Segmentacija slika korišćenjem Gaussian Mixture modela

Projekat iz naučnog izračunavanja
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Gaussian Mixture model

- Za raspodelu verovatnoće se koristi funkcije normalne raspodele

$$f(x) = \sum_{i=1}^{k} p_i N(x \mid \mu_i, \sigma_i^2)$$

- Slika se posmatra kao vektor piksela

- Parametri se dobijaju na osnovu histograma (više verzija)

EM-MAP algoritam

1. Initialize:

$$\theta^{(0)} = (p_1^{(0)},\ldots,p_k^{(0)},\mu_1^{(0)},\ldots,\mu_k^{(0)},\sigma_1^{2\,(0)},\ldots,\sigma_k^{2\,(0)})$$

2. (E-step)

$$p_{ij}^{(r+1)} = P^{(r+1)}(i \mid x_j) = \frac{p_i^{(r)} N(x_j \mid \mu_i^{(r)}, \sigma_i^{2(r)})}{f(x_j)}$$

3. (M-step)

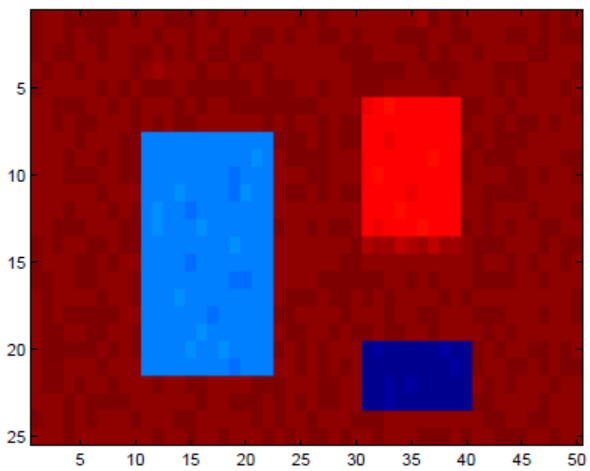
$$\hat{p}_i^{(r+1)} = \frac{1}{n}\sum_{j=1}^{n} p_{ij}^{(r)}$$

$$\hat{\mu}_i^{(r+1)} = \frac{\sum_{j=1}^{n} p_{ij}^{(r+1)} x_j}{n\hat{p}_i^{(r+1)}}$$

$$\hat{\sigma}_i^{2(r+1)} = \frac{\sum_{j=1}^{n} p_{ij}^{(r+1)} (x_j - \hat{\mu}_i^{(r+1)})^2}{n\hat{p}_i^{(r+1)}}$$

- Modifikacija standardnog algoritma
- Kriterijum zaustavljanja
- $p_{lj} = Arg\ \mathrm{Max}_i\ p_{ij}^{(final)}$ $j = 1, 2, \ldots, n$
- Problemi pri implementaciji

Primeri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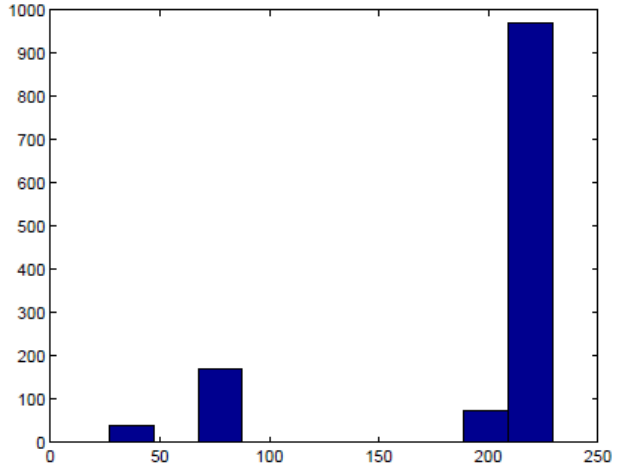
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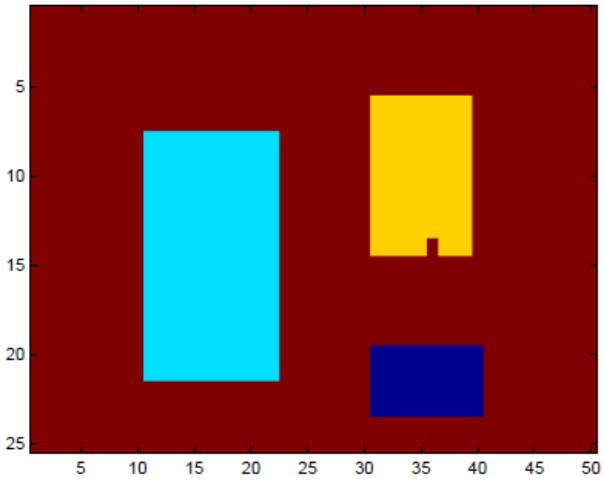
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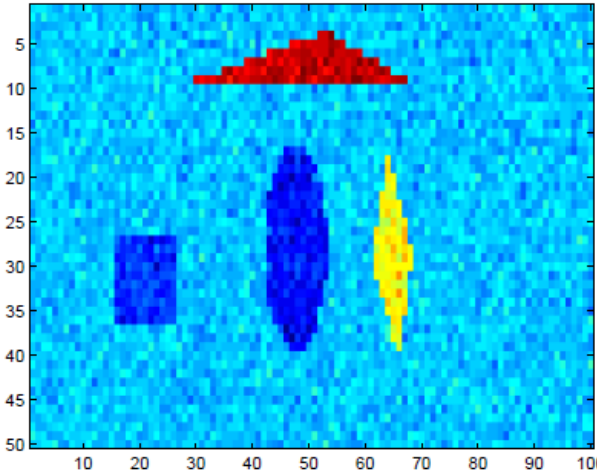
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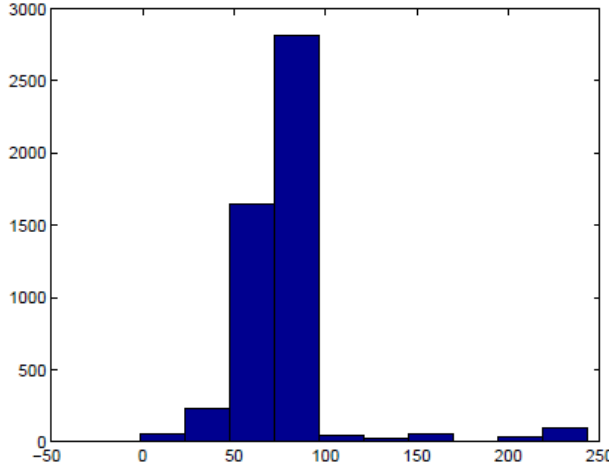
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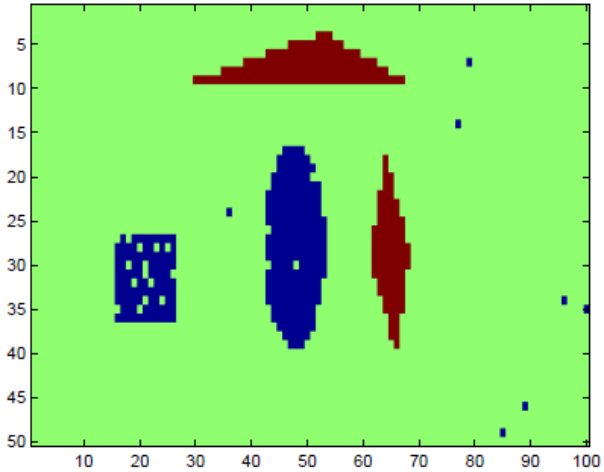
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