

# Relative entropy and clustering

CMSC423 Spring 2017

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**Question 1.** Consider profile  $P$ :

|     |     |     |     |
|-----|-----|-----|-----|
| A : | 0.0 | 0.0 | 0.0 |
| C : | 0.5 | 0.5 | 0.5 |
| G : | 0.2 | 0.3 | 0.5 |
| T : | 0.3 | 0.2 | 0.0 |

and background frequencies  $b_A = 0.3$ ,  $b_C = 0.3$ ,  $b_G = 0.2$  and  $b_T = 0.2$ .

- (a) What is the *entropy* of profile  $P$ ?
- (b) What is the *relative entropy* of profile  $P$  with respect to the background frequencies?