Bloom Filter Space Optimization

Learning Objectives

1. Understand how space is optimized in a bloom filter

S = { 6, 8, 4 }

Repeated Trials Example

$h_1(x) = x \% 10$ $h_2(x) = 2x \% 10$ $h_3(x) = (5+3x) \% 10$

0	0	0	0	0	0
1	0	1	0	1	0
2	0	2	0	2	0
3	0	3	0	3	0
4	0	4	0	4	0
5	0	5	0	5	0
6	0	6	0	6	0
7	0	7	0	7	0
8	0	8	0	8	0
9	0	9	0	9	0

S = { 6, 8, 4 }

Repeated Trials Example

$h_1(x) = x \% 10$ $h_2(x) = 2x \% 10$ $h_3(x) = (5+3x) \% 10$

	$h_1(x)$	$h_2(x)$	$h_3(x)$
0	0	0	0
1	0	0	0
2	0	1	0
3	0	0	1
4	1	0	0
5	0	0	0
6	1	1	0
7	0	0	1
8	1	1	0
9	0	0	1

find(8)
find(1)
find(16)

S = { 6, 8, 4 }

Space Efficient Example

$h_1(x) = x \% 10$ $h_2(x) = 2x \% 10$ $h_3(x) = (5+3x) \% 10$

0	0
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0

find(8)
find(1)
find(16)

S = { 6, 8, 4 }

Space Efficient Example

$h_1(x) = x \% 10$ $h_2(x) = 2x \% 10$ $h_3(x) = (5+3x) \% 10$

0	0
1	0
2	1
3	1
4	1
5	0
6	1
7	1
8	1
9	1

find(8)
find(1)
find(16)