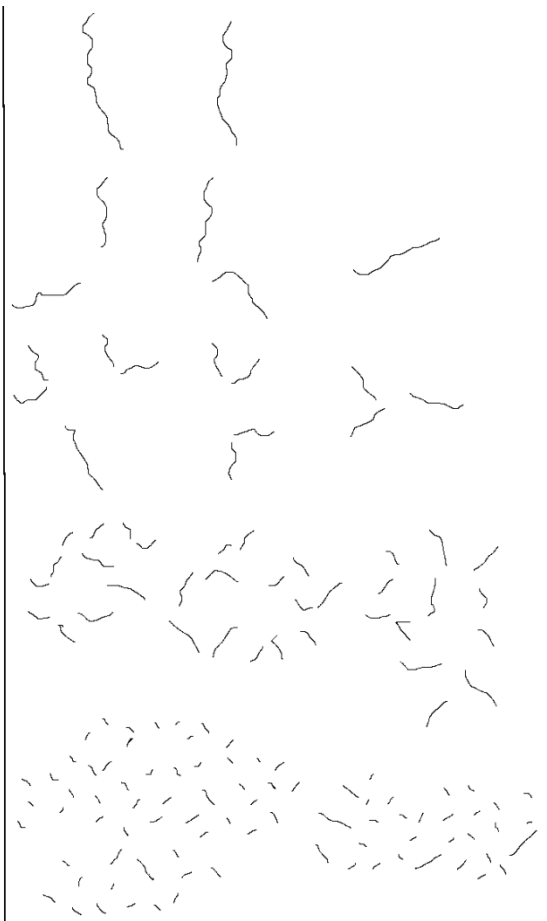






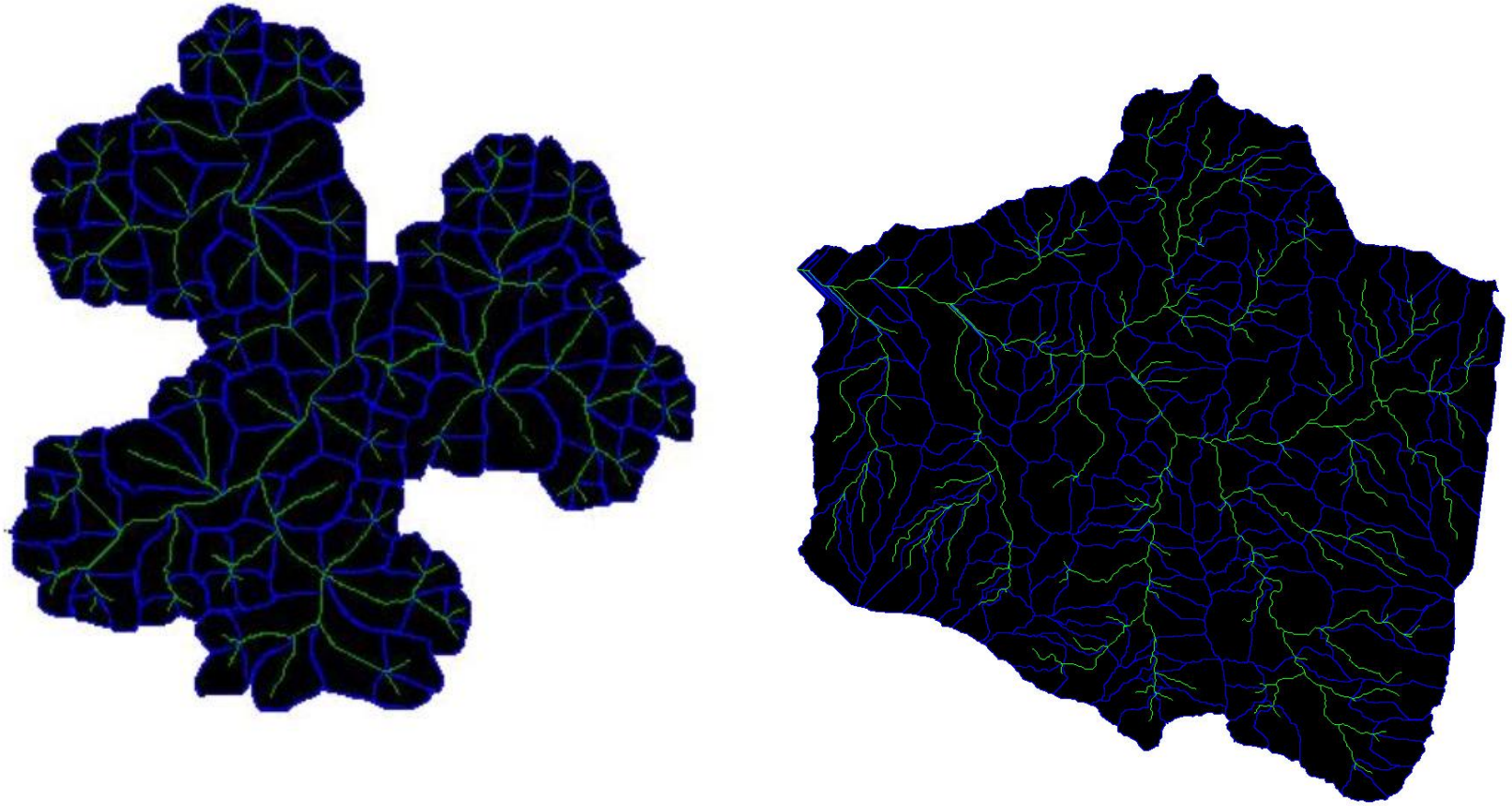


(a)



(b)

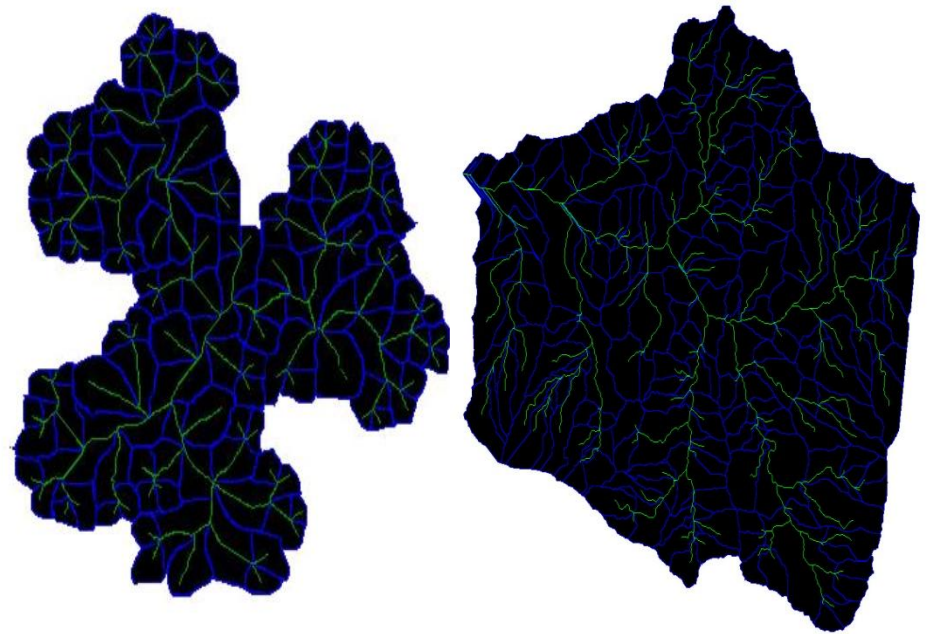
Decomposed basins and networks



Allometric power-laws

- ∞ Allometric power-laws are derived between the basic measures such as basin area, basin perimeter, channel length, longitudinal length and transverse length
- ∞ Observed that these power-laws are of universal type as they exhibit similar scaling relationships at all scales.

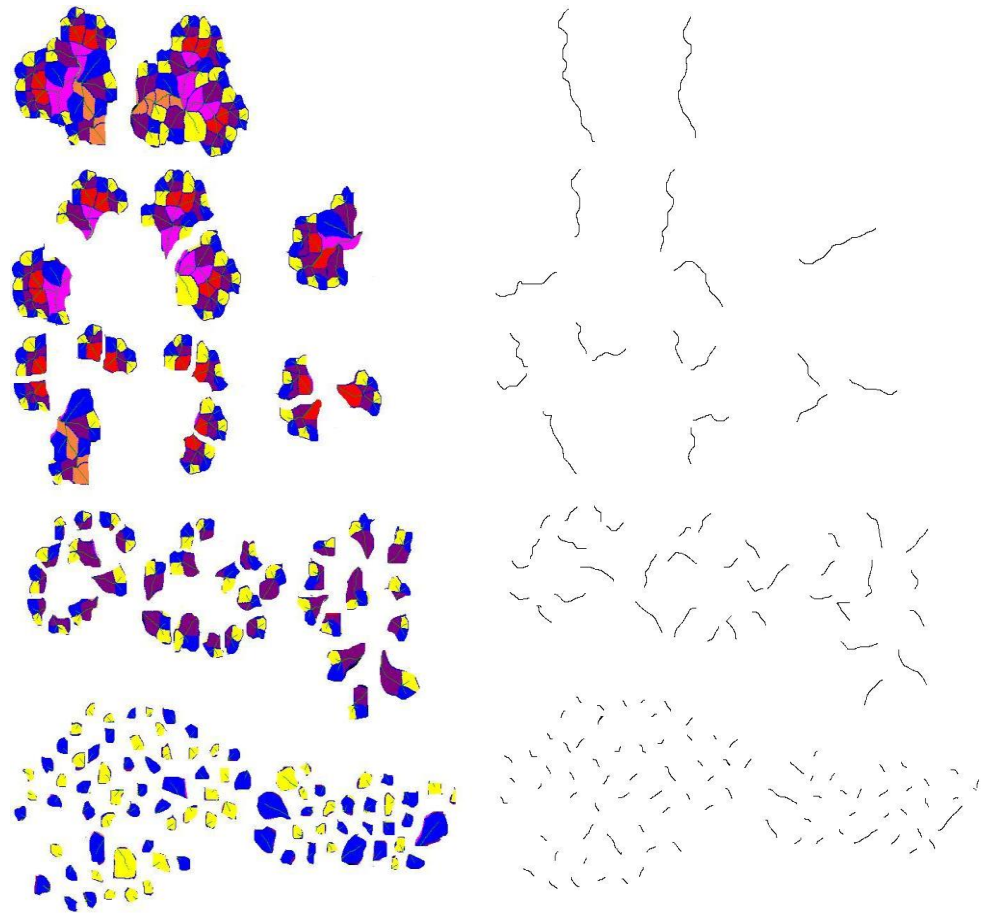
Existing allometric power-laws: Decomposed basins & networks

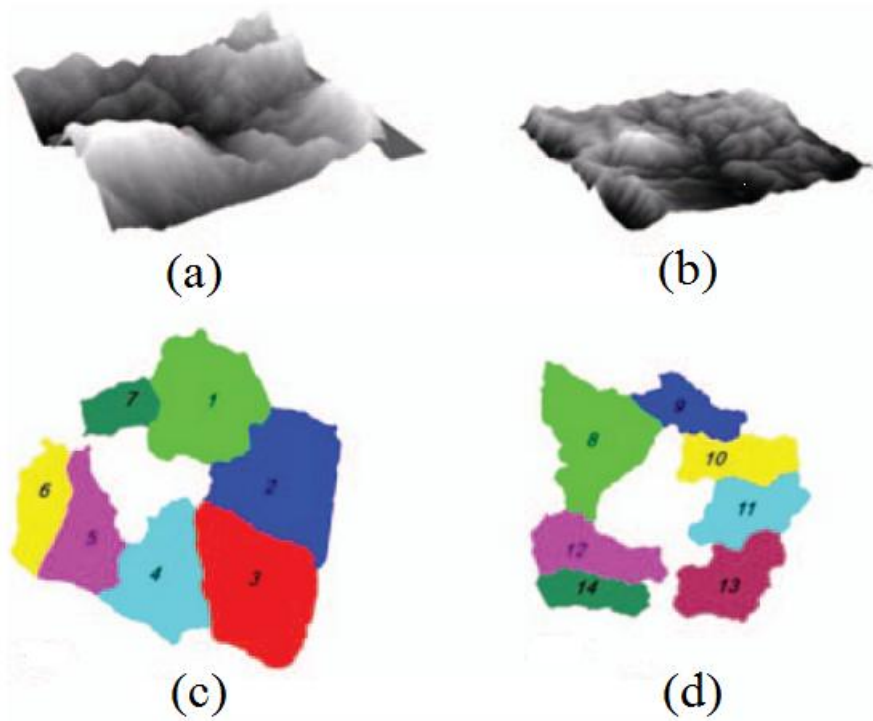


Existing allometric power-laws : Decomposed basins and networks

The number of decomposed sub-basins of respective orders from the simulated 6th order F-DEM include:

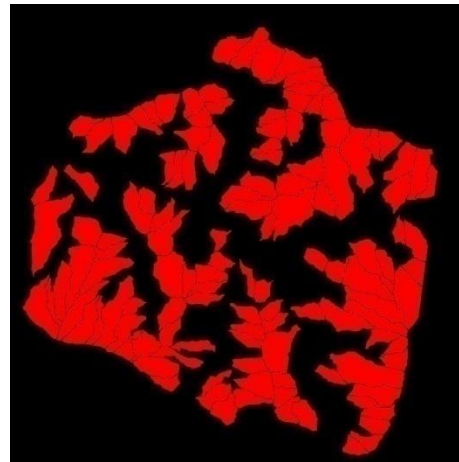
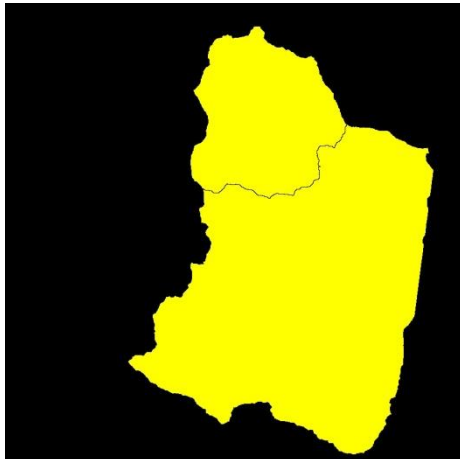
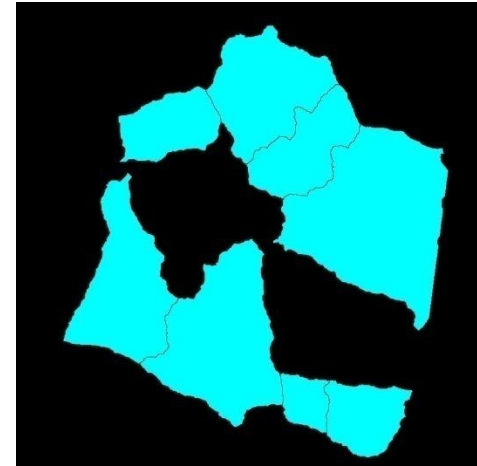
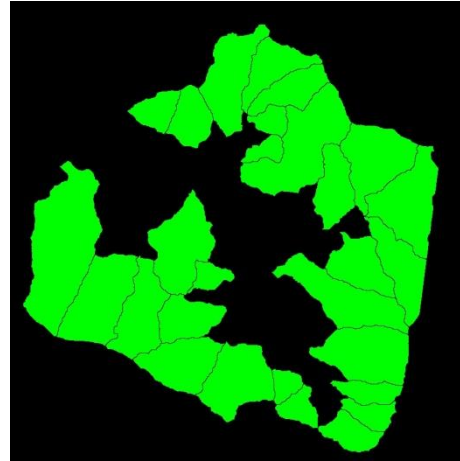
- two 5th
- five 4th
- ten 3rd
- thirty six 2nd, and
- eighty six 1st order basins.





Existing allometric power-laws :

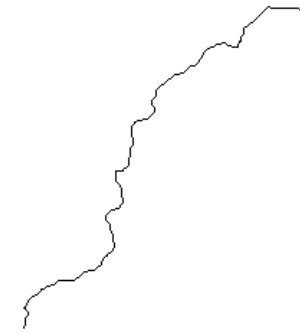
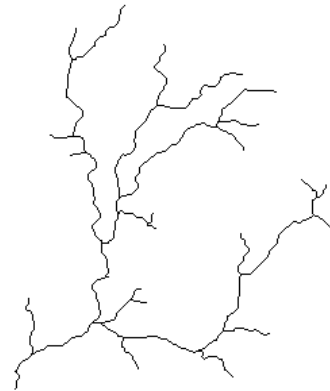
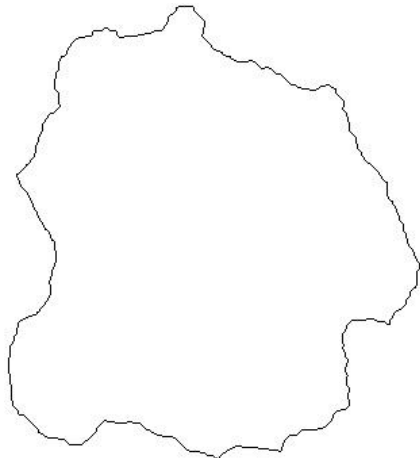
Decomposed basins and networks



Decomposed sub-basins
are

- two 4th
- eight 3rd
- twenty-eight 2nd, and
- one hundred twenty-four 1st
order basins.

Existing allometric power-laws : Basic Measures

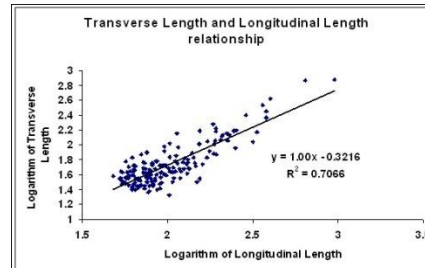
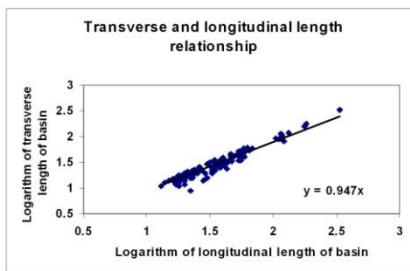
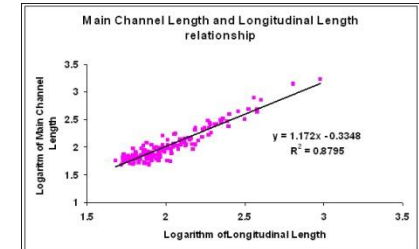
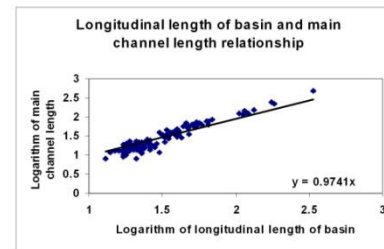
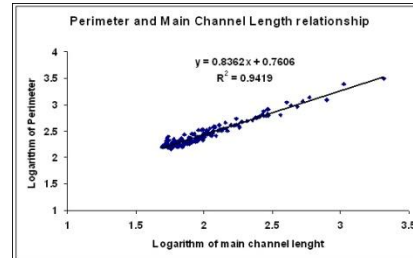
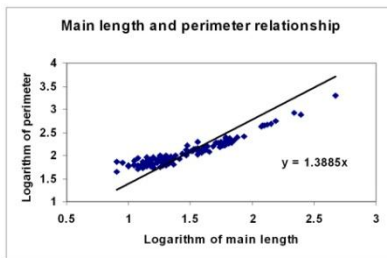
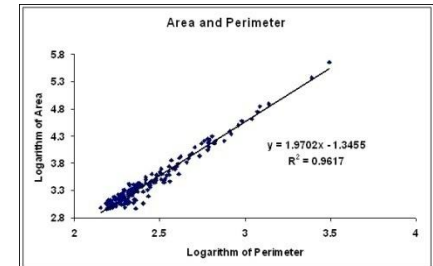
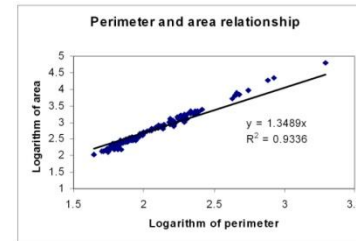
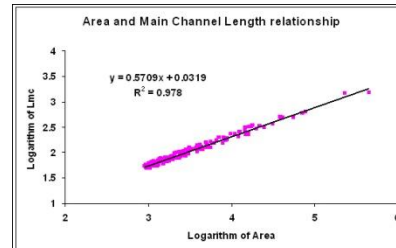
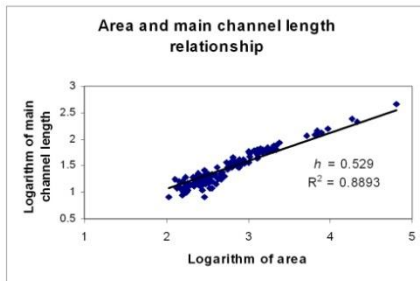


Longitudinal
length

Transverse
Length

Basic measures for a basin, (a) basin area, (b) total channel length, (c) main channel length, (d) basin perimeter, (e) longitudinal length and (f) transverse length.

Scale Invariant allometric power-laws



Allometric relationships among various areal and length parameters for all sub-basins of F-DEM and TOPSAR DEM.

Thank You

Q & A