3. Simple Multinomial Generative model

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Note: For those who have taken **18.6501x (Fundamentals of Statistics)** : The concept of **generative model** introduced in the above video that models the probabilistic nature of data generation is the same as what we learnt as a **statistical model** in 18.6501x. With parameter θ, the analagous notation that we saw for $p\left(w \mid \theta\right)$ in the statistics course is $\left(E, \{P_\theta\}_{\theta \in \Theta}\right)$, where E is the sample space of the data and $\{P_\theta\}_{\theta \in \Theta}$ is the family of distributions parameterized by θ.

Simple Multinomial Generative model

0/1 point (graded)
Consider a very simple multinomial model M to generate text in documents.

Let us assume that this model M has a fixed vocabulary W and that we generate a document by sampling one word at a time from this vocabulary. Furthermore, all the words that are generated by M are independent of each other.

We would like to capture the fact in our generative model M that some words in W are more likely to occur in any given document than the others. So, the first thing that M models is how likely it is to generate certain word $w \in W$. We denote this probability by $P(w|\theta) = \theta_w$, where θ_w is a parameter in our model M.

Which of the following option(s) is/are true about the model parameters θ_w? Choose all that apply from the statements below:

- [ ] $\theta_w \geq 0$ ✔
- [x] $\theta_w \geq 1$
- [x] $\sum_{w \in W} \theta_w = 1$ ✔
- [ ] $\sum_{w \in W} \theta_w > 1$

✖

Solution:

Note that θ_w denotes the probability of model M choosing the word w. Since it's a probability, its value must lie between 0 and 1. Therefore, $0 \leq \theta_w \leq 1$.

Further, all the above probability values must also sum up to 1. That is, $\sum_{w \in W} \theta_w = 1$.

Submit You have used 1 of 1 attempt

Answers are displayed within the problem

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[Staff] Typo in the question

In the second last paragraph of the question: "... We denote this probability by [mathjaxinline... 2