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Geog 579

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Lab 1

Question 1: In your result map, you can see some holes (some pixels are not assigned to any soil type). Why does this happen under Boolean logic framework? (3 points)

Under Boolean logic every element of a set has qualified for membership 100%. The holes we are seeing are the unassigned soils which do not share properties with the rest of the set. For example, an elkmound soil may have had the correct slope but the elevation may have been out of the range >850 and < 950. In addition, we use the AND operator to intersect the sets in which both sets have to be TRUE in order to have the final result be true.

Question 2: There are no holes in result from fuzzy logic based mapping. Explain why. (3 points)

Differing from Boolean logic, Fuzzy logic is mostly continuous gradating membership. The degree in which a membership is granted is based on a range from 0.0 to 1.0. 0.0 meaning no membership and 1.0 being full membership. Fuzzy truth tables produce results in grade and the slight possibly is never aggerated when comparing two sets with the AND operator. The location is then assigned a label of the class whose membership value is the highest among the four soil types. This labeling is done during the hardening process and gives a the value one of the four soil types it’s closely related too.

Question 3: What are the advantages of using fuzzy logic in mapping geographic phenomena compared with Boolean logic? (6 points)

Fuzzy logic allows for the gradual assessment of the membership of elements in a set. The advantage of fuzzy logic is that results are more detailed for classification. For example, mapping crime in a city we can see which areas have a higher crime rate than others so police can allocate resources. If we were to using Boolean logic to test for high crime areas it would leave out areas where there is not a high crime leaving out of medium to low crime areas. The advantage for fuzzy logic in this scenario would be that we would be able to see trends where low to medium crimes also occur and if clustered could lead to potentially develop into a high crime area. Many clusters of medium to low crime areas could also require a more police resources if the geographic area were bigger than high crime zones.

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