

Rabin-Karp Algorithm

Text: $\overset{1}{a} \overset{2}{a} \overset{3}{a} \overset{4}{a} \overset{5}{a} \overset{6}{b}$
 $n=6$ $1+1+1=3$

pattern: $\overset{1}{a} \overset{2}{a} \overset{3}{b}$
 $m=3$ $1+1+2=4$
 \uparrow \uparrow
 $h(p)$ hashCode

a—1
b—2
c—3
d—4
e—5
f—6
g—7
h—8
i—9
j—10

Rabin-Karp Algorithm

Text: $\overset{1}{a} \overset{2}{a} \overset{3}{a} \overset{4}{a} \overset{5}{a} \overset{6}{b}$
 $n=6$ $\underline{1+1+2=4}$

pattern: $\overset{1}{a} \overset{2}{a} \overset{3}{b}$
 $m=3$ $\underline{1+1+2=4}$
 \uparrow \uparrow
 $h(p)$ hashcode

a-1
b-2
c-3
d-4
e-5
f-6
g-7
h-8
i-9
j-10

Drawback

Rabin-Karp Algorithm

Text: $\overset{1}{c} \overset{2}{c} \overset{3}{a} \overset{4}{c} \overset{5}{c} \overset{6}{a} \overset{7}{e} \overset{8}{d} \overset{9}{b} \overset{10}{a}$
 $n=11$ $\frac{3+3+1}{=7}$

pattern: $\overset{1}{d} \overset{2}{b} \overset{3}{a}$
 $m=3$ $4+2+1=7$

a-1
b-2
c-3
d-4
e-5
f-6
g-7
h-8
i-9
j-10

Rabin-Karp Algorithm

Text: $\overset{1}{c} \overset{2}{c} \overset{3}{a} \overset{4}{c} \overset{5}{c} \overset{6}{a} \overset{7}{e} \overset{8}{d} \overset{9}{b} \overset{10}{a}$ $n=11$

$\begin{array}{r} 3+1+3 \\ = 7 \end{array}$

pattern: $\overset{1}{d} \overset{2}{b} \overset{3}{a}$ $m=3$

$4+2+1=7$

a-1
b-2
c-3
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g-7
h-8
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j-10

Rabin-Karp Algorithm

Text: ^{1 2 3 4 5 6 7 8 9 10 11} c c a c c c a e d b a
n=11

pattern: ^{1 2 3} d b a
m=3

$$4 \times 10^2 + 2 \times 10^1 + 1 \times 10^0$$

$$P[1] \times 10^{m-1} + P[2] \times 10^{m-2} + P[3] \times 10^{m-3}$$

Why 10?

No Of Characters Used Here 10 So 10

If 26 Then 26

if 127 Then 127

a-1
b-2
c-3
d-4
e-5
f-6
g-7
h-8
i-9
j-10

Rabin-Karp Algorithm

Text: $\overset{1}{c} \overset{2}{c} \overset{3}{a} \overset{4}{c} \overset{5}{c} \overset{6}{a} \overset{7}{e} \overset{8}{d} \overset{9}{b} \overset{10}{a}$
 $n=11$ $3 \times 10^2 + 3 \times 10^1 + 1 \times 10^0$
 $300 + 30 + 1 = 331$

pattern: $\overset{1}{d} \overset{2}{b} \overset{3}{a}$
 $m=3$
 $4 \times 10^2 + 2 \times 10^1 + 1 \times 10^0$
 $400 + 20 + 1 = 421$

a-1
b-2
c-3
d-4
e-5
f-6
g-7
h-8
i-9
j-10

Rabin-Karp Algorithm

Text: ^{1 2 3 4 5 6 7 8 9 10 11}
c c a c c a e d b a
n=11 $3 \times 10^2 + 3 \times 10^1 + 1 \times 10^0$

$$\left[\frac{3 \times 10^2 + 3 \times 10^1 + 1 \times 10^0}{331} - 3 \times 10^2 \right] \times 10 + 3 \times 10^0$$

pattern: ^{1 2 3}
d b a = 421
m=3

$$4 \times 10^2 + 2 \times 10^1 + 1 \times 10^0$$

$$400 + 20 + 1 = 421$$

a-1
b-2
c-3
d-4
e-5
f-6
g-7
h-8
i-9
j-10

Rabin-Karp Algorithm

Text: $c \ c \ c \ c \ c \ a \ e \ d \ b \ a$
 $n = 11$

$$\begin{aligned} & \underline{3 \times 10^2 + 1 \times 10^1 + 3 \times 10^0} \\ & 331 - 3 \times 10^2 = \\ & 331 - 300 = 31 \\ & 31 \times 10 = 310 + 3 = 313 \end{aligned}$$

pattern: $d \ b \ a = \underline{421}$
 $m = 3$

$$\begin{aligned} & \underline{4 \times 10^2 + 2 \times 10^1 + 1 \times 10^0} \\ & 400 + 20 + 1 = 421 \end{aligned}$$

a — 1
b — 2
c — 3
d — 4
e — 5
f — 6
g — 7
h — 8
i — 9
j — 10

Rabin-Karp Algorithm

Text: ^{1 2 3 4 5 6 7 8 9 10 11}
c c a c c a e d b a
n=11
 $\cdot 3 \times 10^2 + 1 \times 10^1 + 1 \times 10^0$

$$331 - 300 = 31$$

$$31 \times 10 + 1$$

$$310 + 1 = 311$$

pattern: ^{1 2 3}
d b a = 421
m=3

$$\left[4 \times 10^2 + 2 \times 10^1 + 1 \times 10^0 \right] \% 2$$

$$400 + 20 + 1 = 421$$

a-1

b-2

c-3

d-4

e-5

f-6

g-7

h-8

i-9

j-10