

Ядро оператора увеличения нечеткости

Задано ядро K оператора увеличения нечеткости Φ и универсальное множество $E = \{1, 2, 3, 4\}$. Определить результат действия этого оператора на нечеткое множество A .

Круглов В.В., Дли М.И., Голунов Р.Ю. Нечеткая логика и искусственные нейронные сети. – М.: Издательство Физико-математической литературы, 2001

Задача i-20.1.

3

$$\begin{aligned}A &= 0.7/1 + 0.1/2 + 0.6/3 + 0.1/4; \\K(1) &= 0.1/1 + 0.2/2 + 0.1/3 + 0.7/4 \\K(2) &= 0.3/1 + 0.4/2 + 0.2/3 + 0.3/4 \\K(3) &= 0.1/1 + 0.1/2 + 0.1/3 + 0.7/4 \\K(4) &= 0.3/1 + 0.5/2 + 0.1/3 + 0.8/4\end{aligned}$$

Задача i-20.2.

3

$$\begin{aligned}A &= 0.8/1 + 0.2/2 + 0.6/3 + 0.1/4; \\K(1) &= 0.2/1 + 0.5/2 + 0.1/3 + 0.7/4 \\K(2) &= 0.2/1 + 0.6/2 + 0.1/3 + 0.7/4 \\K(3) &= 0.3/1 + 0.4/2 + 0.1/3 + 0.3/4 \\K(4) &= 0.1/1 + 0.1/3 + 0.2/4\end{aligned}$$

Задача i-20.3.

3

$$\begin{aligned}A &= 0.6/1 + 0.6/2 + 0.1/3 + 0.6/4; \\K(1) &= 0.2/1 + 0.4/2 + 0.1/3 + 0.2/4 \\K(2) &= 0.3/1 + 0.6/2 + 0.2/3 + 0.8/4 \\K(3) &= 0.1/2 + 0.1/3 + 0.1/4 \\K(4) &= 0.1/2 + 0.6/4\end{aligned}$$

Задача i-20.4.

3

$$\begin{aligned}A &= 0.3/1 + 0.8/2 + 0.1/3 + 0.9/4; \\K(1) &= 0.1/3 + 0.1/4 \\K(2) &= 0.2/1 + 0.5/2 + 0.2/3 + 0.7/4 \\K(3) &= 0.1/4 \\K(4) &= 0.2/1 + 0.5/2 + 0.1/3 + 0.2/4\end{aligned}$$

Задача i-20.5.

3

$$\begin{aligned}A &= 0.2/1 + 0.6/2 + 0.6/3 + 0.4/4; \\K(1) &= 0.1/1 + 0.1/2 + 0.7/4 \\K(2) &= 0.3/1 + 0.5/2 + 0.2/3 + 0.3/4 \\K(3) &= 0.1/2 + 0.1/4 \\K(4) &= 0.2/1 + 0.4/2 + 0.1/3 + 0.2/4\end{aligned}$$

Задача i-20.6.

3

$$\begin{aligned}A &= 0.1/1 + 0.6/2 + 0.8/3 + 0.2/4; \\K(1) &= 0.3/1 + 0.4/2 + 0.2/3 + 0.3/4 \\K(2) &= 0.1/1 + 0.1/2 + 0.2/4 \\K(3) &= 0.1/1 + 0.2/2 + 0.7/4 \\K(4) &= 0.3/1 + 0.5/2 + 0.1/3 + 0.8/4\end{aligned}$$

Задача i-20.7.

3

$$\begin{aligned}A &= 0.7/1 + 0.1/2 + 0.6/3 + 0.4/4; \\K(1) &= 0.2/1 + 0.5/2 + 0.2/3 + 0.2/4 \\K(2) &= 0.1/1 + 0.1/3 + 0.2/4 \\K(3) &= 0.1/1 + 0.1/3 + 0.2/4 \\K(4) &= 0.3/1 + 0.5/2 + 0.1/3 + 0.8/4\end{aligned}$$

Задача i-20.8.

3

$$\begin{aligned}A &= 0.1/1 + 1/2 + 0.5/3 + 1/4; \\K(1) &= 0.1/2 + 0.1/3 + 0.6/4 \\K(2) &= 0.3/1 + 0.6/2 + 0.1/3 + 0.8/4 \\K(3) &= 0.2/1 + 0.4/2 + 0.1/3 + 0.2/4 \\K(4) &= 0.2/1 + 0.5/2 + 0.1/3 + 0.2/4\end{aligned}$$

Задача i-20.9.

3

$$\begin{aligned}A &= 0.5/1 + 0.2/2 + 0.7/3 + 0.7/4; \\K(1) &= 0.1/2 + 0.1/3 + 0.6/4 \\K(2) &= 0.3/1 + 0.5/2 + 0.1/3 + 0.3/4 \\K(3) &= 0.1/1 + 0.1/3 + 0.2/4 \\K(4) &= 0.1/4\end{aligned}$$

Задача i-20.10.

3

$$\begin{aligned}A &= 0.2/1 + 0.9/2 + 0.2/3 + 1/4; \\K(1) &= 0.2/2 + 0.6/4 \\K(2) &= 0.2/1 + 0.4/2 + 0.2/3 + 0.2/4 \\K(3) &= 0.1/4 \\K(4) &= 0.1/1 + 0.2/2 + 0.7/4\end{aligned}$$

Задача i-20.11.

3

$$A = 0.2/1 + 0.7/2 + 0.6/3 + 0.3/4;$$
$$K(1) = 0.2/1 + 0.6/2 + 0.1/3 + 0.7/4$$
$$K(2) = 0.1/2 + 0.1/3 + 0.1/4$$
$$K(3) = 0.2/1 + 0.6/2 + 0.1/3 + 0.7/4$$
$$K(4) = 0.1/4$$

Задача i-20.13.

3

$$A = 0.8/1 + 0.9/2 + 0.2/3 + 1/4;$$
$$K(1) = 0.3/1 + 0.5/2 + 0.1/3 + 0.3/4$$
$$K(2) = 0.3/1 + 0.5/2 + 0.1/3 + 0.8/4$$
$$K(3) = 0.1/1 + 0.2/4$$
$$K(4) = 0.1/2 + 0.1/3 + 0.1/4$$

Задача i-20.15.

3

$$A = 0.3/1 + 0.5/2 + 0.9/3 + 0.6/4;$$
$$K(1) = 0.2/2 + 0.1/3 + 0.6/4$$
$$K(2) = 0.1/3 + 0.1/4$$
$$K(3) = 0.1/1 + 0.1/2 + 0.2/4$$
$$K(4) = 0.1/1 + 0.1/2 + 0.7/4$$

Задача i-20.17.

3

$$A = 0.2/1 + 0.2/2 + 0.7/3 + 0.7/4;$$
$$K(1) = 0.1/1 + 0.1/2 + 0.7/4$$
$$K(2) = 0.3/1 + 0.6/2 + 0.2/3 + 0.8/4$$
$$K(3) = 0.1/2 + 0.6/4$$
$$K(4) = 0.2/1 + 0.4/2 + 0.1/3 + 0.2/4$$

Задача i-20.19.

3

$$A = 0.7/1 + 0.5/2 + 1/3 + 0.7/4;$$
$$K(1) = 0.3/1 + 0.6/2 + 0.2/3 + 0.8/4$$
$$K(2) = 0.3/1 + 0.5/2 + 0.2/3 + 0.8/4$$
$$K(3) = 0.2/2 + 0.1/3 + 0.6/4$$
$$K(4) = 0.1/2 + 0.6/4$$

Задача i-20.21.

3

$$A = 0.5/1 + 0.6/2 + 0.7/3 + 0.8/4;$$
$$K(1) = 0.2/1 + 0.5/2 + 0.2/3 + 0.7/4$$
$$K(2) = 0.2/1 + 0.5/2 + 0.1/3 + 0.2/4$$
$$K(3) = 0.1/2 + 0.1/3 + 0.1/4$$
$$K(4) = 0.2/1 + 0.4/2 + 0.1/3 + 0.2/4$$

Задача i-20.12.

3

$$A = 0.4/1 + 0.8/2 + 0.8/3 + 0.3/4;$$
$$K(1) = 0.1/2 + 0.6/4$$
$$K(2) = 0.2/1 + 0.5/2 + 0.1/3 + 0.7/4$$
$$K(3) = 0.1/1 + 0.1/3 + 0.2/4$$
$$K(4) = 0.3/1 + 0.5/2 + 0.1/3 + 0.3/4$$

Задача i-20.14.

3

$$A = 0.1/1 + 1/2 + 0.5/3 + 0.9/4;$$
$$K(1) = 0.1/1 + 0.1/2 + 0.1/3 + 0.7/4$$
$$K(2) = 0.2/2 + 0.6/4$$
$$K(3) = 0.3/1 + 0.4/2 + 0.1/3 + 0.3/4$$
$$K(4) = 0.2/1 + 0.6/2 + 0.1/3 + 0.7/4$$

Задача i-20.16.

3

$$A = 1/1 + 0.9/2 + 0.1/3 + 0.5/4;$$
$$K(1) = 0.1/1 + 0.1/2 + 0.2/4$$
$$K(2) = 0.1/2 + 0.1/3 + 0.6/4$$
$$K(3) = 0.2/1 + 0.5/2 + 0.1/3 + 0.7/4$$
$$K(4) = 0.2/1 + 0.5/2 + 0.2/3 + 0.2/4$$

Задача i-20.18.

3

$$A = 0.1/1 + 0.4/2 + 1/3 + 0.7/4;$$
$$K(1) = 0.1/3 + 0.1/4$$
$$K(2) = 0.1/1 + 0.2/4$$
$$K(3) = 0.1/1 + 0.1/2 + 0.2/4$$
$$K(4) = 0.1/1 + 0.1/2 + 0.7/4$$

Задача i-20.20.

3

$$A = 0.3/1 + 0.1/2 + 1/3 + 1/4;$$
$$K(1) = 0.1/1 + 0.1/2 + 0.1/3 + 0.2/4$$
$$K(2) = 0.1/1 + 0.1/2 + 0.1/3 + 0.7/4$$
$$K(3) = 0.3/1 + 0.5/2 + 0.1/3 + 0.8/4$$
$$K(4) = 0.3/1 + 0.4/2 + 0.1/3 + 0.3/4$$

Задача i-20.22.

3

$$A = 0.4/1 + 1/2 + 0.4/3 + 0.6/4;$$
$$K(1) = 0.2/1 + 0.5/2 + 0.1/3 + 0.7/4$$
$$K(2) = 0.2/1 + 0.5/2 + 0.1/3 + 0.2/4$$
$$K(3) = 0.2/1 + 0.4/2 + 0.2/3 + 0.2/4$$
$$K(4) = 0.1/1 + 0.1/2 + 0.2/4$$

Задача i-20.23.

3

$$A = 0.1/1 + 0.9/2 + 0.3/3 + 0.5/4;$$
$$K(1) = 0.1/1 + 0.1/2 + 0.1/3 + 0.2/4$$
$$K(2) = 0.1/1 + 0.1/2 + 0.7/4$$
$$K(3) = 0.2/1 + 0.5/2 + 0.1/3 + 0.7/4$$
$$K(4) = 0.1/1 + 0.2/2 + 0.7/4$$

Задача i-20.25.

3

$$A = 1/1 + 0.2/2 + 0.3/3 + 0.6/4;$$
$$K(1) = 0.2/1 + 0.5/2 + 0.1/3 + 0.7/4$$
$$K(2) = 0.2/1 + 0.6/2 + 0.2/3 + 0.7/4$$
$$K(3) = 0.1/2 + 0.6/4$$
$$K(4) = 0.2/1 + 0.5/2 + 0.2/3 + 0.7/4$$

Задача i-20.27.

3

$$A = 0.4/1 + 1/2 + 0.7/3 + 0.4/4;$$
$$K(1) = 0.1/1 + 0.1/2 + 0.7/4$$
$$K(2) = 0.1/2 + 0.1/4$$
$$K(3) = 0.3/1 + 0.4/2 + 0.2/3 + 0.3/4$$
$$K(4) = 0.2/2 + 0.6/4$$

Задача i-20.29.

3

$$A = 0.1/1 + 0.8/2 + 0.4/3 + 0.5/4;$$
$$K(1) = 0.1/1 + 0.1/2 + 0.1/3 + 0.7/4$$
$$K(2) = 0.1/1 + 0.1/2 + 0.7/4$$
$$K(3) = 0.1/2 + 0.6/4$$
$$K(4) = 0.2/2 + 0.6/4$$

Задача i-20.31.

3

$$A = 0.3/1 + 0.3/2 + 0.4/3 + 0.4/4;$$
$$K(1) = 0.3/1 + 0.5/2 + 0.2/3 + 0.3/4$$
$$K(2) = 0.1/1 + 0.1/2 + 0.1/3 + 0.2/4$$
$$K(3) = 0.3/1 + 0.5/2 + 0.1/3 + 0.8/4$$
$$K(4) = 0.1/2 + 0.6/4$$

Задача i-20.33.

3

$$A = 0.5/1 + 1/2 + 0.1/3 + 0.2/4;$$
$$K(1) = 0.2/1 + 0.5/2 + 0.2/3 + 0.7/4$$
$$K(2) = 0.2/2 + 0.6/4$$
$$K(3) = 0.3/1 + 0.5/2 + 0.2/3 + 0.8/4$$
$$K(4) = 0.2/2 + 0.6/4$$

Задача i-20.24.

3

$$A = 0.1/1 + 0.4/2 + 0.3/3 + 0.5/4;$$
$$K(1) = 0.1/1 + 0.1/3 + 0.2/4$$
$$K(2) = 0.1/1 + 0.1/2 + 0.7/4$$
$$K(3) = 0.1/1 + 0.2/2 + 0.7/4$$
$$K(4) = 0.1/4$$

Задача i-20.26.

3

$$A = 0.4/1 + 1/2 + 1/3 + 0.4/4;$$
$$K(1) = 0.2/1 + 0.4/2 + 0.1/3 + 0.2/4$$
$$K(2) = 0.2/1 + 0.5/2 + 0.1/3 + 0.2/4$$
$$K(3) = 0.3/1 + 0.4/2 + 0.2/3 + 0.3/4$$
$$K(4) = 0.1/1 + 0.2/2 + 0.7/4$$

Задача i-20.28.

3

$$A = 1/1 + 0.6/2 + 0.5/3 + 0.4/4;$$
$$K(1) = 0.1/2 + 0.6/4$$
$$K(2) = 0.2/2 + 0.1/3 + 0.6/4$$
$$K(3) = 0.2/1 + 0.6/2 + 0.1/3 + 0.7/4$$
$$K(4) = 0.3/1 + 0.5/2 + 0.2/3 + 0.8/4$$

Задача i-20.30.

3

$$A = 0.1/1 + 0.6/2 + 0.5/3 + 0.8/4;$$
$$K(1) = 0.1/2 + 0.1/3 + 0.6/4$$
$$K(2) = 0.2/1 + 0.5/2 + 0.1/3 + 0.2/4$$
$$K(3) = 0.1/2 + 0.1/4$$
$$K(4) = 0.1/2 + 0.6/4$$

Задача i-20.32.

3

$$A = 0.2/1 + 0.6/2 + 0.8/3 + 0.9/4;$$
$$K(1) = 0.2/1 + 0.5/2 + 0.1/3 + 0.7/4$$
$$K(2) = 0.2/1 + 0.5/2 + 0.2/3 + 0.2/4$$
$$K(3) = 0.2/2 + 0.6/4$$
$$K(4) = 0.2/1 + 0.4/2 + 0.1/3 + 0.2/4$$

Задача i-20.34.

3

$$A = 0.6/1 + 0.9/2 + 0.9/3 + 0.5/4;$$
$$K(1) = 0.1/2 + 0.1/4$$
$$K(2) = 0.2/1 + 0.4/2 + 0.2/3 + 0.2/4$$
$$K(3) = 0.2/1 + 0.4/2 + 0.2/3 + 0.2/4$$
$$K(4) = 0.1/1 + 0.2/2 + 0.7/4$$

i-20 Ответы.**Ядро оператора увеличения нечеткости**

13.12.2012

| № | $\Phi(A, K)$ |
|----|--------------------------------|
| 1 | 0.07/1+ 0.14/2+ 0.07/3+ 0.49/4 |
| 2 | 0.18/1+ 0.4/2+ 0.08/3+ 0.56/4 |
| 3 | 0.18/1+ 0.36/2+ 0.12/3+ 0.48/4 |
| 4 | 0.18/1+ 0.45/2+ 0.16/3+ 0.56/4 |
| 5 | 0.18/1+ 0.3/2+ 0.12/3+ 0.18/4 |
| 6 | 0.08/1+ 0.16/2+ 0.02/3+ 0.56/4 |
| 7 | 0.14/1+ 0.35/2+ 0.14/3+ 0.32/4 |
| 8 | 0.3/1+ 0.6/2+ 0.1/3+ 0.8/4 |
| 9 | 0.07/1+ 0.1/2+ 0.07/3+ 0.3/4 |
| 10 | 0.18/1+ 0.36/2+ 0.18/3+ 0.7/4 |
| 11 | 0.12/1+ 0.36/2+ 0.07/3+ 0.42/4 |
| 12 | 0.16/1+ 0.4/2+ 0.08/3+ 0.56/4 |
| 13 | 0.27/1+ 0.45/2+ 0.1/3+ 0.72/4 |
| 14 | 0.18/1+ 0.54/2+ 0.09/3+ 0.63/4 |
| 15 | 0.09/1+ 0.09/2+ 0.05/3+ 0.42/4 |
| 16 | 0.1/1+ 0.25/2+ 0.1/3+ 0.54/4 |
| 17 | 0.14/1+ 0.28/2+ 0.07/3+ 0.42/4 |
| 18 | 0.1/1+ 0.1/2+ 0.01/3+ 0.49/4 |
| 19 | 0.21/1+ 0.42/2+ 0.14/3+ 0.6/4 |
| 20 | 0.3/1+ 0.5/2+ 0.1/3+ 0.8/4 |
| 21 | 0.16/1+ 0.32/2+ 0.1/3+ 0.35/4 |
| 22 | 0.2/1+ 0.5/2+ 0.1/3+ 0.28/4 |
| 23 | 0.09/1+ 0.15/2+ 0.03/3+ 0.63/4 |
| 24 | 0.04/1+ 0.06/2+ 0.01/3+ 0.28/4 |
| 25 | 0.2/1+ 0.5/2+ 0.12/3+ 0.7/4 |
| 26 | 0.3/1+ 0.5/2+ 0.2/3+ 0.3/4 |
| 27 | 0.21/1+ 0.28/2+ 0.14/3+ 0.28/4 |
| 28 | 0.12/1+ 0.3/2+ 0.08/3+ 0.6/4 |
| 29 | 0.08/1+ 0.1/2+ 0.01/3+ 0.56/4 |
| 30 | 0.12/1+ 0.3/2+ 0.06/3+ 0.48/4 |
| 31 | 0.12/1+ 0.2/2+ 0.06/3+ 0.32/4 |
| 32 | 0.18/1+ 0.36/2+ 0.12/3+ 0.48/4 |
| 33 | 0.1/1+ 0.25/2+ 0.1/3+ 0.6/4 |
| 34 | 0.18/1+ 0.36/2+ 0.18/3+ 0.35/4 |

i-20 файл о20в3А