Fair Division - from Cakes to Lands

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Abstract

As the world becomes crowded, it becomes necessary to find ways for dividing land-resources fairly among people.   I approach this task by adapting the classic problem of fair cake-cutting, from cakes to lands.   I present the following adaptations:

1. Geometry. When dividing land, the two-dimensional geometric shape of the pieces is important. I present fair division algorithms that guarantee that the pieces have a pre-specified geometric shape.

2. Redivision. Dividing land is an on-going process. Land often has to be re-divided when new agents appear. I present re-division algorithms that are approximately fair both for the old land-holders and for the new comers.

3. Group ownership. The ownership of land is often shared among several individuals, such as family members. I present fair division algorithms that take into account the different preferences of family members.