STA 138 Discussion 5

Fall 2020

Maximum likelihood estimation by numerical methods

For our discussion this week, we will further explore maximum likelihood estimation with numerical methods.

1. *MLE under the multinomial model*

   Suppose that Amelia has sampled 76 newts out of a tank. There are four species in the tank (A, B, C, and D); the observed counts are given in the table below.

A	B	C	D
14	22	25	15

   Use numerical methods to obtain the maximum likelihood estimate of the relative proportions of the four species of newt in the tank.

2. *Constrained estimation*

   Beatrice, the lab assistant, feeds the newts in the tank regularly. She takes particular notice when she does so of the brightly colored species A and B. From her experience, she claims that 20% of the newts in the tank are from species A, and 30% from species B.

   Assuming that she is correct, use numerical methods to obtain the MLE of the proportions of the species in the tank.