I want to solve the following optimization problem using cvxopt:

$$\min_{\varphi} \sum_{(i,j)\in E} \frac{1}{2}\|\varphi_i - \varphi_j\|^2 - \sum_{i=1}^{N}\sum_{k=1}^{k=K} \varphi_{ik} \ln \varphi_{ik} - \sum_{i=1}^{N}\sum_{k=1}^{k=K} \gamma_{ik} \ln \varphi_{ik} \quad \text{subject to}$$

$$\sum_{k=1}^{K} \varphi_{ik} = 1 \; \forall \, i = 1,2,\ldots N$$

where $\varphi = [\varphi_1, \varphi_{2,..}\varphi_N] \in \Re^{KxN}$ is the set of vectors $\varphi_i s$ to be determined. The equation comes from a markov random field. E represents the edges in the graph. Each i has a set of neoghbors denoted by Ni. γ_{ik} Is known for all i=1,2,3...N k=1,2...K.