

## NLP Assignment 1

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### 1. $P(\text{Comedy} | \text{fast, couple, shoot, fly})$

#### a) Non-smoothing:

##### i. $P(\text{Comedy} | \text{fast, couple, shoot, fly})$

$$\begin{aligned} &= P(\text{fast} | \text{Comedy}) P(\text{couple} | \text{Comedy}) P(\text{shoot} | \text{Comedy}) P(\text{fly} | \\ &\text{Comedy}) P(\text{Comedy}) \\ &= (1/7) * (2/7) * 0 * (1/7) * (2/5) \\ &= 0 \end{aligned}$$

#### b) Smoothing

##### i. $P(\text{Comedy} | \text{fast, couple, shoot, fly})$

$$\begin{aligned} &= P(\text{fast} | \text{Comedy}) P(\text{couple} | \text{Comedy}) P(\text{shoot} | \text{Comedy}) P(\text{fly} | \\ &\text{Comedy}) P(\text{Comedy}) \\ &= (2/14) * (3/14) * (1/14) * (2/14) * (2/5) \\ &= 3/24010 \\ &\approx 0.00012 \end{aligned}$$

### $P(\text{Action} | \text{fast, couple, shoot, fly})$

#### a) Non-smoothing

##### i. $P(\text{Action} | \text{fast, couple, shoot, fly})$

$$\begin{aligned} &= P(\text{fast} | \text{Action}) P(\text{couple} | \text{Action}) P(\text{shoot} | \text{Action}) P(\text{fly} | \text{Action}) \\ &P(\text{Action}) \\ &= (2/10) * 0 * (3/10) * (1/10) * (3/5) \\ &= 0 \end{aligned}$$

#### b) Smoothing

##### i. $P(\text{Action} | \text{fast, couple, shoot, fly})$

$$\begin{aligned} &= P(\text{fast} | \text{Action}) P(\text{couple} | \text{Action}) P(\text{shoot} | \text{Action}) P(\text{fly} | \text{Action}) \\ &P(\text{Action}) \\ &= (3/17) * (1/17) * (4/17) * (2/17) * (3/5) \\ &= 72/417605 \\ &\approx 0.00017 \end{aligned}$$

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4.

- a. Original: The striped bats were hanging on their feet and ate best fishes.

Lemmatized: The strip bat are hang on their foot and eat best fish.

- b. Original: At some point, I realized that I started to use the bike more often, not only to get to work but also to catch up with friends and to head out for coffee on weekends.

Lemmatized: At some point, I realize that I start to use the bike more often, not only to get to work but also to catch up with friend and to head out for coffee on weekend.