

### ***Risk analysis lab 2014. 11. 10. (Oja's algorithm)***

1. It is known, that a single neuron model can be used to identify the largest or the smallest eigenvector of the correlation matrix of the observed vectors. Calculate the largest eigenvector with the following iterative weight update rule:

$$\mathbf{w}(k+1) = \mathbf{w}(k) + \eta y(\mathbf{s}(k) - y(k)\mathbf{w}(k)) \quad , \text{ where } y(k) = \mathbf{w}^T(k)\mathbf{s}(k) \quad .$$

```
function [l1, v1] = maxeig_correl_oja(s)
```

2. Generalize the previous algorithm for arbitrary matrices by using the following equation:

$$\mathbf{w}(k+1) = \mathbf{w}(k) + \eta (\mathbf{M} \mathbf{w}(k) - \mathbf{w}(k)^T \mathbf{M} \mathbf{w}(k) \mathbf{w}(k)) \quad .$$

```
function [l1, v1] = maxeig_oja(M)
```