

#### Q4. TF-IDF Ranking Task

Query: "apple pie"

Documents:

- D1: apple=1/5, pie=1/5
  - D2: apple=0.1, pie=0
  - D3: apple=0, pie=0.25
- Assume  $IDF("apple") = 0.6$ ,  $IDF("pie") = 0.8$

Tasks:

- (a) Compute TF-IDF score for each term in each document

$$TF-IDF = TF \times IDF$$

Document	apple TF	pie TF	apple TF-IDF	pie TF-IDF
D1	$1/5 = 0.2$	$1/5 = 0.2$	$0.2 \times 0.6 = 0.12$	$0.2 \times 0.8 = 0.16$
D2	0.1	0	$0.1 \times 0.6 = 0.06$	$0 \times 0.8 = 0$
D3	0	0.25	$0 \times 0.6 = 0$	$0.25 \times 0.8 = 0.20$

- (b) Compute total TF-IDF per document

Document	Total TF-IDF
D1	$0.12 + 0.16 = 0.28$
D2	$0.06 + 0 = 0.06$
D3	$0 + 0.20 = 0.20$

**D1 = 0.28**

**D2 = 0.06**

**D3 = 0.20**

- (c) Rank D1, D2, D3 by score  
Higher TF-IDF  $\rightarrow$  Higher rank  
**D1 = 0.28** (highest relevance)  
**D3 = 0.20**  
**D2 = 0.06**

**Final Ranking:** D1 > D3 > D2