

Кривошеев О.И.

МЭСИ,

**каф. Прикладной
математики**



Elimination et choix traduisant la realite

РИПСА:
Разработка
индексов
попарного сравнения альтернатив

лучше

$I^+ : m\text{-во крит.: } A_i \boxtimes A_j$

$I^= : m\text{-во крит.: } A_i = A_j$

$I^- : m\text{-во крит.: } A_i \boxtimes A_j$

лучше

$I^+ : m\text{-во крит.: } A_i \boxtimes A_j$

$I^- : m\text{-во крит.: } A_i = A_j$

$I^- : m\text{-во крит.: } A_i \boxtimes A_j$

↑
лучше

индекс согласия

$$C_{A_i A_j} = \frac{\sum_{i \text{ из } I^+, I^-} p_i}{\sum p_i}$$

$C_{A_i A_j}$ Сохраняет значение при замене 1го критерия на несколько с тем же сум. весом

првосходство

$$C_{A_i A_j} \geq \alpha$$

$$d_{A_i A_j} \leq \gamma$$

индекс несогласия: $d_{A_i A_j} = \max_{I^-} \frac{l_{A_j}^k - l_{A_i}^k}{L_k}$

| n.book | K_1 | K_2 | K_3 |
|---------|---------------|---------------|---------------|
| Acer | $2a$ | $\frac{d}{2}$ | $d-1$ |
| Asus | $\frac{a}{2}$ | $b+2$ | $d-1$ |
| Sony | a | b | c |
| Toshiba | d | $a-1$ | $b+1$ |
| Beca | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |

As S Ac Метод ELECTRE

$$p = \frac{1}{2}; Ac \rightarrow S \rightarrow As$$

$$\begin{matrix} & As & S & Ac \\ As & - & 0 & 0 \\ S & .5 & - & 0 \\ Ac & .5 & .5 & - \end{matrix}$$

$$p = \frac{1}{6}; S \rightarrow Ac \rightarrow As$$

$$\begin{matrix} & As & S & Ac \\ As & & 0 & 0 \\ S & 1/6 & & 1/6 \\ Ac & 1/6 & 0 & \end{matrix}$$

$$p = \frac{1}{3}; As \rightarrow S \rightarrow Ac$$

$$\begin{matrix} & As & S & Ac \\ As & 0 & \frac{1}{3} & \frac{1}{3} \\ S & 0 & 0 & \frac{1}{3} \\ Ac & 0 & 0 & 0 \end{matrix}$$

матрица

As S Ac

C

$$\begin{matrix} As & (.33 & .33) \\ S & (.67 & .5) \\ Ac & (.67 & .50) \end{matrix}$$

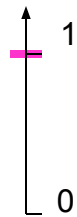
| n.book | K ₁ | K ₂ | K ₃ |
|---------|----------------|----------------|----------------|
| Acer | 2a | $\frac{d}{2}$ | d-1 |
| Asus | $\frac{a}{2}$ | b+2 | d-1 |
| Sony | a | b | c |
| Toshiba | d | a-1 | b+1 |
| беса | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |

$$D1 \begin{matrix} & As & S & Ac \\ As & . & 0.2 & 1 \\ S & 0 & . & 0.8 \\ Ac & 0 & 0 & . \end{matrix}$$

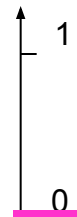
$$D2 \begin{matrix} & As & S & Ac \\ As & . & 0 & 0 \\ S & 0 & . & 0.7 \\ Ac & 1 & 0.3 & . \end{matrix}$$

$$D3 \begin{matrix} & As & S & Ac \\ As & . & 1 & .3 \\ S & 0 & . & 0 \\ Ac & 0 & .7 & . \end{matrix}$$

$$D^+ \begin{matrix} & As & S & Ac \\ As & . & 1 & 1 \\ S & 0 & . & 0.8 \\ Ac & 1 & .7 & . \end{matrix}$$

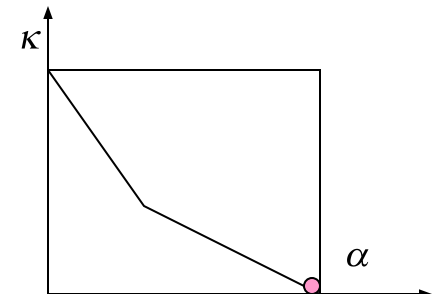


$$C_{ij} \geq \alpha$$



$$D_{ij} = \frac{l_i - l_j}{L} < \kappa$$

| n.book | K ₁ | K ₂ | K ₃ |
|---------|----------------|----------------|----------------|
| Acer | 9 | 2 | 4,2 |
| Asus | 4 | 12 | 3 |
| Sony | 5 | 5 | 7 |
| Toshiba | | | |
| беса | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |



$$C_{ij} \geq \alpha \qquad D_{ij} < 1 - \alpha$$

Будем принимать:

$$K = 1 - \alpha$$

$$p = \frac{1}{2}; Ac \rightarrow S \rightarrow As$$

$$p = \frac{1}{6}; S \rightarrow Ac \rightarrow As$$

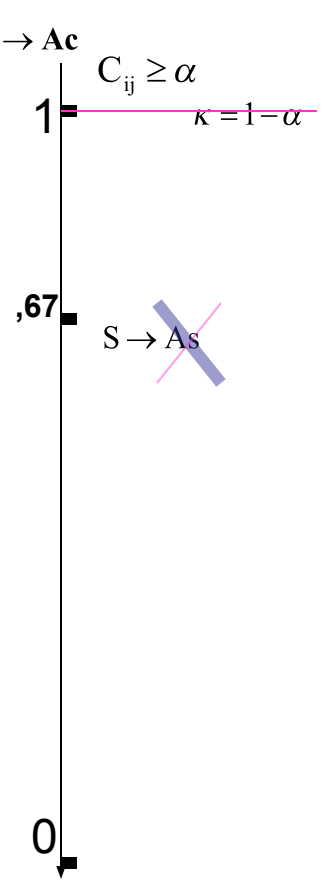
$$p = \frac{1}{3}; As \rightarrow S \rightarrow Ac$$

| | | | |
|--------|----------------|----------------|----------------|
| n.book | K ₁ | K ₂ | K ₃ |
| Acer | 9 | 2 | 4,2 |
| Asus | 4 | 12 | 3 |
| Sony | 5 | 5 | 7 |
| books | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |
| books | | | |

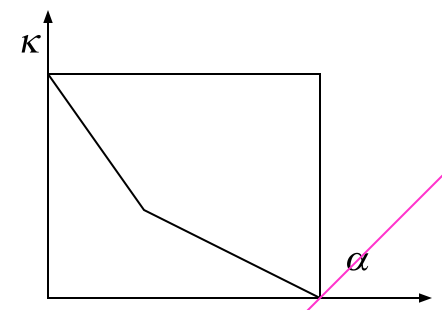
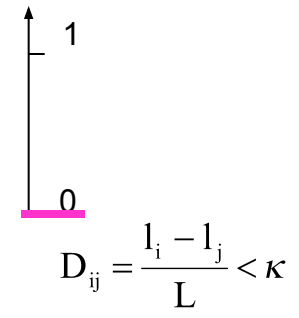
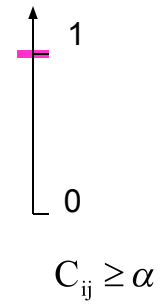
$$D^+ \begin{matrix} & As & S & Ac \\ As & . & 1 & 1 \\ S & 0 & . & 0.8 \\ Ac & 1 & .7 & . \end{matrix}$$

матрица

$$C \begin{matrix} & As & S & Ac \\ As & & .33 & .33 \\ S & .67 & & .5 \\ Ac & .67 & .50 & \end{matrix}$$



$$D_{ij} = \frac{l_i - l_j}{L}$$



$$p = \frac{1}{2}; Ac \rightarrow S \rightarrow As$$

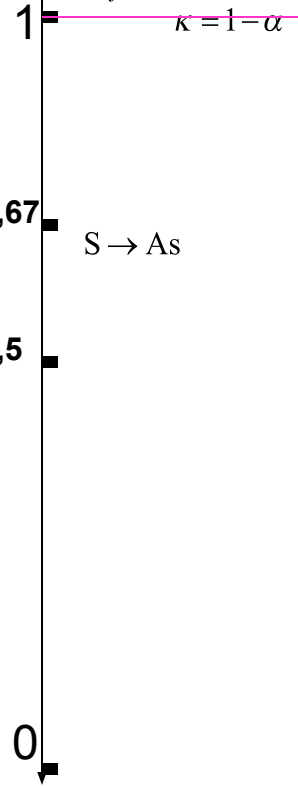
$$p = \frac{1}{6}; S \rightarrow Ac \rightarrow As$$

$$p = \frac{1}{3}; As \rightarrow S \rightarrow Ac$$

$$D^+ \begin{matrix} & As & S & Ac \\ As & \begin{pmatrix} . & 1 & 1 \end{pmatrix} \\ S & \begin{pmatrix} 0 & . & 0.8 \end{pmatrix} \\ Ac & \begin{pmatrix} 1 & .7 & . \end{pmatrix} \end{matrix}$$

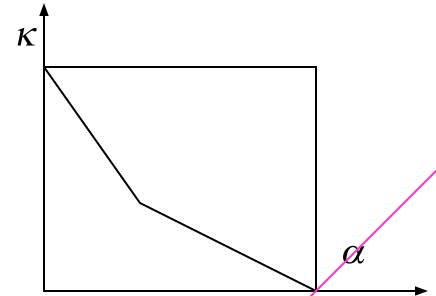
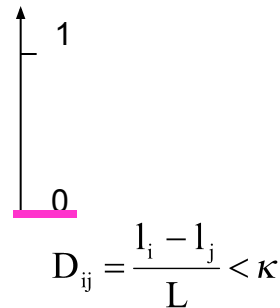
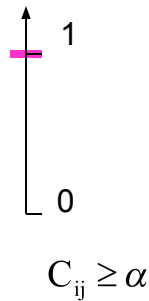
$$C \begin{matrix} & As & S & Ac \\ As & \begin{pmatrix} .33 & .33 \end{pmatrix} \\ S & \begin{pmatrix} .67 & .5 \end{pmatrix} \\ Ac & \begin{pmatrix} .67 & .50 \end{pmatrix} \end{matrix}$$

$$C_{ij} \geq \alpha$$



| | | | |
|--------|----------------|----------------|----------------|
| n.book | K ₁ | K ₂ | K ₃ |
| Acer | 9 | 2 | 4,2 |
| Asus | 4 | 12 | 3 |
| Sony | 5 | 5 | 7 |
| book | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |
| beca | | | |

$$D_{ij} = \frac{l_i - l_j}{L}$$



| | | | |
|--------|----------------|----------------|----------------|
| n.book | K ₁ | K ₂ | K ₃ |
| Acer | 9 | 2 | 4,2 |
| Asus | 4 | 12 | 3 |
| Sony | 5 | 5 | 7 |
| books | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |
| books | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |

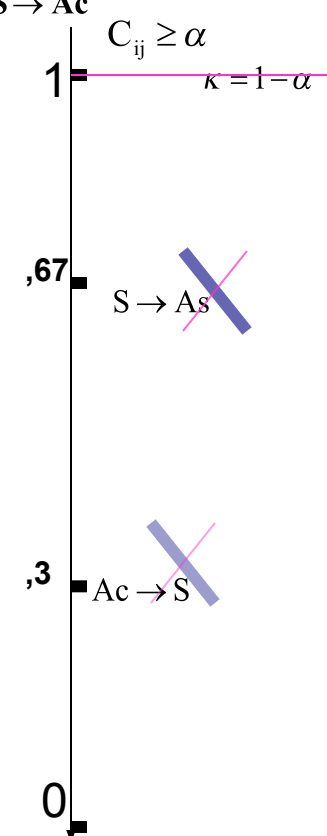
$$p = \frac{1}{2}; Ac \rightarrow S \rightarrow As$$

$$D^+ \begin{matrix} & As & S & Ac \\ As & \left(\begin{matrix} . & 1 & 1 \\ 0 & . & 0.8 \\ 1 & .7 & . \end{matrix} \right) \\ S \\ Ac \end{matrix}$$

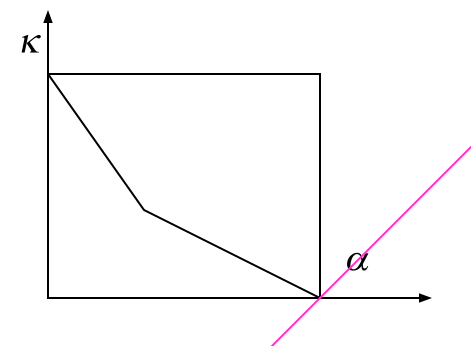
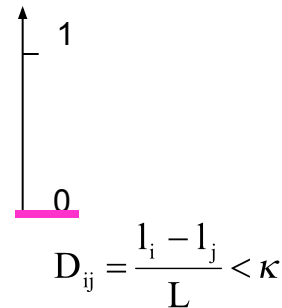
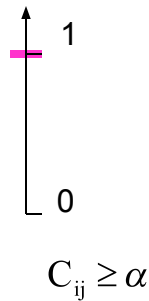
$$p = \frac{1}{6}; S \rightarrow Ac \rightarrow As$$

$$C \begin{matrix} & As & S & Ac \\ As & \left(\begin{matrix} .33 & .33 \\ .67 & .5 \\ .67 & .50 \end{matrix} \right) \\ S \\ Ac \end{matrix}$$

$$p = \frac{1}{3}; As \rightarrow S \rightarrow Ac$$



$$D_{ij} = \frac{l_i - l_j}{L}$$



| | | | |
|--------|----------------|----------------|----------------|
| n.book | K ₁ | K ₂ | K ₃ |
| Acer | 9 | 2 | 4,2 |
| Asus | 4 | 12 | 3 |
| Sony | 5 | 5 | 7 |
| Table | | | |
| Becca | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |

$$p = \frac{1}{2}; Ac \rightarrow S \rightarrow As$$

$$D^+ \begin{matrix} & As & S & Ac \\ As & . & 1 & 1 \\ S & 0 & . & 0.8 \\ Ac & 1 & .7 & . \end{matrix}$$

$$p = \frac{1}{6}; S \rightarrow Ac \rightarrow As$$

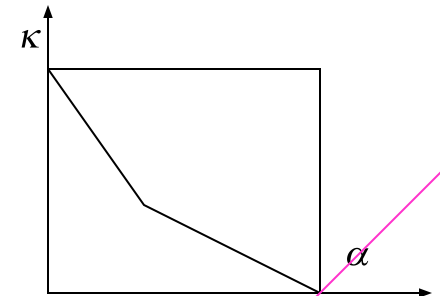
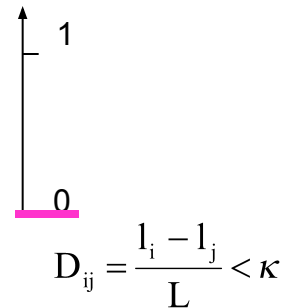
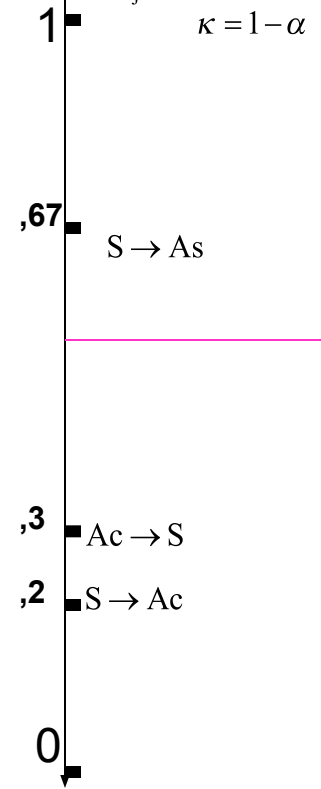
матрица

$$C \begin{matrix} & As & S & Ac \\ As & . & .33 & .33 \\ S & .67 & . & .5 \\ Ac & .67 & .50 & . \end{matrix}$$

$$p = \frac{1}{3}; As \rightarrow S \rightarrow Ac$$

$$C_{ij} \geq \alpha \quad \kappa = 1 - \alpha$$

$$D_{ij} = \frac{l_i - l_j}{L}$$



| | | | |
|--------|----------------|----------------|----------------|
| n.book | K ₁ | K ₂ | K ₃ |
| Acer | 9 | 2 | 4,2 |
| Asus | 4 | 12 | 3 |
| Sony | 5 | 5 | 7 |
| books | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |
| books | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |

$$p = \frac{1}{2}; Ac \rightarrow S \rightarrow As$$

$$D^+ \begin{matrix} & As & S & Ac \\ As & . & 1 & 1 \\ S & 0 & . & 0.8 \\ Ac & 1 & .7 & . \end{matrix}$$

$$p = \frac{1}{6}; S \rightarrow Ac \rightarrow As$$

матрица C $\begin{matrix} & As & S & Ac \\ As & .33 & .33 & \\ S & .67 & .5 & \\ Ac & .67 & .50 & \end{matrix}$

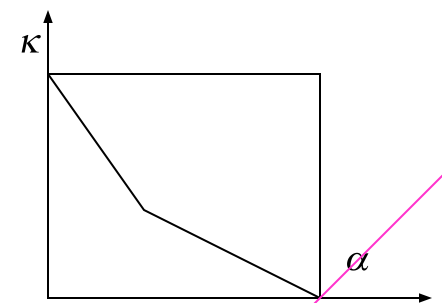
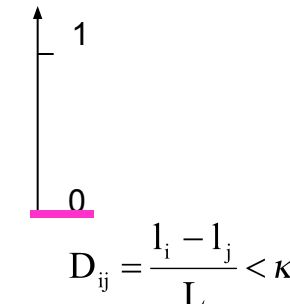
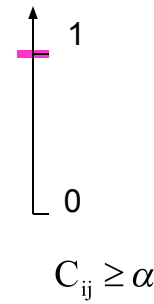
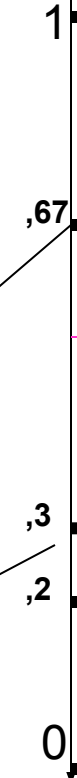
$$D_{ij} = \frac{l_i - l_j}{L}$$

$$p = \frac{1}{3}; As \rightarrow S \rightarrow Ac$$

$$C_{ij} \geq \alpha \quad \kappa = 1 - \alpha$$

Ядро

$S \rightarrow As$
 $Ac \rightarrow S$
 $Ac \rightarrow S$



| | | | |
|---------|---------------|---------------|---------------|
| n.book | K_1 | K_2 | K_3 |
| Acer | $2a$ | $\frac{d}{2}$ | $d-1$ |
| Asus | $\frac{a}{2}$ | $b+2$ | $d-1$ |
| Sony | a | b | c |
| Toshiba | d | $a-1$ | $b+1$ |
| веса | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |

$p = \frac{1}{2}; Ac \rightarrow S \rightarrow As$

$$D^+ \begin{matrix} & As & S & Ac \\ As & . & 1 & 1 \\ S & 0 & . & 0.8 \\ Ac & 1 & .7 & . \end{matrix}$$

$p = \frac{1}{6}; S \rightarrow Ac \rightarrow As$

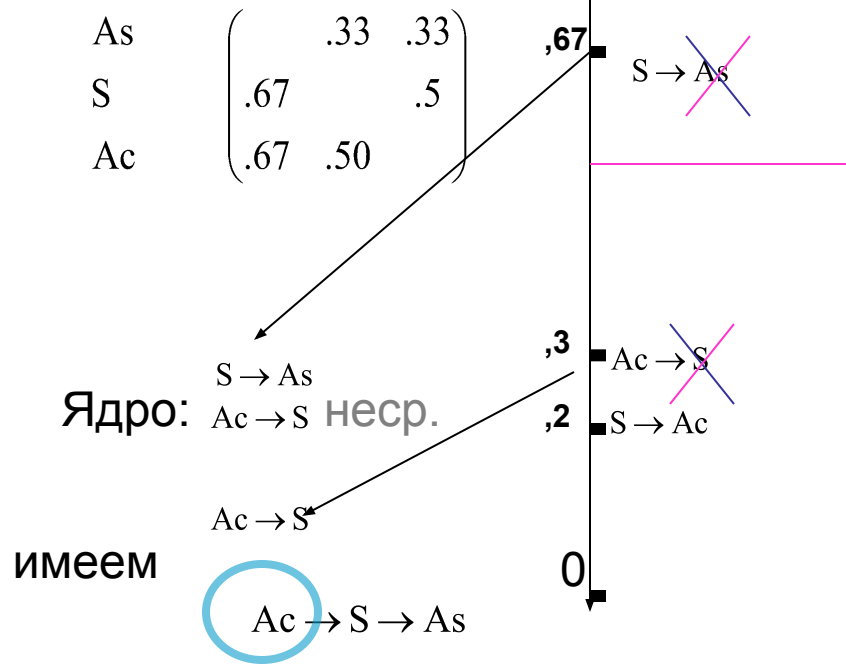
матрица C

$$\begin{matrix} & As & S & Ac \\ As & .33 & .33 & \\ S & .67 & .5 & \\ Ac & .67 & .50 & \end{matrix}$$

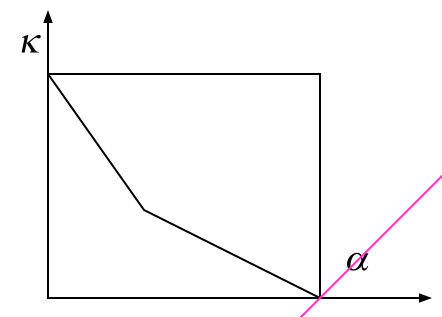
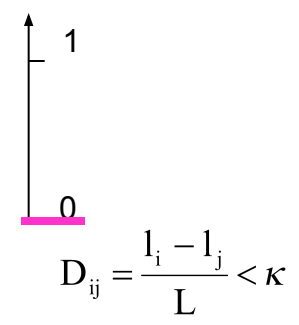
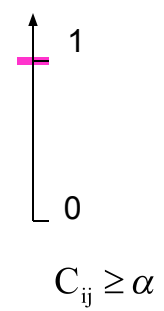
$p = \frac{1}{3}; As \rightarrow S \rightarrow Ac$

$C_{ij} \geq \alpha$
 $\kappa = 1 - \alpha$

$$D_{ij} = \frac{l_i - l_j}{L}$$



| | | | |
|--------|---------------|---------------|---------------|
| n.book | K_1 | K_2 | K_3 |
| Acer | 9 | 2 | 4,2 |
| Asus | 4 | 12 | 3 |
| Sony | 5 | 5 | 7 |
| веса | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{6}$ |



Ответ: выбран **асер**.