Neizrazito, evolucijsko i neuro računarstvo - izvještaj
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30.12.2019.

1. Zadatak

$$E_k = \frac{1}{2}(y_k - o_k)^2$$

izlaz: $o_k = \dfrac{\sum_{i=1}^{m} \pi_i \cdot z_i}{\sum_{i=1}^{m} \pi_i}$ pri čemu je $\pi_i = \alpha_i \cdot \beta_i$

$$\alpha_i = \frac{1}{1 + e^{b_i(x - a_i)}}$$

$$\beta_i = \frac{1}{1 + e^{d_i(y - c_i)}}$$

$$\psi(t+1) = \psi(t) - \eta \frac{\partial E_k}{\partial \psi}$$

$\boxed{a_i}$

$$\frac{\partial E_k}{\partial a_i} = \frac{\partial E_k}{\partial o_k} \frac{\partial o_k}{\partial \pi_i} \cdot \frac{\partial \pi_i}{\partial \alpha_i} \frac{\partial \alpha_i}{\partial a_i}$$

$$= -(y_k - o_k) \cdot \frac{z_i \sum_{j=1}^{m} \pi_j - \sum_{j=1}^{m} \pi_j z_j}{\left(\sum_{j=1}^{m} \pi_j\right)^2} \cdot \beta_i \cdot \alpha_i (1 - \alpha_i) \cdot b_i$$

$\boxed{b_i}$

$$\frac{\partial E_k}{\partial b_i} = \frac{\partial E_k}{\partial o_k} \cdot \frac{\partial o_k}{\partial \pi_i} \cdot \frac{\partial \pi_i}{\partial \alpha_i} \cdot \frac{\partial \alpha_i}{\partial b_i}$$

$$= -(y_k - o_k) \frac{z_i \sum_{j=1}^{m} \pi_j - \sum_{j=1}^{m} \pi_j z_j}{\left(\sum_{j=1}^{m} \pi_j\right)^2} \beta_i \cdot \alpha_i (1 - \alpha_i)(a_i - x)$$

$\boxed{c_i}$

$$\frac{\partial E_k}{\partial c_i} = \frac{\partial E_k}{\partial o_k} \cdot \frac{\partial o_k}{\partial \pi_i} \cdot \frac{\partial \pi_i}{\partial \beta_i} \cdot \frac{\partial \beta_i}{\partial c_i}$$

$$= -(y_k - o_k) \frac{z_i \sum_{j=1}^{m} \pi_j - \sum_{j=1}^{m} \pi_j z_j}{\left(\sum_{j=1}^{m} \pi_j\right)^2} \alpha_i \beta_i (1 - \beta_i) d_i$$

$\boxed{d_i}$

$$\frac{\partial E_k}{\partial d_i} = \frac{\partial E_k}{\partial o_k} \cdot \frac{\partial o_k}{\partial \pi_i} \cdot \frac{\partial \pi_i}{\partial \beta_i} \cdot \frac{\partial \beta_i}{\partial d_i}$$

$$= -(y_k - o_k) \cdot \frac{z_i \sum_{j=1}^{m} \pi_j - \sum_{j=1}^{m} \pi_j \cdot z_j}{\left(\sum_{j=1}^{m} \pi_j\right)^2} \cdot \alpha_i \cdot \beta_i (1 - \beta_i)(c_i - y)$$

$\boxed{p_i}$

$$\frac{\partial E_k}{\partial p_i} = \frac{\partial E_k}{\partial o_k}\cdot\frac{\partial o_k}{\partial z_i}\cdot\frac{\partial z_i}{\partial p_i} = -(y_k - o_k)\cdot\frac{\pi_i}{\sum_{j=1}^{m}\pi_j}\cdot x$$

$\boxed{q_i}$

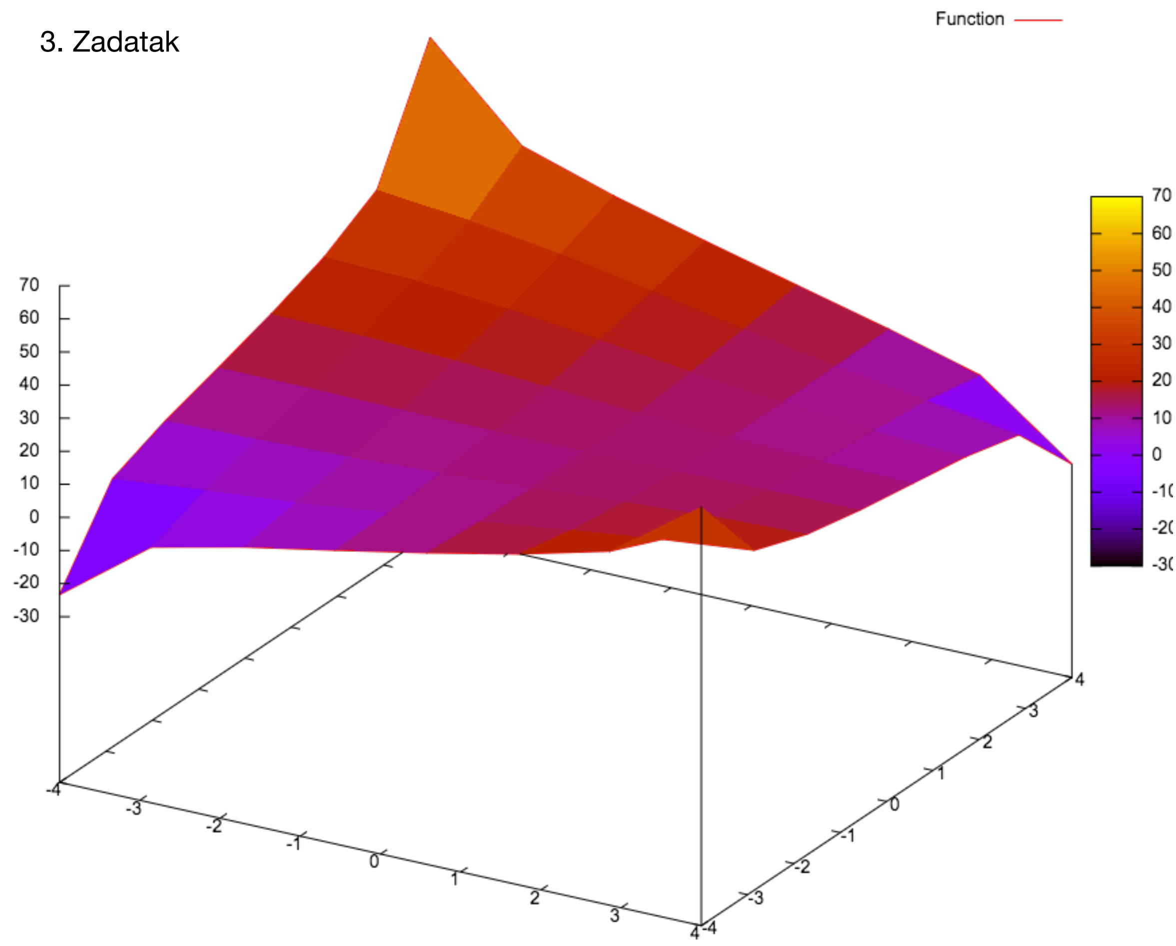
$$\frac{\partial E_k}{\partial q_i} = \frac{\partial E_k}{\partial o_k}\cdot\frac{\partial o_k}{\partial z_i}\cdot\frac{\partial z_i}{\partial q_i} = -(y_k - o_k)\cdot\frac{\pi_i}{\sum_{j=1}^{m}\pi_j}\cdot y$$

$\boxed{r_i}$

$$\frac{\partial E_k}{\partial r_i} = \frac{\partial E_k}{\partial o_k}\cdot\frac{\partial o_k}{\partial z_i}\cdot\frac{\partial z_i}{\partial r_i} = -(y_k - o_k)\cdot\frac{\pi_i}{\sum_{j=1}^{m}\pi_j}$$

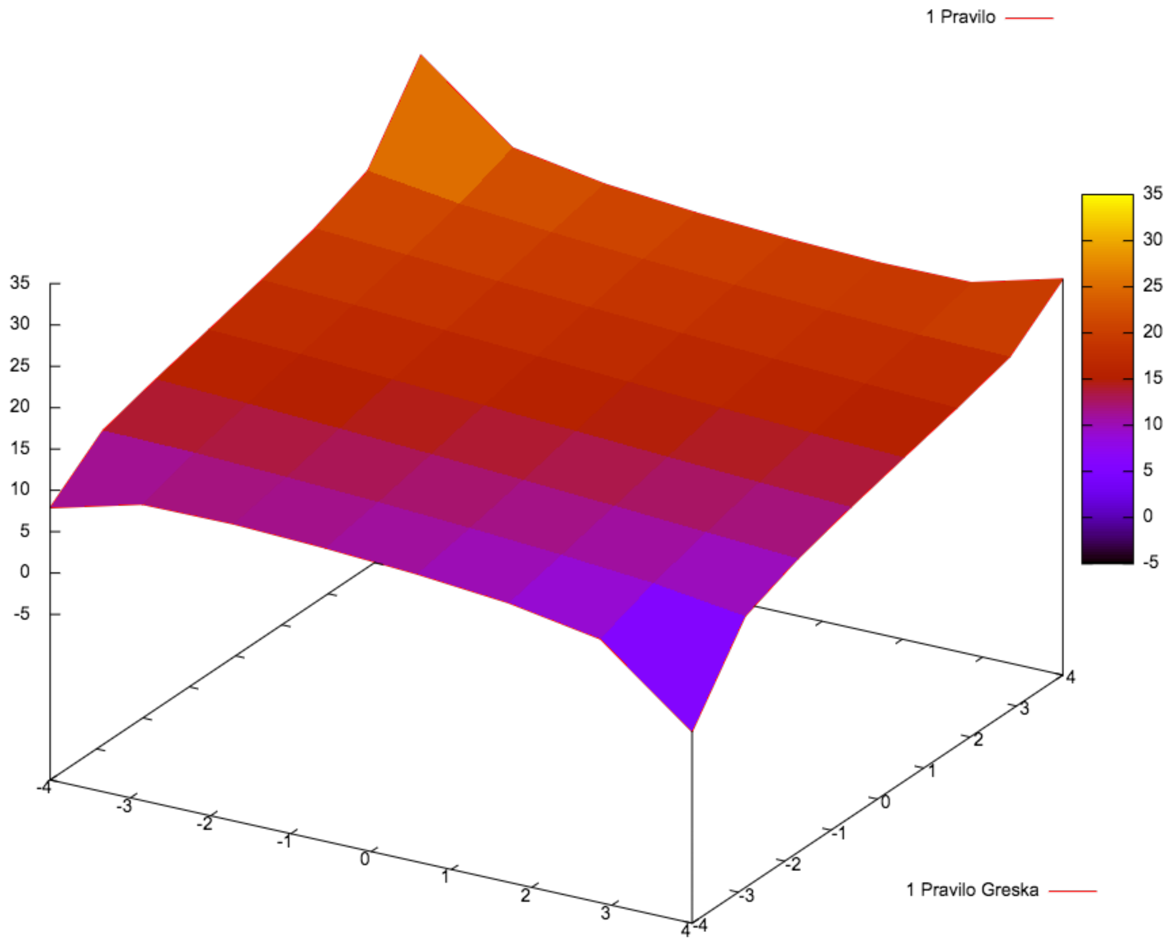
↳ stohastički, za pravi gradijentni spust se dodaje $\sum_{i=1}^{N}$ na svaki izraz (gradijent se računa za sve dostupne primjere te se potom radi ažuriranje)

3. Zadatak

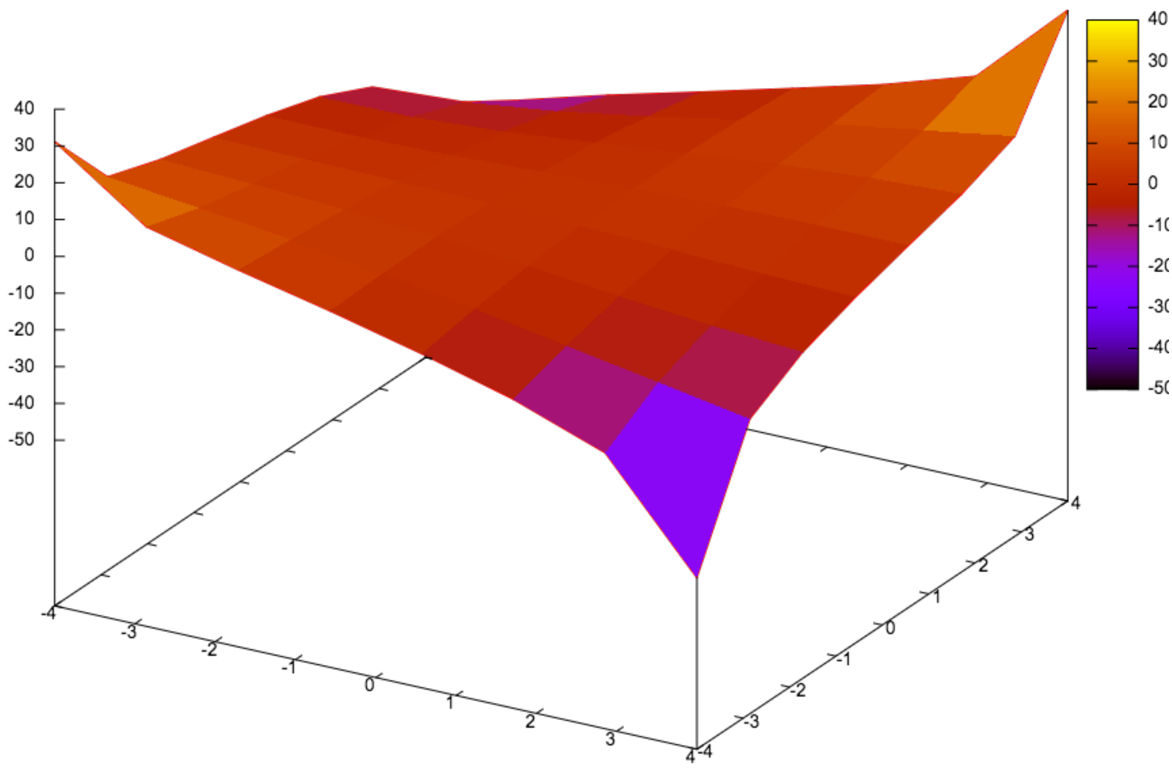


4. Zadatak

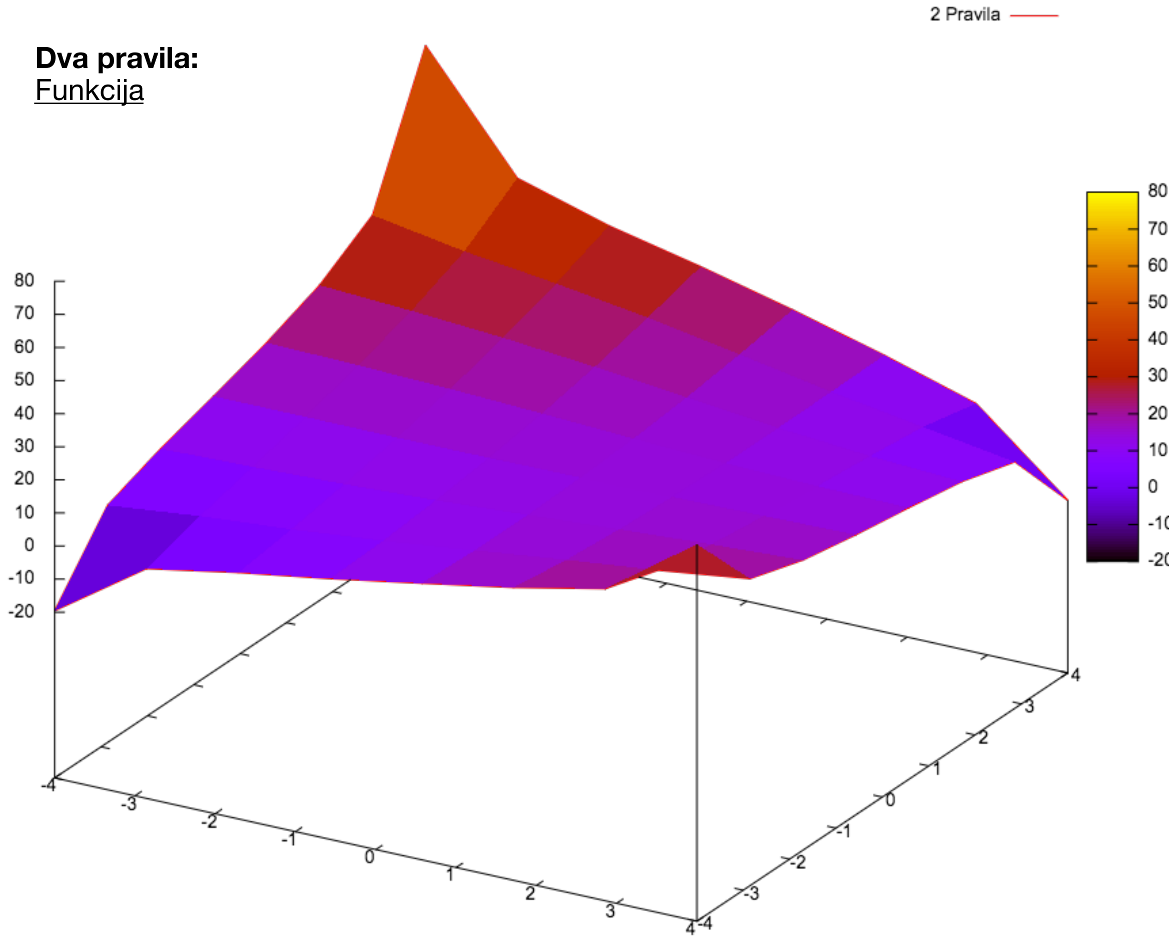
Jedno pravilo
Funkcija



Pogreška



Dva pravila:
Funkcija



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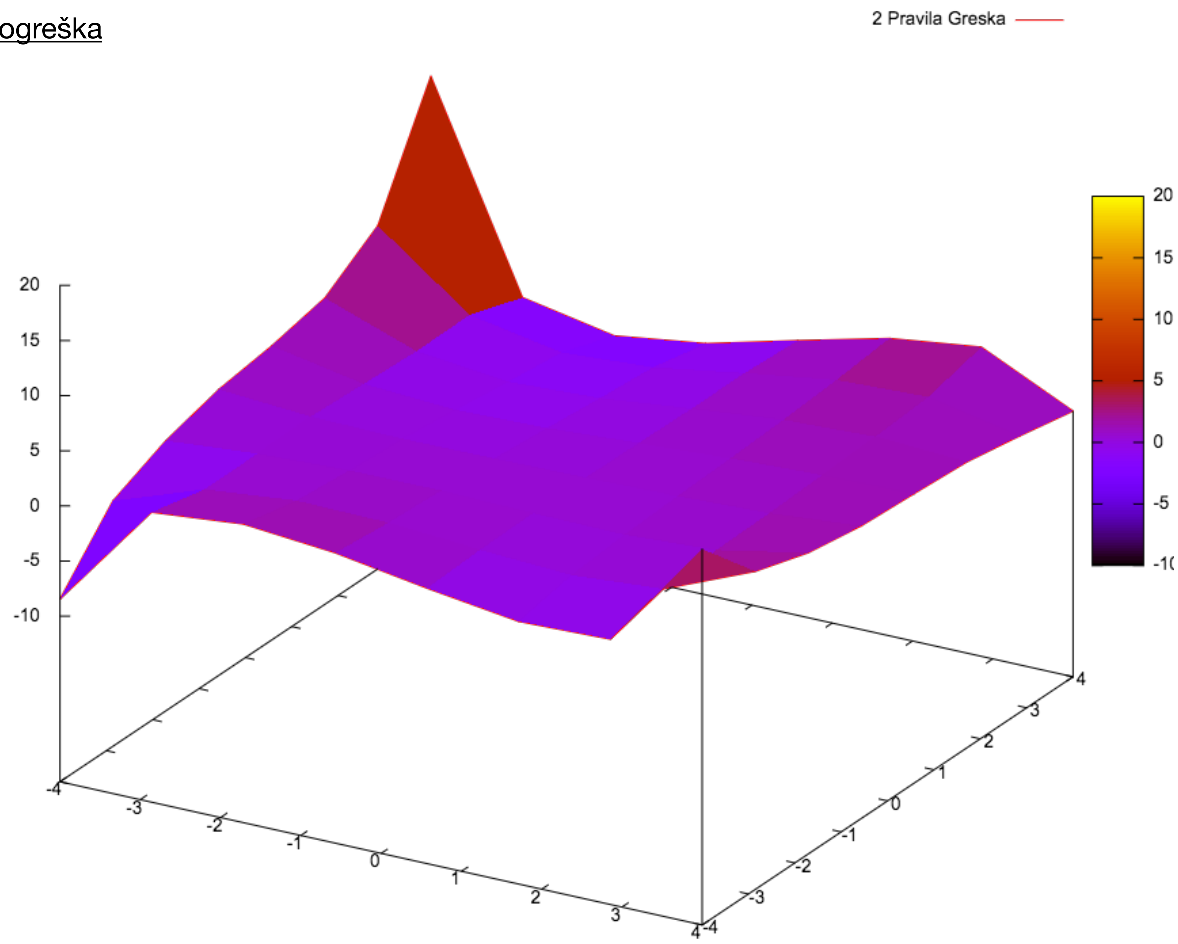
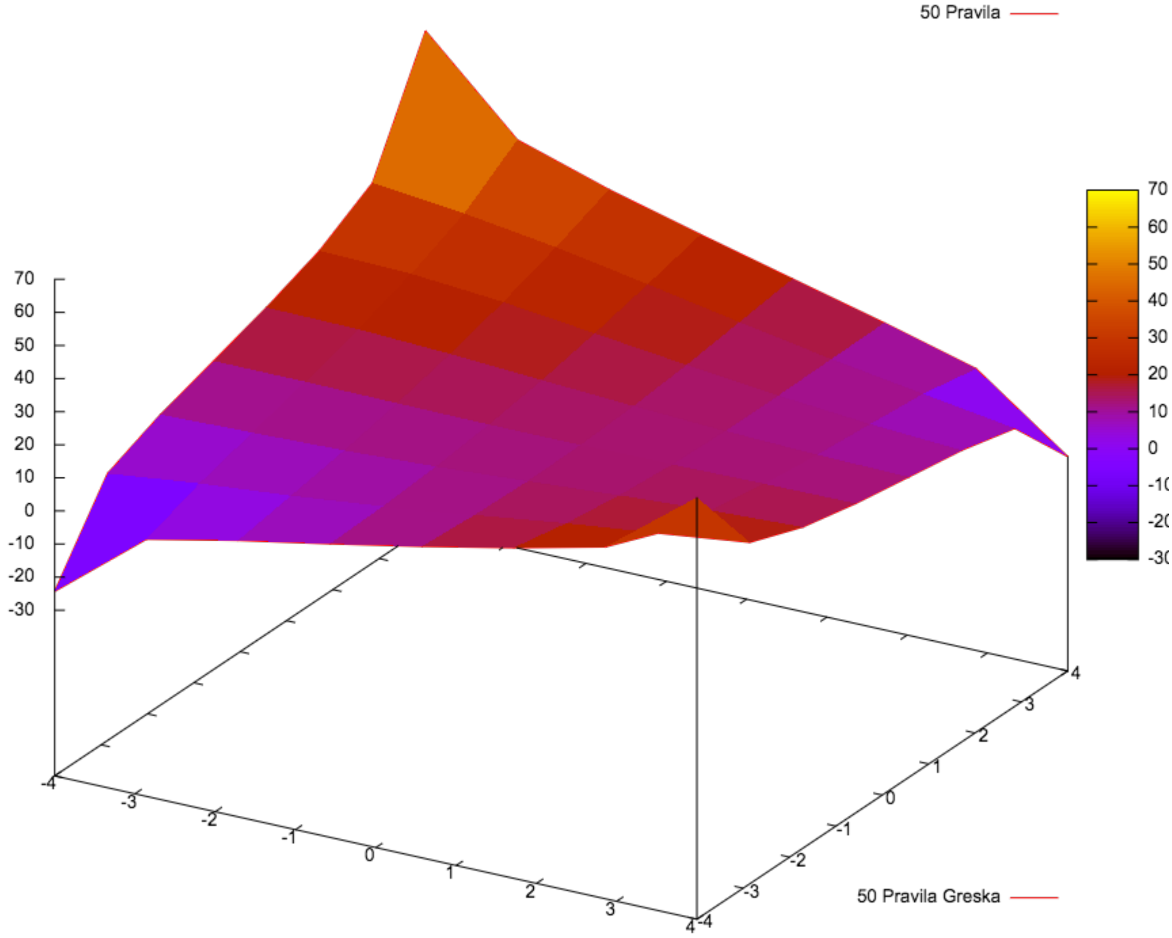


50 pravila

Funkcija



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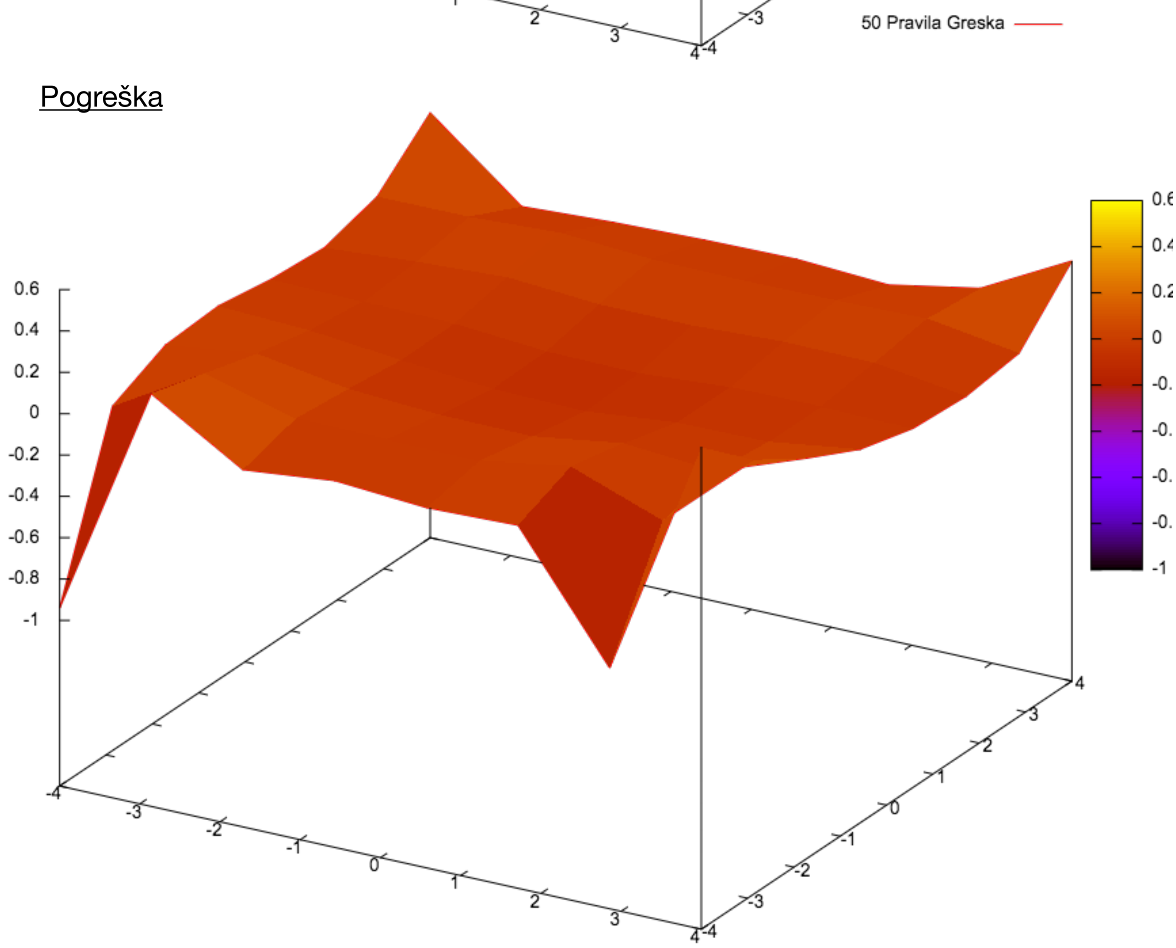
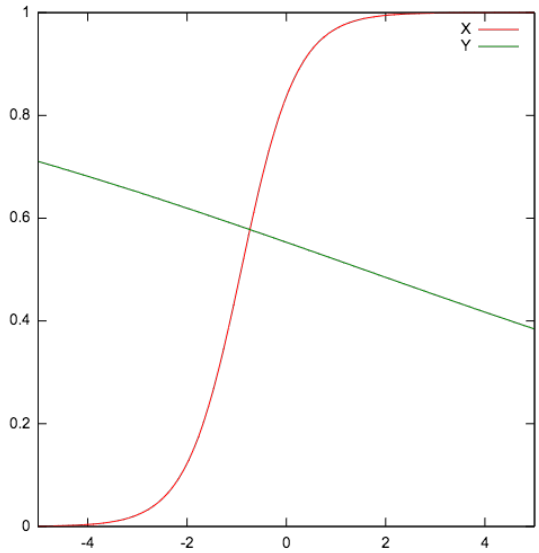


5. Zadatak



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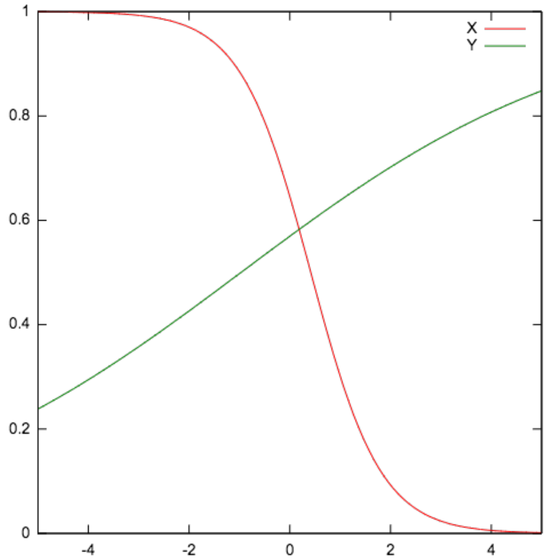

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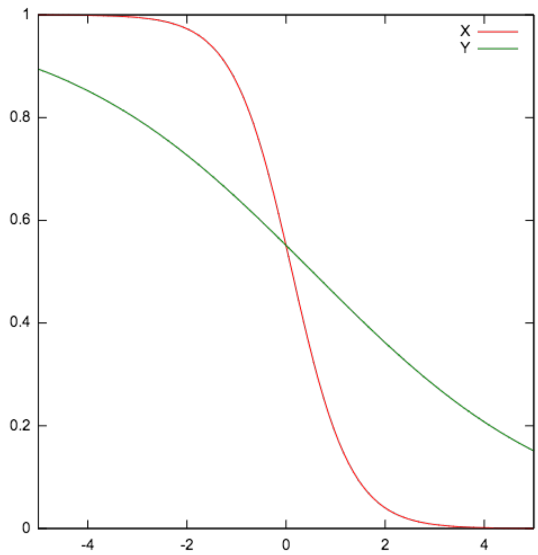

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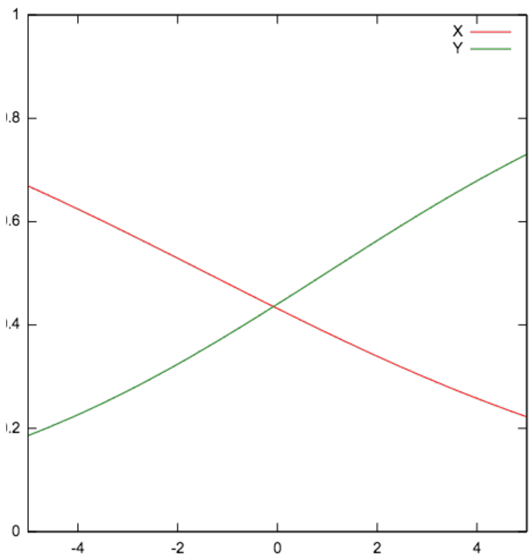

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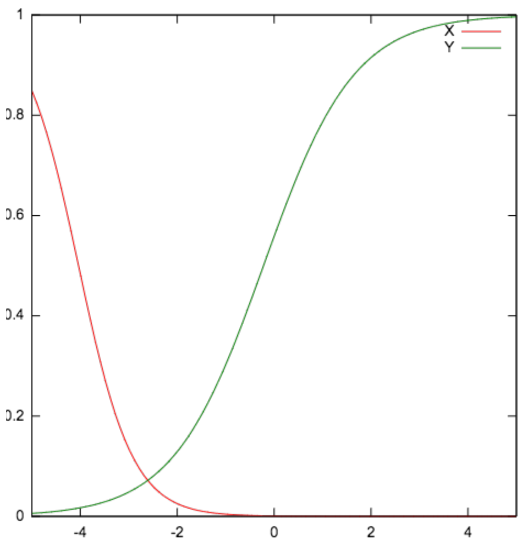

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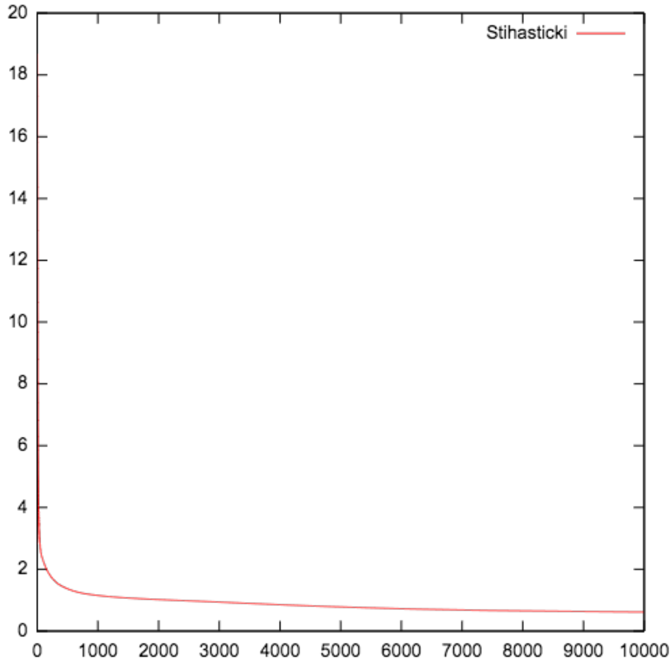
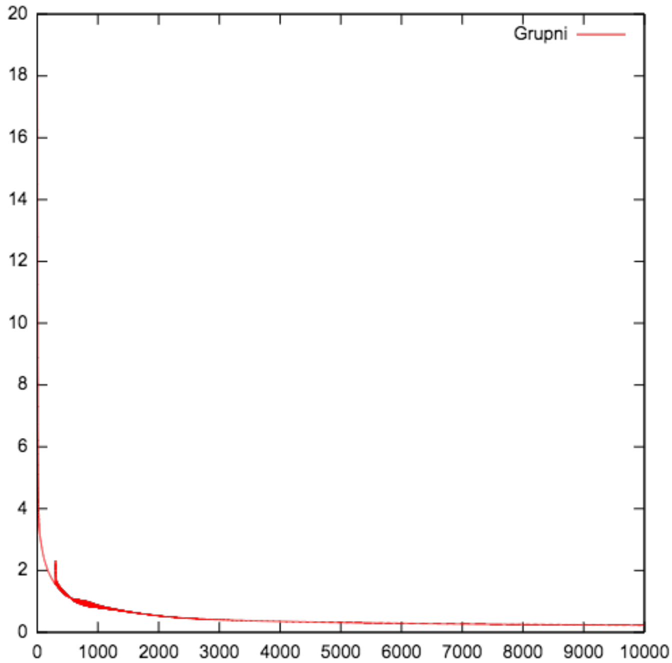
7. Zadatak

Stohastički

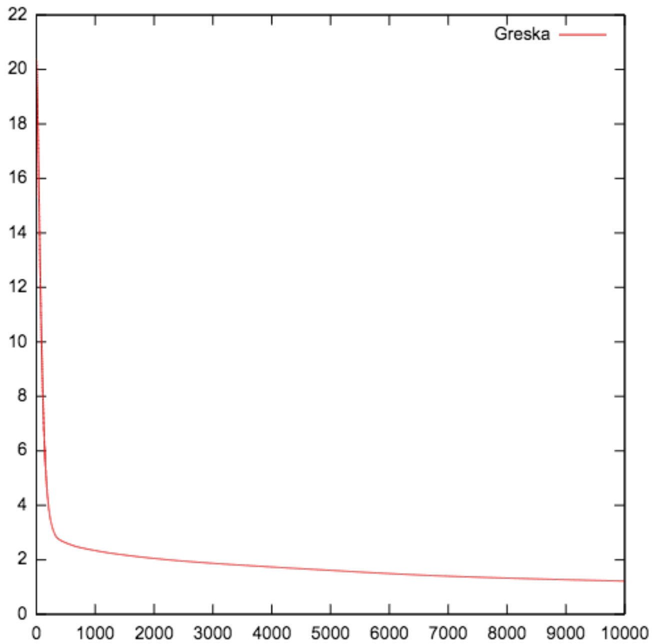


Grupni

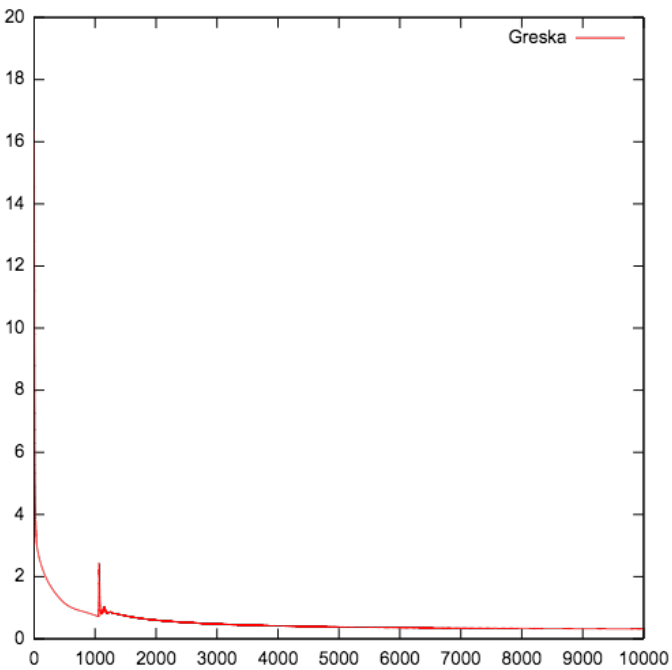


8. zadatak
Grupni

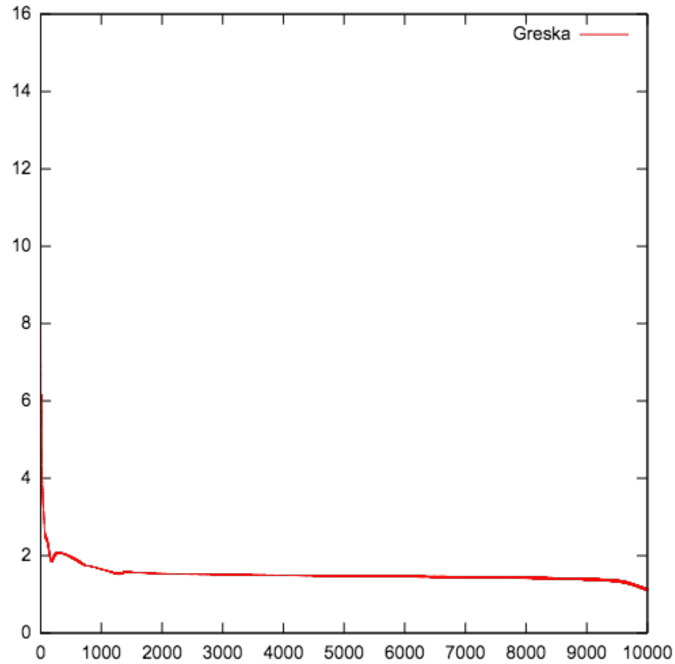
<u>Vrlo mala</u>



<u>Prikladna</u>

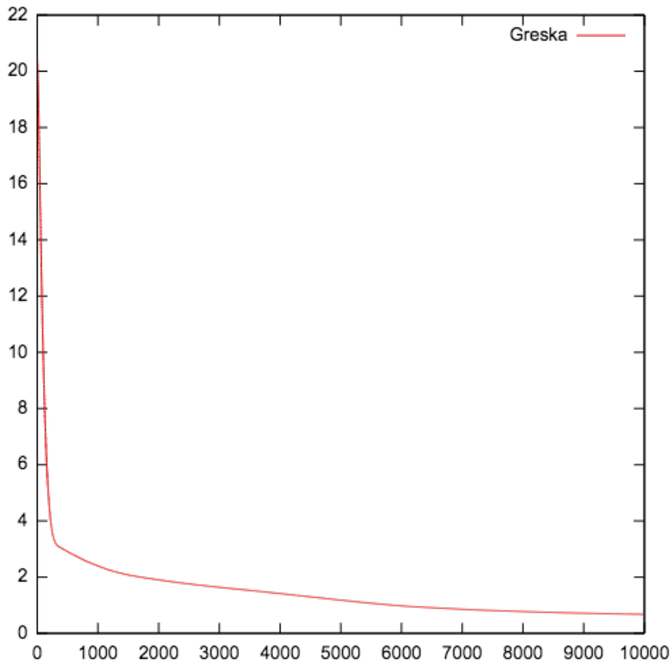


Prevelika

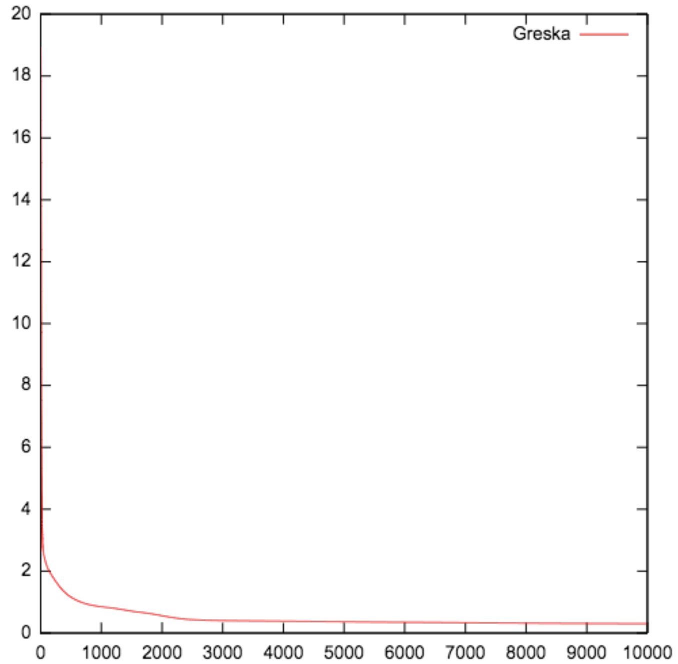


Stohastički

Vrlo mala



Prikladna



Velika