

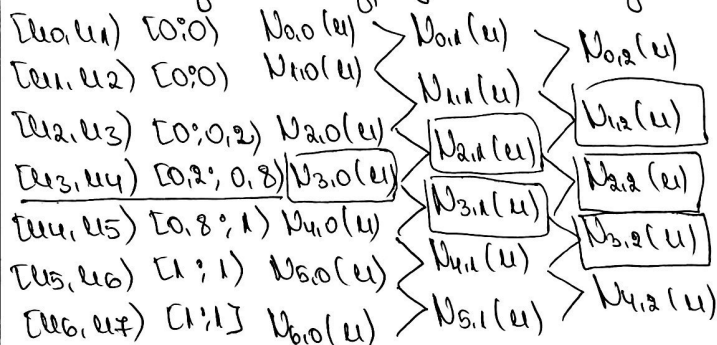
Задача. Нека $U = \{0 \leq u_1 < u_2 < \dots < u_n \leq 1\}$ е възлов вектор. Намерете стойностите на ненулевите основни Б-сплайн функции от втора степен $N_{i,2}(u)$ за $u = 0.5$.

Решение:

Вървите раздели във възловия вектор се подреждат последователно в таблица:

| | | | |
|-------------------|-------|-------|-------------------|
| $u_0 = u_1 = u_2$ | u_3 | u_4 | $u_5 = u_6 = u_7$ |
| 0 | 0.2 | 0.8 | 1 |

Всички върви се подреждат в последователни интервали:



$$u = 0.5 \in [u_3, u_4) \Rightarrow 1. \underline{N_{3,2}(0.5) = 1}$$

$$2. N_{2,2}(0.5) = ? \text{ и } N_{4,2}(0.5) = ?$$

$$N_{i,p}(u) = \frac{u - u_i}{u_{i+p} - u_i} N_{i,p-1}(u) + \frac{u_{i+p+1} - u}{u_{i+p+1} - u_{i+1}} N_{i+1,p-1}(u)$$

$$N_{2,2}(0.5) = \frac{u_4 - u}{u_4 - u_3} \cdot N_{3,0}(0.5) = \frac{0.8 - 0.5}{0.8 - 0.2} \cdot 1 = \frac{0.3}{0.6} \cdot 1 = \frac{3}{6} = \frac{1}{2}$$

$$\Rightarrow \underline{N_{2,2}(0.5) = \frac{1}{2}}$$

$$N_{2,1}(0,5) + N_{3,1}(0,5) = 1$$

$$N_{3,1}(0,5) = 1 - N_{2,1}(0,5) = 1 - \frac{1}{2} = \frac{1}{2} \Rightarrow \underline{N_{3,1}(0,5) = \frac{1}{2}}$$

$$2. N_{1,2}(0,5) = ? , N_{2,2}(0,5) = ? \text{ u } N_{3,2}(0,5) = ?$$

$$N_{i,p}(u) = \frac{u - u_i}{u_{i+p} - u_i} N_{i,p-1}(u) + \frac{u_{i+p+1} - u}{u_{i+p+1} - u_{i+1}} N_{i+1,p-1}(u)$$

$$\underset{i \ p}{N_{1,2}(0,5)} = \frac{u_4 - u}{u_4 - u_1} \underset{i \ p}{N_{2,1}(0,5)} = \frac{0,8 - 0,5}{0,8 - 0} \cdot \frac{1}{2} = \frac{0,3}{0,8} \cdot \frac{1}{2} = \frac{3}{8} \cdot \frac{1}{2} = \frac{3}{16}$$

$$\Rightarrow \underline{N_{1,2}(0,5) = \frac{3}{16}}$$

$$\underset{i \ p}{N_{3,2}(0,5)} = \frac{u - u_3}{u_5 - u_3} \underset{i \ p}{N_{3,1}(0,5)} = \frac{0,5 - 0,2}{1 - 0,2} \cdot \frac{1}{2} = \frac{0,3}{0,8} \cdot \frac{1}{2} = \frac{3}{8} \cdot \frac{1}{2} = \frac{3}{16}$$

$$\Rightarrow \underline{N_{3,2}(0,5) = \frac{3}{16}}$$

$$N_{1,2}(0,5) + N_{2,2}(0,5) + N_{3,2}(0,5) = 1$$

$$N_{2,2}(0,5) = 1 - N_{1,2}(0,5) - N_{3,2}(0,5) = 1 - \frac{3}{16} - \frac{3}{16} = 1 - \frac{6}{16} = \frac{10}{16}$$

$$\Rightarrow \underline{N_{2,2}(0,5) = \frac{10}{16}}$$

$$\underline{N_{1,2}(0,5) = \frac{3}{16} ; N_{2,2}(0,5) = \frac{10}{16} ; N_{3,2}(0,5) = \frac{3}{16}}$$