PHAN TICH THIET KE THUAT TOAN – CS112.L11.KHCL

Phan tich thuat toan perfectly balanced tree va quick select

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Cau 1:

Thoi gian chay thuat toan tao cay nhi phan bang thuc nghiem

|  |  |
| --- | --- |
| n | t(n) |
| 100 | 0.003 |
| 450 | 0.032 |
| 800 | 0.062 |
| 1150 | 0.08 |
| 1500 | 0.081 |
| 1850 | 0.103 |
| 2200 | 0.144 |
| 2550 | 0.175 |
| 2900 | 0.17 |
| 3250 | 0.161 |
| 3600 | 0.186 |
| 3950 | 0.241 |
| 4300 | 0.327 |
| 4650 | 0.253 |
| 5000 | 0.23 |
| 5350 | 0.207 |
| 5700 | 0.22 |
| 6050 | 0.259 |
| 6400 | 0.282 |
| 6750 | 0.402 |
| 7100 | 0.464 |
| 7450 | 0.316 |
| 7800 | 0.353 |
| 8150 | 0.36 |
| 8500 | 0.347 |
| 8850 | 0.391 |
| 9200 | 0.365 |
| 9550 | 0.368 |
| 9900 | 0.352 |

Do phuc tap cua thuat toan tao cay nhi phan bang thuc nghiem tu ket qua

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| TB lgn - n | TB sqrt(n) - c | TB n - c | TB nlgn - c | TB n^2 - c | TB n^3 - c |
| 11.58011301 | 66.24017412 | 4999.760897 | 62881.79503 | 33574999.76 | 2.53625E+11 |

Ta thay trung binh chenh lech cua log n la nho nhat nen chon log n

Cau 2:

Phuong trinh de quy do phuc tap thuat toan tao cay nhi phan can bang hoan hao

T(n) =

T(n) = 2T + C2

= 2[2T + C2] + C2

= 4T + 3C2

= 4[2T + C2] + 3C2

= 8T + 7C2

= 8[2T + C2] + 7C2

= 16T + 15C2

=> T(n) = + (C2

Khi i = => nC’ + (n-1) \* C2

=> Do phuc tap la

Cau 3:

Thoi gian chay thuat toan quick select bang thuc nghiem

|  |  |
| --- | --- |
| k | t |
| 100 | 3.213 |
| 500 | 18.894 |
| 900 | 33.773 |
| 1300 | 50.718 |
| 1700 | 61.472 |
| 2100 | 76.53 |
| 2500 | 117.976 |
| 2900 | 61.802 |
| 3300 | 88.477 |
| 3700 | 182.524 |
| 4100 | 228.378 |
| 4500 | 315.38 |
| 4900 | 342.713 |
| 5300 | 393.447 |
| 5700 | 194.629 |
| 6100 | 379.642 |
| 6500 | 399.27 |
| 6900 | 565.222 |
| 7300 | 391.981 |
| 7700 | 393.284 |

Vay thoi gian phu thuoc vao gia tri cua k

Cau 4:

Do phuc tap quick select bang thuc nghiem tu ket qua cau 3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| TB lgn - n | TB sqrt(n) - c | TB n - c | TB nlgn - c | TB n^2 - c | TB n^3 - c |
| 203.8669332 | 157.3920367 | 3685.03375 | 47462.31288 | 20529785.03 | 1.21563E+11 |

Ta thay trung binh chenh lech của sqrt n là nho nhat nên chọn sqrt n

Cau 5:

Phuong trinh de quy do phuc tap thuat toan quick select

T(n) =

T(n) = T() + cn

= T() + c + cn

= T() + c + c + cn

= T() + c + c + c + cn

= T() + c( + + + n)

=> T(n) = c(

Khi i = log2(n) => T(n) = c(

= cn

= c\*2n + c’ O(n)

=> Do phuc tap la O(n)