Laboratory for
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jGMDH – Java implementacija GMDH

13.11.2009

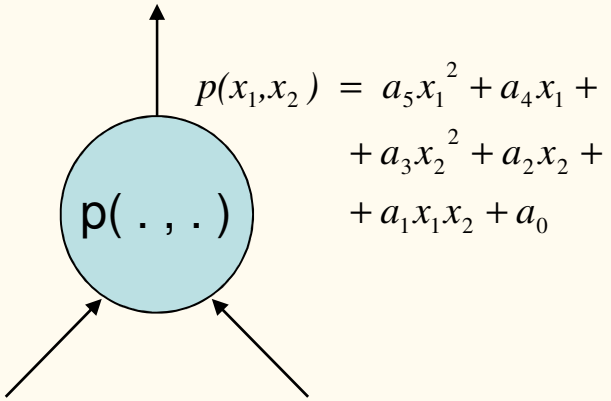
Group Method of Data Handling

- Ivakhnenko, 1966.
- predikcija, kontrola, identifikacija sistema...

- *Svojstva:*
  - *samopodešavanje strukture*
  - *selekcija ulaznih varijabli*

Osnovni čvor

$$\hat{\mathbf{y}} = [\hat{y}_1 \quad \hat{y}_2 \quad \dots \quad \hat{y}_N]^T$$



$$p(x_1, x_2) = a_5 x_1^2 + a_4 x_1 + a_3 x_2^2 + a_2 x_2 + a_1 x_1 x_2 + a_0$$

LS regresija:

- regresori: $\mathbf{x_i} = [x_{i1} \quad x_{i2} \quad \dots \quad x_{iN}]^T$, $\mathbf{x_j} = [x_{j1} \quad x_{j2} \quad \dots \quad x_{jN}]^T$
- na izlazu bloka želimo: $\mathbf{y} = [y_1 \quad y_2 \quad \dots \quad y_N]^T$

$$\mathbf{x_i} = [x_{i1} \quad x_{i2} \quad \dots \quad x_{iN}]^T \qquad \mathbf{x_j} = [x_{j1} \quad x_{j2} \quad \dots \quad x_{jN}]^T$$

$$SSE = \sum_{i=1}^{N} (\hat{y}_i - y_i)$$

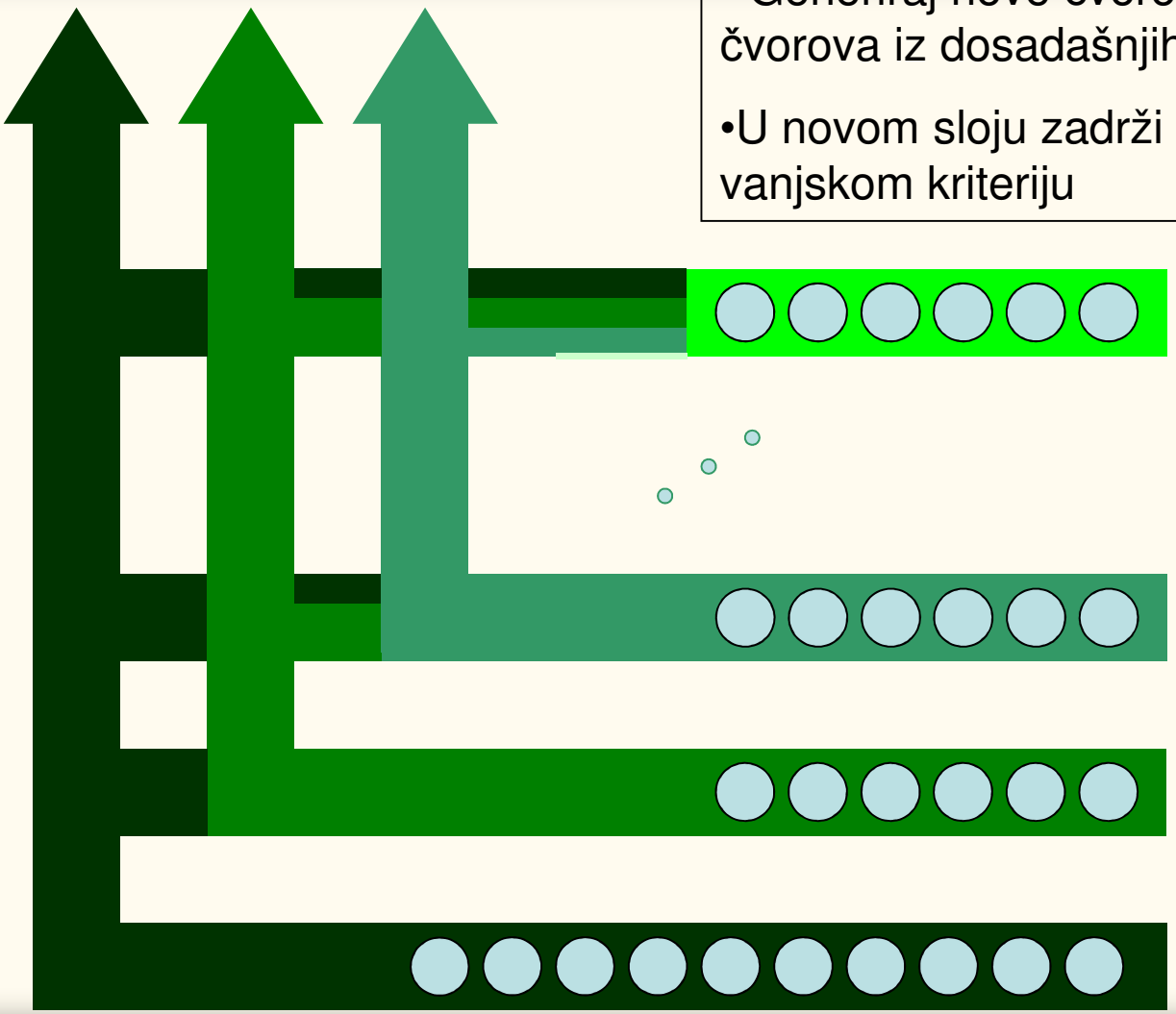
$$dSSE = 0$$

želimo ↓

$$\Rightarrow \begin{bmatrix} N & \sum x_{1i}x_{2i} & \sum x_{2i} & \sum x_{2i}^2 & \sum x_{1i} & \sum x_{1i}^2 \\ \sum x_{1i}x_{2i} & \sum x_{1i}^2 x_{2i}^2 & \sum x_{1i}x_{2i}^2 & \sum x_{1i}x_{2i}^3 & \sum x_{1i}^2 x_{2i} & \sum x_{1i}^3 x_{2i} \\ \sum x_{2i} & \sum x_{1i}x_{2i}^2 & \sum x_{2i}^2 & \sum x_{2i}^3 & \sum x_{1i}x_{2i} & \sum x_{1i}^2 x_{2i} \\ \sum x_{2i}^2 & \sum x_{1i}x_{2i}^3 & \sum x_{2i}^3 & \sum x_{2i}^4 & \sum x_{1i}x_{2i}^2 & \sum x_{1i}^2 x_{2i}^2 \\ \sum x_{1i} & \sum x_{1i}^2 x_{2i} & \sum x_{1i}x_{2i} & \sum x_{1i}x_{2i}^2 & \sum x_{1i}^2 & \sum x_{1i}^3 \\ \sum x_{1i}^2 & \sum x_{1i}^3 x_{2i} & \sum x_{1i}^2 x_{2i} & \sum x_{1i}^2 x_{2i}^2 & \sum x_{1i}^3 & \sum x_{2i}^4 \end{bmatrix} \begin{bmatrix} a_0 \\ a_1 \\ a_2 \\ a_3 \\ a_4 \\ a_5 \end{bmatrix} = \begin{bmatrix} \sum y_i \\ \sum y_i x_{1i} x_{2i} \\ \sum y_i x_{2i} \\ \sum y_i x_{2i}^2 \\ \sum y_i x_{1i} \\ \sum y_i x_{1i}^2 \end{bmatrix}$$

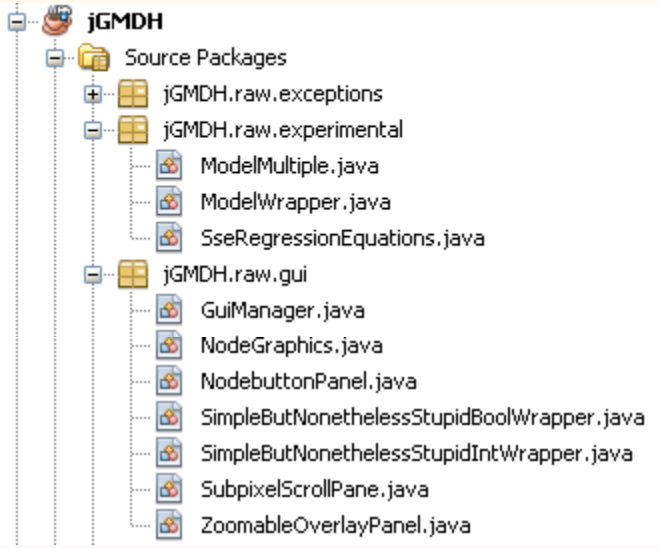
COMBI algoritam

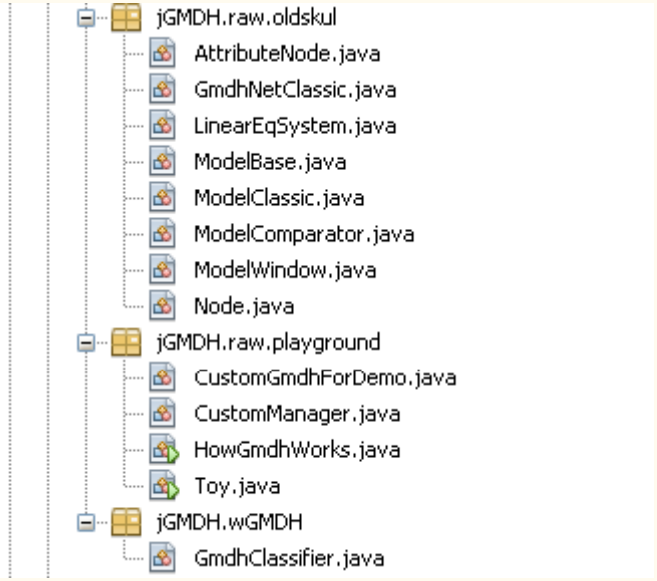
- Generiraj nove čvorove kombiniranjem svih čvorova iz dosadašnjih slojeva
- U novom sloju zadrži K najboljih po vanjskom kriteriju



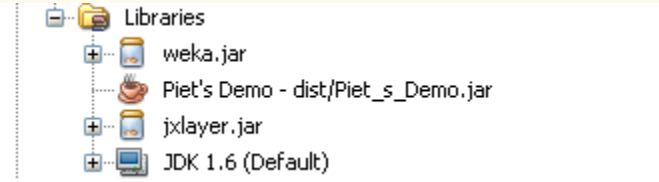
Java demo

jGDMH – *Snapshot*





- Troši još i:



- http://www.cs.waikato.ac.nz/ml/weka/
- https://jxlayer.dev.java.net/
- http://www.pbjar.org/blogs/jxlayer/jxlayer40/

Poziv iz Java koda

```
public class Toy {

    private Toy() {
    }

    /**
     * @param args the command line arguments
     */
    public static void main(String[] args)
            throws IOException, ExpressionEqualToZero, TooBig {

        Instances data = new Instances(
                new Buffered
                new FileRead

        GmdhNetClassic gmdhT
        /* We will simply sp
         */
        gmdhTest.oneFold(0,
```

```
                data.setClassIndex(data.numAttributes() - 1);    // set class
                gmdhTest.setAttributeLayer();    // set layer of attribute nodes
                gmdhTest.multiSelectCombi(5, 50);    // initiate MSC algorithm

                /* Graphical stuff
                 */
                final GuiManager drawModel = new GuiManager(gmdhTest.selectedLayers,
                        1000, 800, 50, 50);
                javax.swing.SwingUtilities.invokeLater(new Runnable() {

                    public void run() {
                        drawModel.launchGUI();
                    }
                });
            }
        }
```

Poziv iz Weka GUI-a (1)

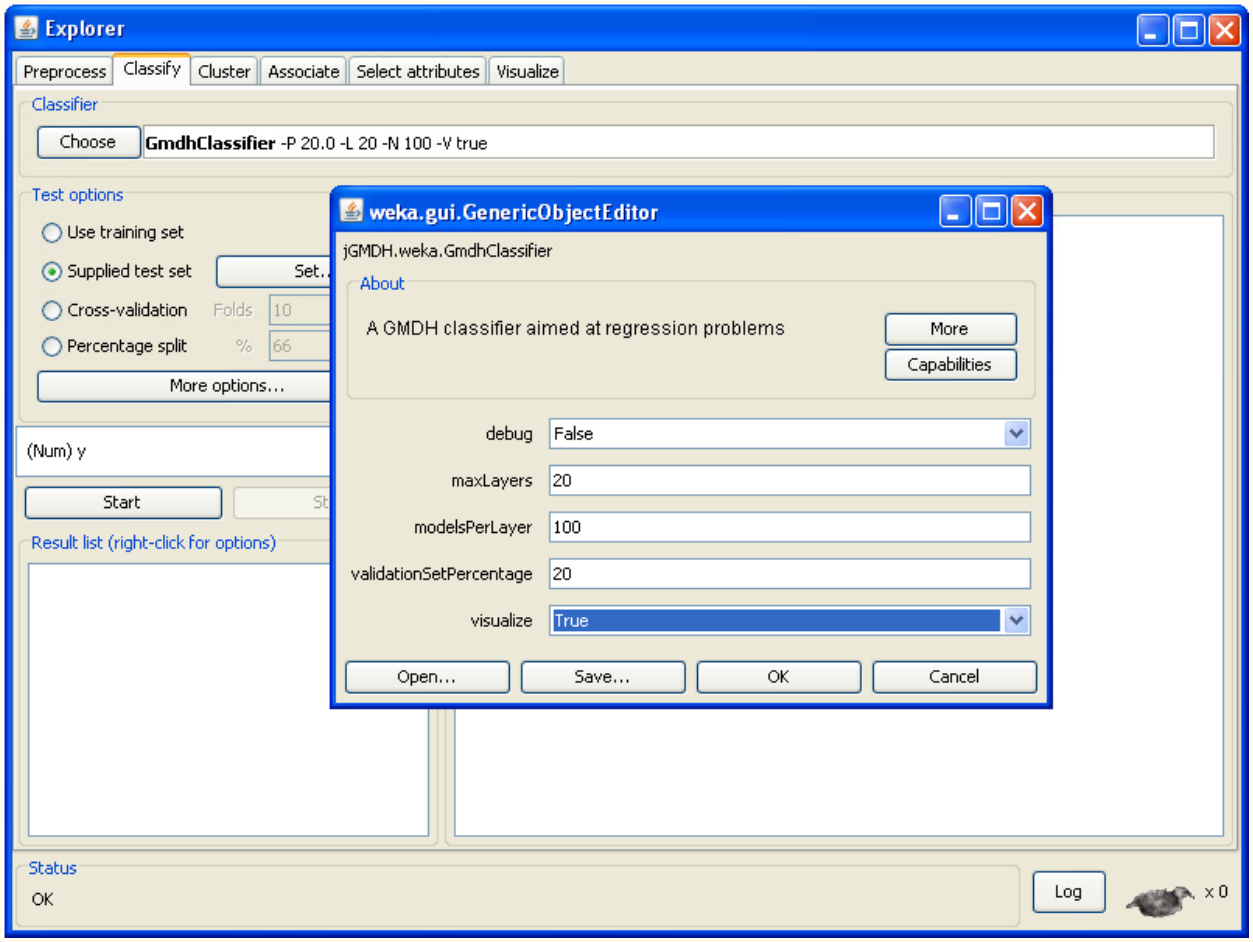
- Weka *Bean-conform wrapper*
  - *jGMDH.wGMDH.**
- Modificiraj
  - *GenericObjectEditor.props*

```
# Lists the Classifiers I want to choose from
weka.classifiers.Classifier=\
      # Add jGMDH it at the end of the list
      # ...
 jGMDH.weka.GmdhClassifier
```

  - *RunWeka.ini*

```
# The classpath placeholder. Add any environment variables or jars to it that
# you need for your Weka environment.
#...
# Depends where you put the jGMDH.jar
cp=%CLASSPATH%;jGMDH.jar
```

Poziv iz Weka GUI-a (2)



http://gmdh4weka.irb.hr/

Pitanja dobrodošla.