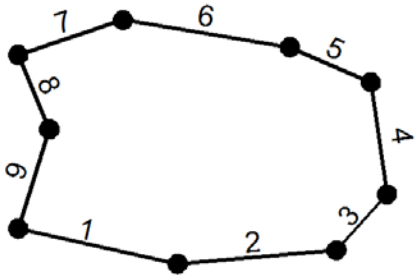
ВОДОСТРОИТЕЛНО ПРЕДПРИЯТИЕ ЕООД

Geometric Visualization of a Polygon Area Partitioning

In the process of modeling sewerage networks, the main component is the drained area (catchment) from which water is collected to each conduit (pipe). If the area for a single subcatchment is derived from a mathematical model, we have to create the geometry of that territory. Software that is used for this purpose, however, has rarely the functionality to visualize well the partitioning of a given living area, with respect to the known water debit, relative to each pipe.

We formulate the problem mathematically in the following way:

A polygon (corresponding to the catchment) is given with the Cartesian coordinates of its vertices (corresponding to Manholes) and its edges $i = 1, \dots, N$ (corresponding to pipes). Thus, the area of the polygon F is also known. With each edge, we associate a relative area $f(i)$ (corresponding to the relative water debit in percentages), where $100\% = \sum_{i=1}^{N} f(i)$.

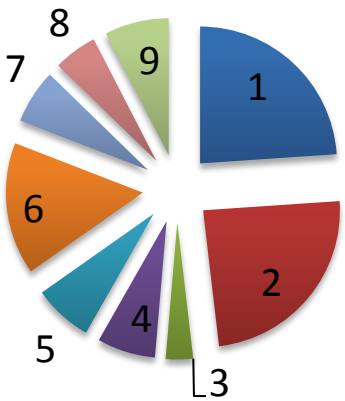


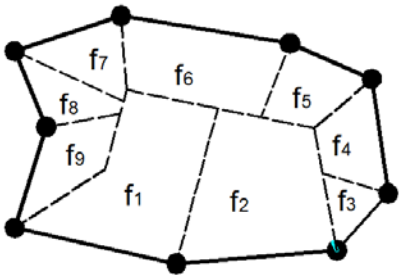
For visualization purposes, we look for a geometric partitioning of the polygon, such that the area of the i-th part is equal to $f(i)$.

Examples:

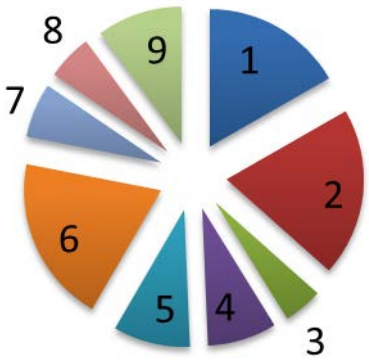
Given data	Standard visual interpretation	Visual (geometrical) interpretation we are looking for

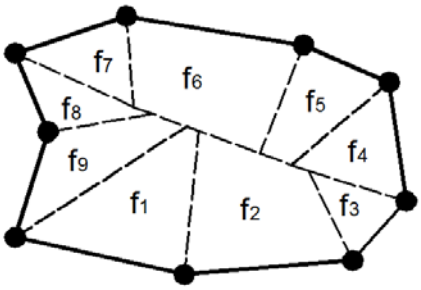
i	f(i) [%]
1	23.93
2	24.21
3	3.23
4	6.88
5	7.00
6	15.63
7	6.40
8	5.15
9	7.58
F	**1.00**



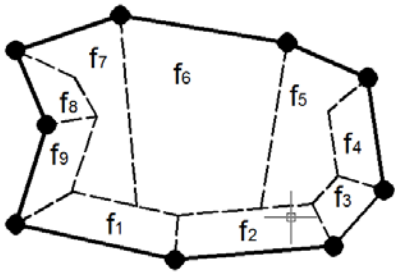


i	f(i) [%]
1	16.73
2	19.84
3	4.60
4	8.16
5	9.08
6	19.64
7	6.44
8	5.36
9	10.14
F	**1.00**





i	f(i) [%]
1	8.31
2	9.00
3	3.46
4	5.46
5	13.49
6	37.03
7	13.60
8	3.96
9	5.68
F	**1.00**



i	f(i) [%]
1	5.46
2	6.84
3	3.20
4	4.23
5	5.60
6	65.84
7	3.82
8	2.24
9	2.77
F	**1.00**