Zbývající čas 0:09:42 Skrýt

What is the entropy of a bigram distribution estimated from the following data, in the standard MLE way (start counting at position 2, i.e., e.g., p_2(so,similar) (joint prob.) = p(so) = 1/8):

```
# No two numbers are so similar numbers .
```

Odpověď:

$p(no / \#) = 1$

$p(two / no) = 1$

$p(numbers / two) = 1$

$p(are \mid numbers) = 0{,}5$

$p(so \mid are) = 1$

$p(similar \mid so) = 1$

$p(numbers / similar) = 1$

$p(. / numbers) = 0{,}5$

$$\text{Entropy} = -\sum \underbrace{p}_{\frac{1}{8}} \cdot \log(p(x|y)) = -\left(1 \cdot 0 + \ldots - \frac{1}{2} - \frac{1}{2}\right)$$

Conditional entropy has $p(x) \cdot \log(p(x|y))$

! this can't be conditional !

Zbývající čas 0:05:52 Skrýt

Estimate a bigram LM in the standard MLE way from data T (collect counts starting at position 2):

```
# No two numbers are so similar numbers .
```

Then compute its cross-entropy against the following data S:

```
# No two numbers .
```

When computing the cross-entropy, also start at position 2.

Odpověď:

$p_1(no \mid \#) = 1$

$p_1(two \mid no) = 1$

$p_1(numbers \mid two) = 1$

$p_1(. \mid numbers) = 1/2$

$$CE = -\sum p_1(x) \cdot \log p(x)$$

$$CE = -1 \cdot \frac{1}{4} = -\frac{1}{4}$$

Maximum Entropy principle:

- the most general distribution should win
- uniform gives the highest entropy → therefore if I don't have data for $P(X|Y,Z)$, I will replace it with $P(X)$, which burdens the later counts the least.

Estimate a trigram LM in the standard MLE way from data T (collect counts starting at position 3):

```
# # No two numbers are so similar numbers .
```

Then, compute its cross-entropy against the following data S:

```
# # No two numbers .
```

When computing the cross-entropy, also start at position 3.

Vyberte jednu z nabízených možností:

- a. infinity
- b. 0 ✕ No. It is true that no two trigrams overlap in data T, but it only means that entropy of p_3 is zero. The cross-entropy denepds on the data S and could be (very) different.
- c. 1/4 (0.25)
- d. 1

$p(no \mid \#, \#) = 1$

$p(two \mid \#, no) = 1$

$p(numbers \mid no, two) = 1$

$p(. \mid two, numbers) = 0$

$\log(0) = \infty$,

therefore the total sum will also be ∞.