**Proiectarea Algoritmilor – Laborator 5**

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*18.02.2020*

1. **Arbori optimali de cautare**

p[i] = {0.15, 0.10, 0.05, 0.10, 0.20}

q[i] = {0.05, 0.10, 0.05, 0.05, 0.05, 0.10}

Formule:

* + E[i][i-1] = q[i-1]
  + W[i][i-1] = q[i-1]
  + W[i][j] = W[i][j-1] + p[j] + q[j]
  + E[i][j] = W[i][j] + min(E[i][r-1] + E[r+1][j]), r=i..j
* W[0][0] = q[0] = 0.05

W[1][1] = q[1] = 0.10

W[2][2] = q[2] = 0.05

W[3][3] = q[3] = 0.05

W[4][4] = q[4] = 0.05

W[5][5] = q[5] = 0.10

* W[0][1] = W[0][0] + p[1] + q[1] = 0.05 + 0.15 + 0.10 = 0.30

W[1][2] = W[1][1] + p[2] + q[2] = 0.10 + 0.10 + 0.05 = 0.25

W[2][3] = W[2][2] + p[3] + q[3] = 0.05 + 0.05 + 0.05 = 0.15

W[3][4] = W[3][3] + p[4] + q[4] = 0.05 + 0.10 + 0.05 = 0.20

W[4][5] = W[4][4] + p[5] + q[5] = 0.05 + 0.20 + 0.10 = 0.35

* W[0][2] = W[0][1] + p[2] + q[2] = 0.30 + 0.10 + 0.05 = 0.45

W[1][3] = W[1][2] + p[3] + q[3] = 0.25 + 0.05 + 0.05 = 0.35

W[2][4] = W[2][3] + p[4] + q[4] = 0.15 + 0.10 + 0.05 = 0.30

W[3][5] = W[3][4] + p[5] + q[5] = 0.20 + 0.20 + 0.10 = 0.50

* W[0][3] = W[0][2] + p[3] + q[3] = 0.45 + 0.05 + 0.05 = 0.55

W[1][4] = W[1][3] + p[4] + q[4] = 0.35 + 0.10 + 0.05 = 0.50

W[2][5] = W[2][4] + p[5] + q[5] = 0.30 + 0.20 + 0.10 = 0.60

* W[0][4] = W[0][3] + p[4] + q[4] = 0.55 + 0.10 + 0.05 = 0.70

W[1][5] = W[1][4] + p[5] + q[5] = 0.50 + 0.20 + 0.10 = 0.80

* W[0][5] = W[0][4] + p[5] + q[5] = 0.70 + 0.20 + 0.10 = 1.00
* C[0][0] = 0

C[1][1] = 0

C[2][2] = 0

C[3][3] = 0

C[4][4] = 0

C[5][5] = 0

* C[0][1] = W[0][1] + min(C[0][0] + C[1][1]) = W[0][1] = 0.30

C[1][2] = W[1][2] = 0.25

C[2][3] = W[2][3] = 0.15

C[3][4] = W[3][4] = 0.20

C[4][5] = W[4][5] = 0.35

* C[0][2] = W[0][2] + min(C[0][1], C[1][2]) = 0.45 + 0.25 = 0.70

C[1][3] = W[1][3] + min(C[1][2], C[2][3]) = 0.35 + 0.15 = 0.50

C[2][4] = W[2][4] + min(C[2][3], C[3][4]) = 0.30 + 0.15 = 0.45

C[3][5] = W[3][5] + min(C[3][4], C[4][5]) = 0.50 + 0.20 = 0.70

* C[0][3] = W[0][3] + min(C[0][0] + C[1][3], C[0][1] + C[2][3], C[0][2] + C[3][3]) = 0.55 + 0.45 = 1.00

C[1][4] = W[1][4] + min(C[1][1] + C[2][4], C[1][2] + C[3][4], C[1][3] + C[4][4]) = 0.50 + 0.45 = 0.95

C[2][5] = W[2][5] + min(C[2][2] + C[3][5], C[2][3] + C[4][5], C[2][4] + C[5][5]) = 0.60 + 0.45 = 1.05

* C[0][4] = W[0][4] + min(C[0][0] + C[1][4], C[0][1] + C[2][4], C[0][2] + C[3][4], C[0][3] + C[4][4]) = 0.70 + 0.75 = 1.45

C[1][5] = W[1][5] + min(C[1][1] + C[2][5], C[1][2] + C[3][5], C[1][3] + C[4][5], C[1][4] + C[5][5]) = 0.80 + 0.85 = 1.65

* C[0][5] = W[0][5] + min(C[0][0] + C[1][5], C[0][1] + C[2][5], C[0][2] + C[3][5], C[0][3] + C[4][5], C[0][4] + C[5][5]) =

= 1.00 + 1.35 = 2.35

1. **k-garduri**

*n = 6, k = 2*

Formula de recurenta : D[i] = D[i-1] + D[i-k]

Cazuri de baza:

D[0] = 0

D[1] = 1

D[2] = 2

D[3] = D[2] + D[1] = 3

D[4] = D[3] + D[2] = 5

D[5] = D[4] + D[3] = 8

D[6] = D[5] + D[4] = 13

Desen: D[1] => |

D[2] => || sau =

D[3] => ||| sau =| sau |=

D[4] => |||| sau =|| sau |=| sau ||= sau ==

D[5] => ||||| sau |||= sau ||=| sau |=|| sau =||| sau ==| sau =|= sau |==

D[6] => |||||| sau ||||= sau |||=| sau ||=|| sau |=||| sau =|||| sau ||== sau |=|= sau |==| sau =|=|

sau =||= sau ==|| sau ===

1. **Sume cu rest 0 la impartirea cu 3**

sirul de numere: v = {3, 1, 2, 4}

caz de baza: D[-1][0] = 0; D[-1][1] = 0; D[-1][2] = 0

v[0] = 3 % 3 == 0 => D[0][0] = 1 + D[-1][0] = 1 - {3}

D[0][1] = 2 \* D[-1][0] = 0 - {}

D[0][2] = 2 \* D[-1][0] = 0 - {}

v[1] = 1 % 3 == 1 => D[1][0] = D[0][0] + D[0][2] = 1 + 0 = 1 – {3}

D[1][1] = 1 + D[0][0] + D[0][1] = 1 + 1 + 0 = 2 – {{3, 1}, {1}}

D[1][2] = D[0][2] + D[0][1] = 0 – {}

v[2] = 2 % 3 == 2 => D[2][0] = D[1][0] + D[1][1] = 1 + 2 = 3 – {{3}, {1, 2}, {3, 1, 2}}

D[2][1] = D[1][2] + D[1][1] = 0 + 2 = 2 – {{3, 1}, {1}}

D[2][2] = 1 + D[1][2] + D[1][0] = 1 + 0 + 1 = 2 – {{3, 2}, {2}}

v[3] = 4 % 3 == 1 => D[3][0] = D[2][0] + D[2][2] = 3 + 2 = 5 - {{3}, {1, 2}, {3, 1, 2}, {3, 2, 4}, {2, 4}}

D[3][1] = 1 + D[2][0] + D[2][1] = 1 + 3 + 2 = 6 - {{1}, {3, 1}, {4}, {3, 4}, {1, 2, 4}, {3, 1, 2, 4}}

D[3][2] = D[2][2] + D[2][1] = 2 + 2 = 4 – {{2}, {3, 2}, {1, 4}, {3, 1, 4}}