介绍

Note：

期中／期末 考试

平时 10% ／ 大作业 30% ／ 期中 20% ／ 期末 40%

Introduction

> Information retrieval （Wikipedia）

> Information retrieval (IR) is the activity of obtaining information resources relevant to an information need from a collection of information resources. Searches can be based on full-text or other content-based indexing.

广义：满足人们对信息需求的学问

狭义：信息搜索技术

信息检索的例子：书籍、图书馆、数据库、搜索引擎

信息等存在形式：结构化数据、非结构化数据

Main Task

1. 搜索（**Ad-hoc Search**）
    - 用户用关键字描述需求，系统返回满足用户需求的文档
2. 过滤（Filtering）
    - 找出对文档感兴趣的潜在用户
3. 分类
    - 对文档分类，便于用户浏览
4. 问题回答
    - 在文档中找到具体问题的答案

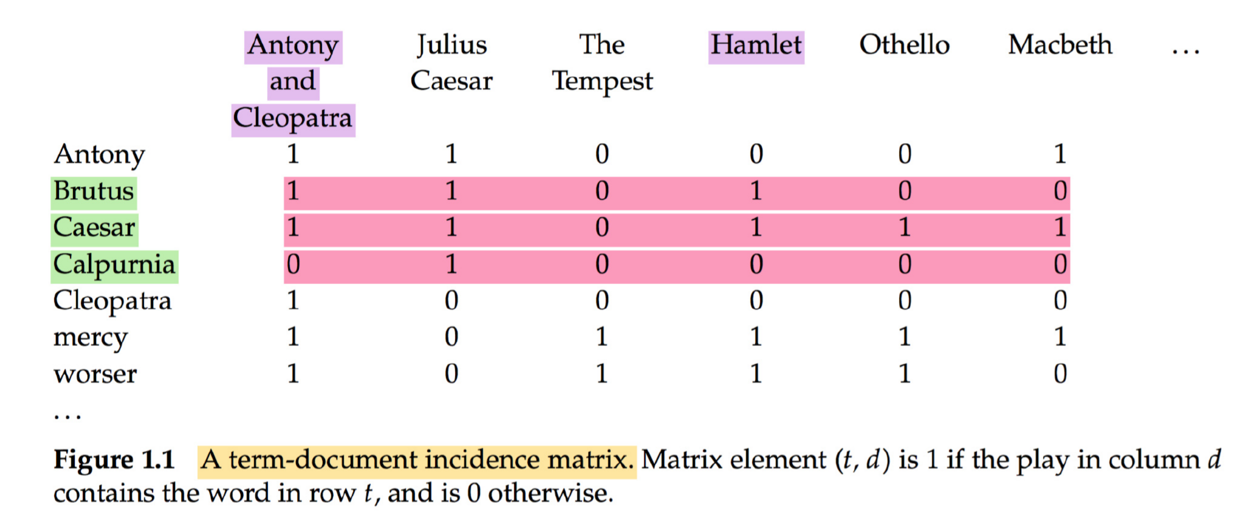
Basic Problems

- 相关性问题【包含哪些方面、如何衡量、用什么衡量】
- 性能问题【同时考虑系统的速度与容量】
- 测试问题【如何衡量准确性，有哪些指标】
- 人机交互问题【用户界面、系统易用性】

Boolean Retrieval

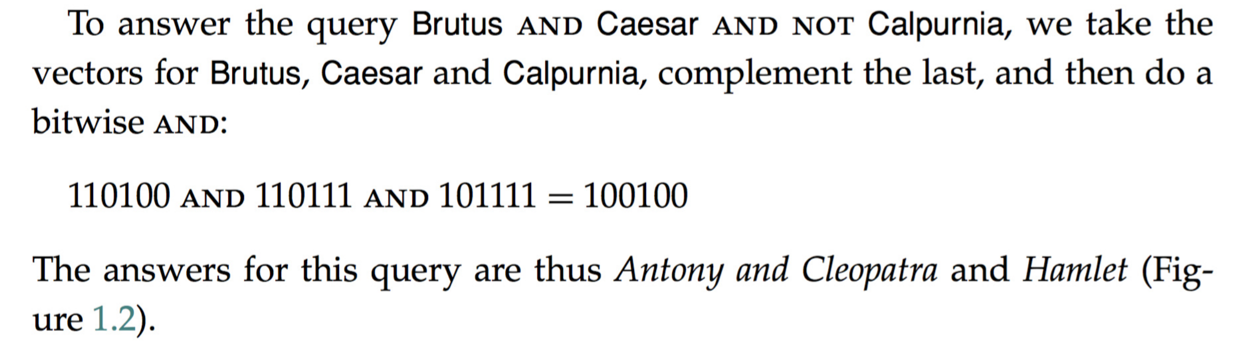
用户的信息需求通过词和布尔代数表示

Example



	Antony and Cleopatra	Julius Caesar	The Tempest	Hamlet	Othello	Macbeth	…
Antony	1	1	0	0	0	1	
Brutus	1	1	0	1	0	0	
Caesar	1	1	0	1	1	1	
Calpurnia	0	1	0	0	0	0	
Cleopatra	1	0	0	0	0	0	
mercy	1	0	1	1	1	1	
worser	1	0	1	1	1	0	
…							

Figure 1.1 A term-document incidence matrix. Matrix element (t, d) is 1 if the play in column d contains the word in row t, and is 0 otherwise.



To answer the query Brutus AND Caesar AND NOT Calpurnia, we take the vectors for Brutus, Caesar and Calpurnia, complement the last, and then do a bitwise AND:

$$110100 \text{ AND } 110111 \text{ AND } 101111 = 100100$$

The answers for this query are thus *Antony and Cleopatra* and *Hamlet* (Figure 1.2).

缺陷

关系矩阵稀疏造成空间浪费

改进—倒排索引

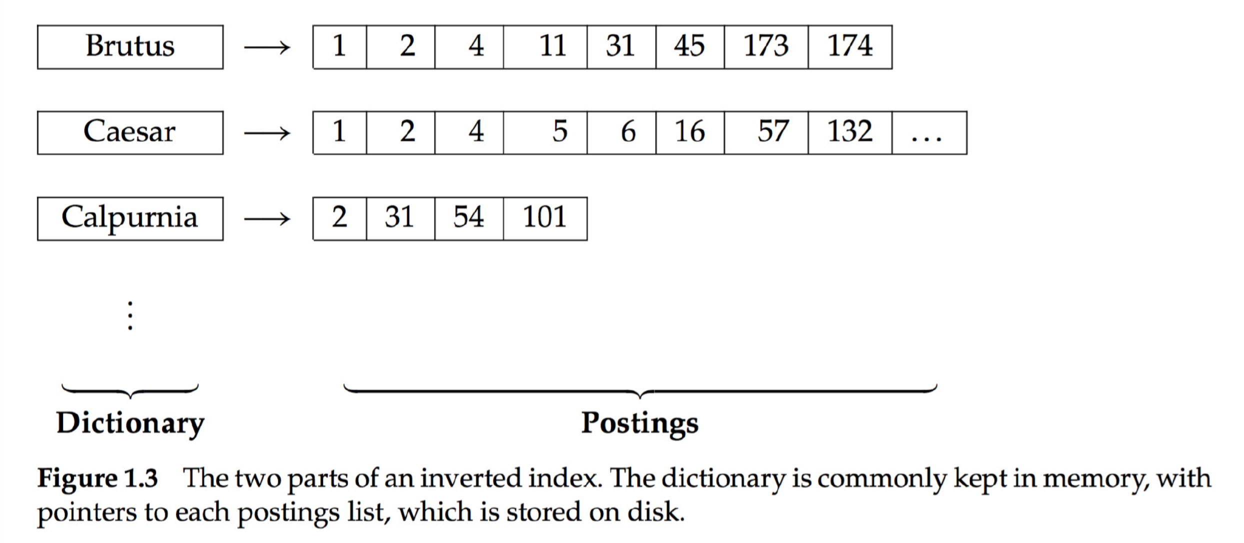
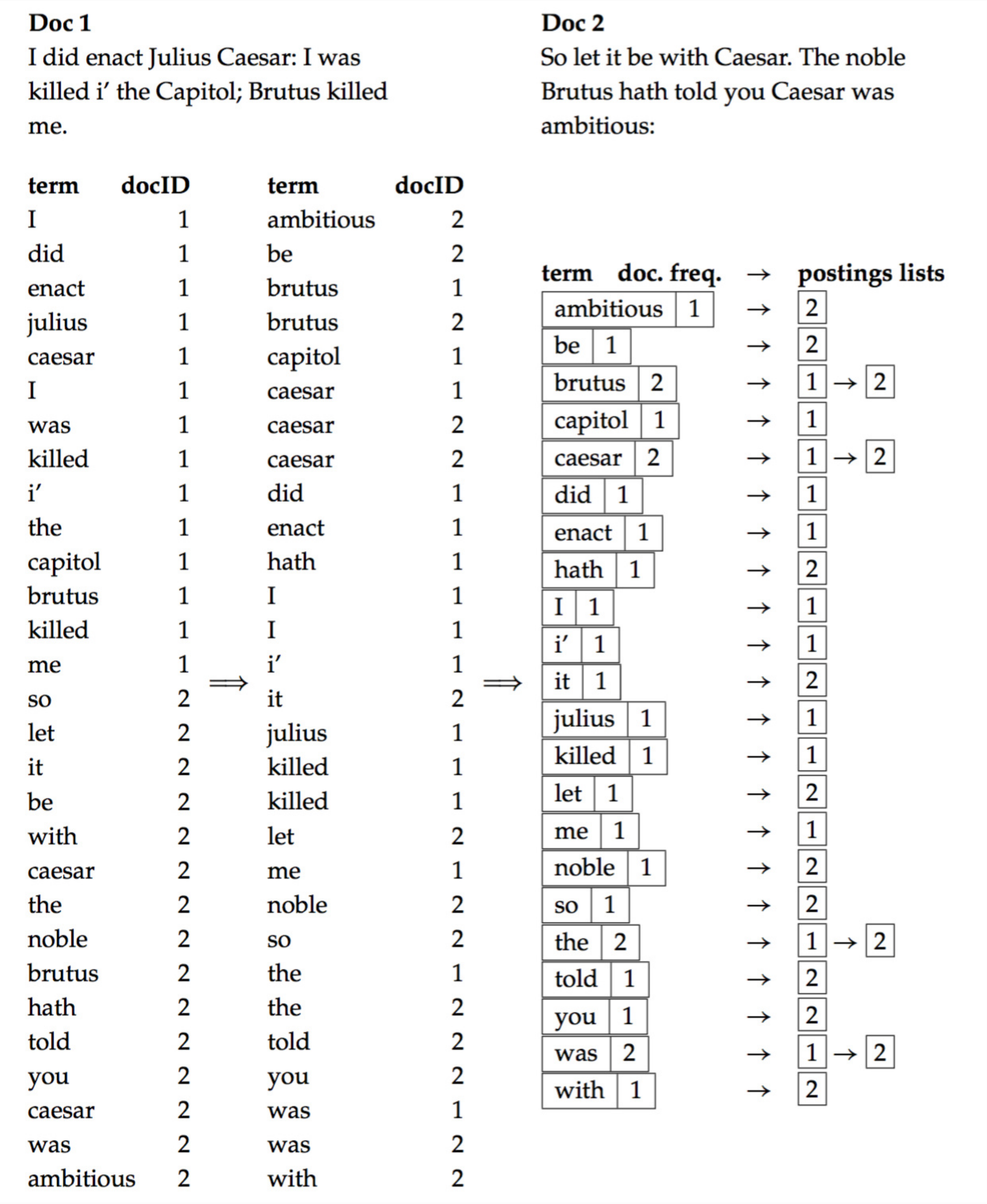


Figure 1.3 The two parts of an inverted index. The dictionary is commonly kept in memory, with pointers to each postings list, which is stored on disk.

在此基础上进行集合运算以进行文档检索

> PS：取交集过程－－边遍历边合并［多个Postings的时候，先取长度短的相互扫描］
>
> 计算复杂度为O(x+y). x 和y 为posting lists 的长度

倒排索引的创建



Doc 1
I did enact Julius Caesar: I was killed i' the Capitol; Brutus killed me.

Doc 2
So let it be with Caesar. The noble Brutus hath told you Caesar was ambitious:

term	docID
I	1
did	1
enact	1
julius	1
caesar	1
I	1
was	1
killed	1
i'	1
the	1
capitol	1
brutus	1
killed	1
me	1
so	2
let	2
it	2
be	2
with	2
caesar	2
the	2
noble	2
brutus	2
hath	2
told	2
you	2
caesar	2
was	2
ambitious	2

⟹

term	docID
ambitious	2
be	2
brutus	1
brutus	2
capitol	1
caesar	1
caesar	2
caesar	2
did	1
enact	1
hath	1
I	1
I	1
i'	1
it	2
julius	1
killed	1
killed	1
let	2
me	1
noble	2
so	2
the	1
the	2
told	2
you	2
was	1
was	2
with	2

⟹

term	doc. freq.	→	postings lists
ambitious	1	→	2
be	1	→	2
brutus	2	→	1 → 2
capitol	1	→	1
caesar	2	→	1 → 2
did	1	→	1
enact	1	→	1
hath	1	→	2
I	1	→	1
i'	1	→	1
it	1	→	2
julius	1	→	1
killed	1	→	1
let	1	→	2
me	1	→	1
noble	1	→	2
so	1	→	2
the	2	→	1 → 2
told	1	→	2
you	1	→	2
was	2	→	1 → 2
with	1	→	2