**Grundlagen der Sequenzanalyse**

**Übungen zur Vorlesung am 29.10.2013**

**Afg. 3.1:** **aufgabe\_1.py**

**Afg. 3.2:**

1. Einheitskosten

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 |  |  |  |  |  |  |  |  |  |  |
| 0 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|  | 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|  | 2 | 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|  | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 |
|  | 4 | 3 | 2 | 2 | 3 | 4 | 5 | 6 | 7 | 7 | 8 |
|  | 5 | 4 | 3 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 |
|  | 6 | 5 | 4 | 3 | 2 | 3 | 3 | 4 | 5 | 6 | 7 |
|  | 7 | 6 | 5 | 4 | 3 | 2 | 3 | 3 | 4 | 5 | 6 |
|  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 3 | 4 | 5 | 6 |
|  | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 3 | 4 | 5 |
|  | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 3 | 4 | 4 |

= minimierter Pfad

1. Hammingkosten

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 |  |  |  |  |  |  |  |  |  |  |
| 0 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|  | 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
|  | 4 | 2 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
|  | 6 | 4 | 2 | 4 | 6 | 8 | 10 | 12 | 12 | 14 | 16 |
|  | 8 | 6 | 4 | 4 | 6 | 8 | 10 | 12 | 14 | 14 | 16 |
|  | 10 | 8 | 6 | 4 | 6 | 6 | 8 | 10 | 12 | 14 | 16 |
|  | 12 | 10 | 8 | 6 | 4 | 6 | 6 | 8 | 10 | 12 | 14 |
|  | 14 | 12 | 10 | 8 | 6 | 4 | 6 | 6 | 8 | 10 | 12 |
|  | 16 | 14 | 12 | 10 | 8 | 6 | 4 | 6 | 8 | 10 | 10 |
|  | 18 | 16 | 14 | 12 | 10 | 8 | 6 | 4 | 6 | 8 | 10 |
|  | 20 | 18 | 16 | 14 | 12 | 10 | 8 | 6 | 6 | 8 | 8 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 |  |  |  |  |  |  |  |  |  |  |
| 0 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
|  | 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
|  | 6 | 3 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
|  | 9 | 6 | 3 | 6 | 9 | 12 | 15 | 18 | 18 | 21 | 24 |
|  | 6 | 9 | 6 | 6 | 9 | 12 | 15 | 18 | 21 | 21 | 24 |
|  | 15 | 12 | 9 | 6 | 9 | 9 | 12 | 15 | 18 | 21 | 24 |
|  | 18 | 15 | 12 | 9 | 6 | 9 | 9 | 12 | 15 | 18 | 21 |
|  | 21 | 18 | 15 | 12 | 9 | 6 | 9 | 9 | 12 | 15 | 18 |
|  | 24 | 21 | 18 | 15 | 12 | 9 | 6 | 9 | 12 | 15 | 18 |
|  | 27 | 24 | 21 | 18 | 15 | 12 | 9 | 6 | 9 | 12 | 15 |
|  | 30 | 27 | 24 | 21 | 18 | 15 | 12 | 9 | 9 | 12 | 12 |