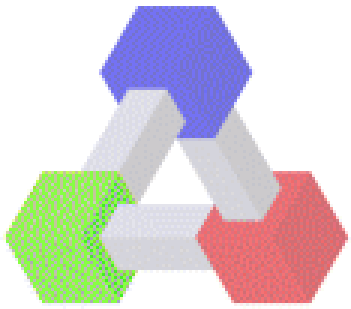


Osnovi računarske inteligencije

Mašinsko učenje

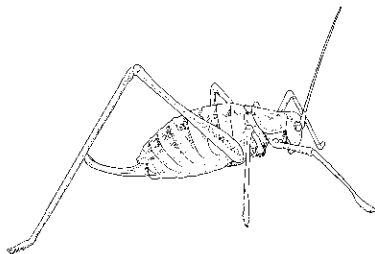
2



Klasifikacija

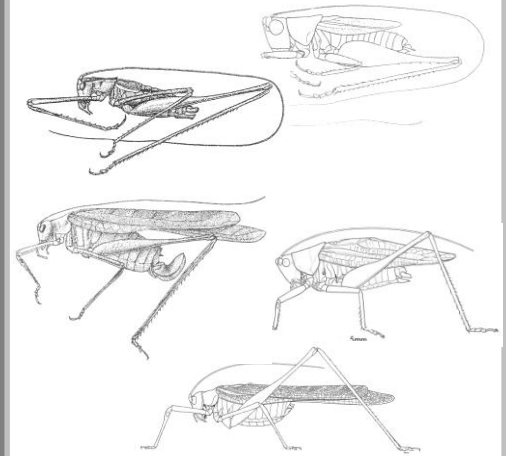
Kolekcija obeleženih podataka sadrži:
5 uzoraka klase **Cvrčak (Katydid)** i
6 uzoraka klase **Skakavac (Grasshoppers)**

Odrediti kojoj klasi pripada insekt?

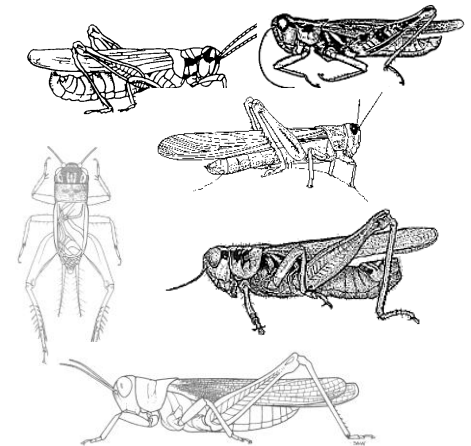


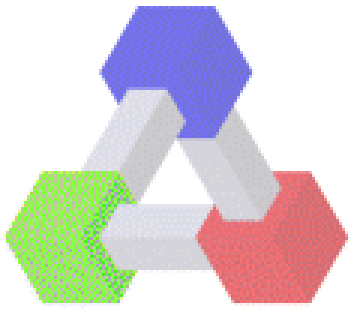
Cvrčak ili **Skakavac**?

Cvrčak



Skakavac

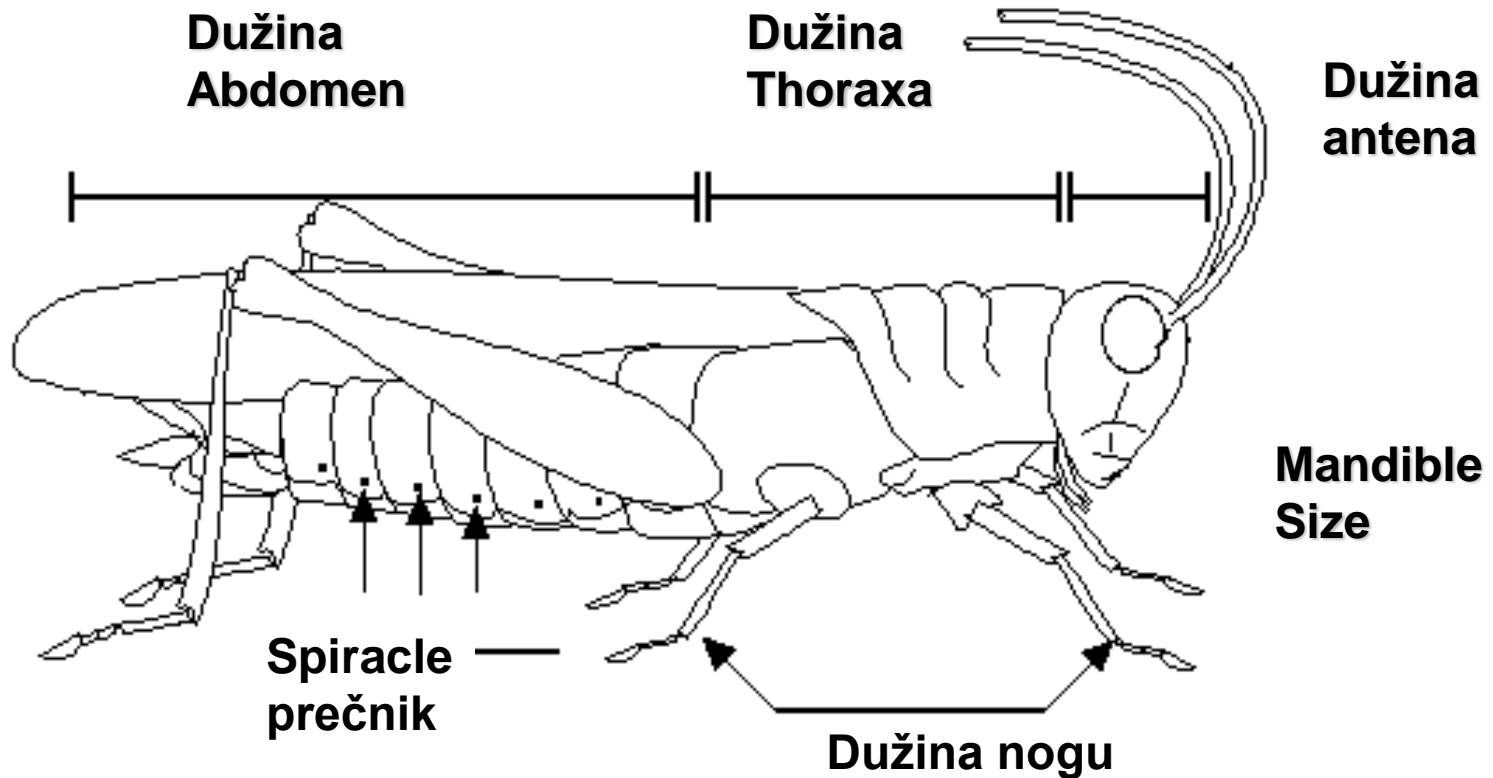




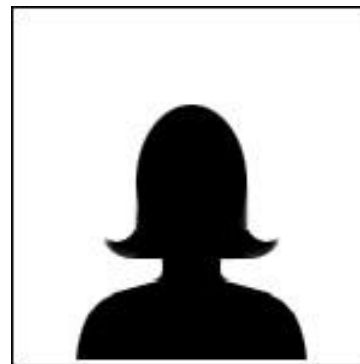
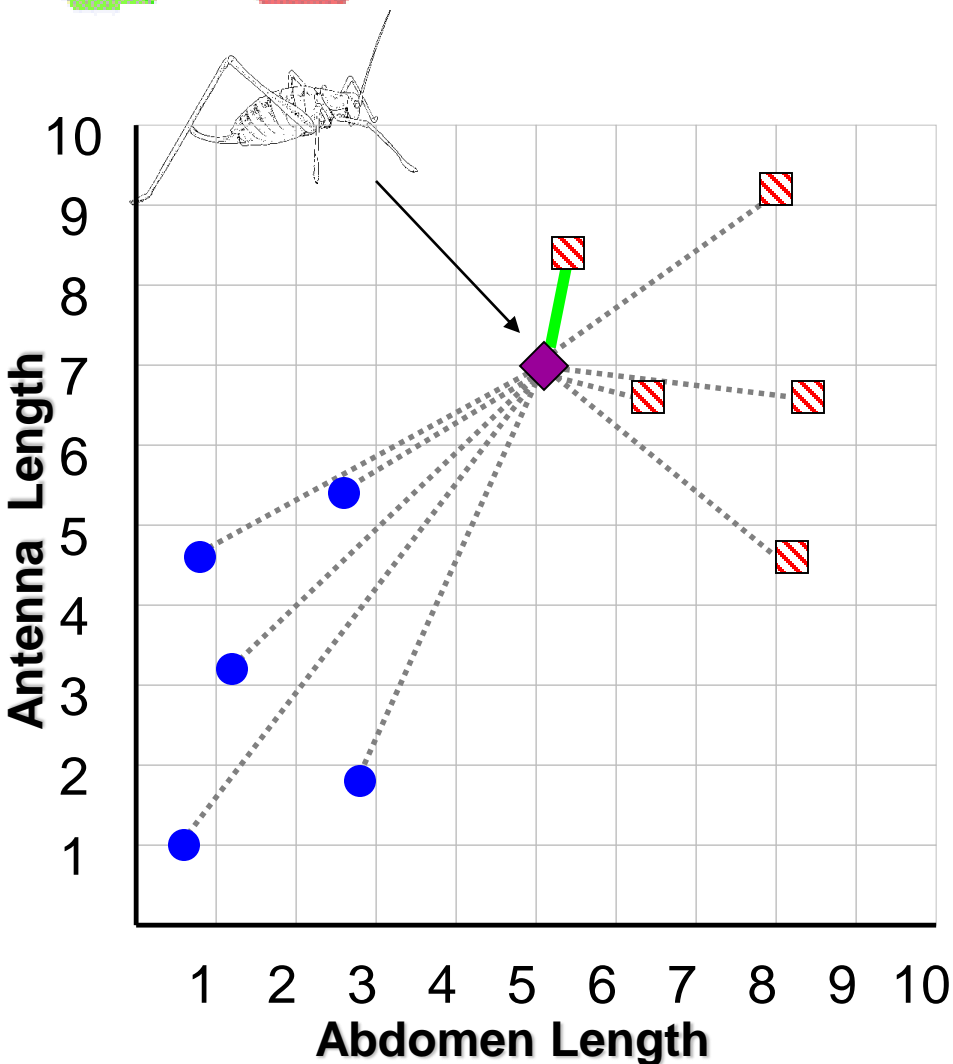
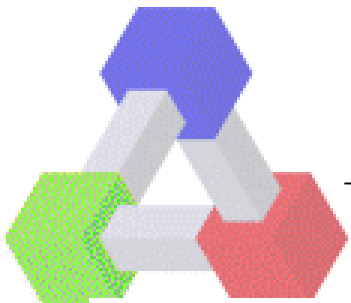
Klasifikacija: cvrčak - skakavac

Color {Green, Brown, Gray, Other}

Ima krila?



Nearest Neighbor Classifier



Evelyn Fix
1904-1965



Joe Hodges
1922-2000

```

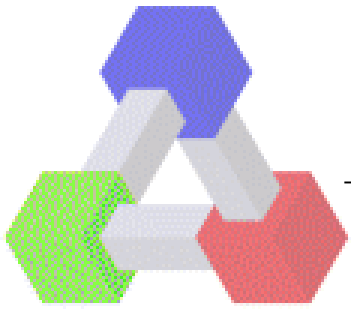
If najbliži primer.klasa == K
    uzorak.klasa = K
else
    uzorak.klasa = G
    
```

K

G

Katydid **Cvrčak**

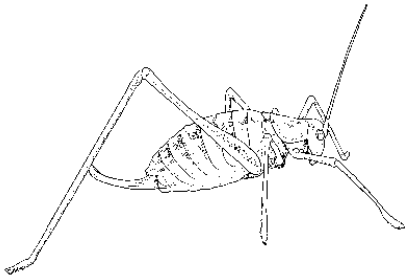
Grasshopper **Skakavac**



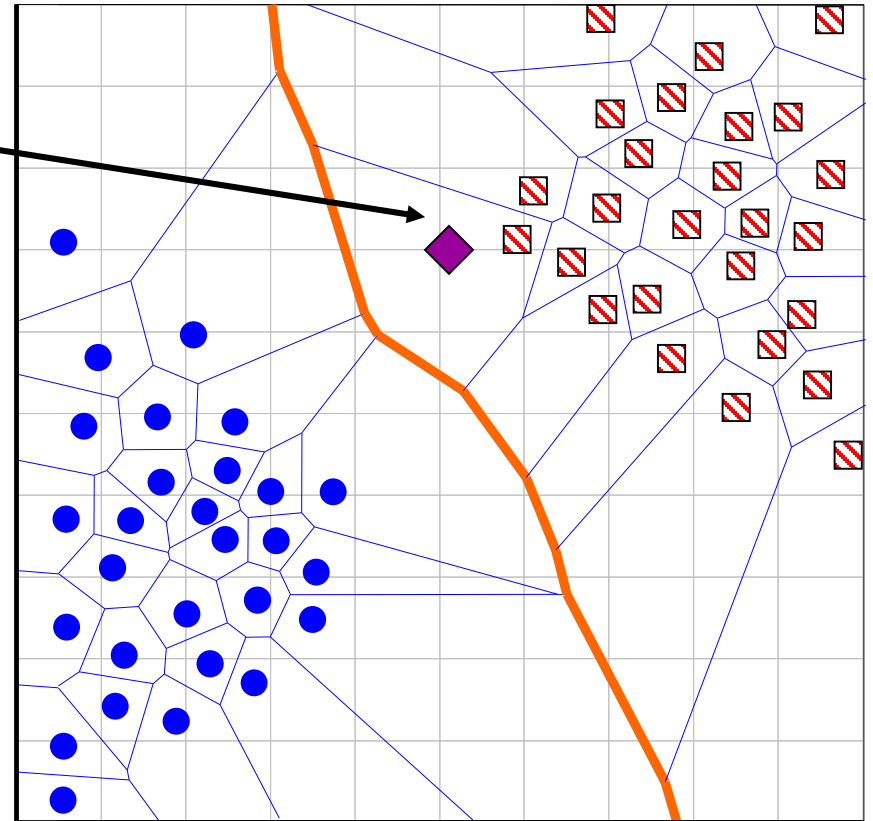
Nearest Neighbor Classifier

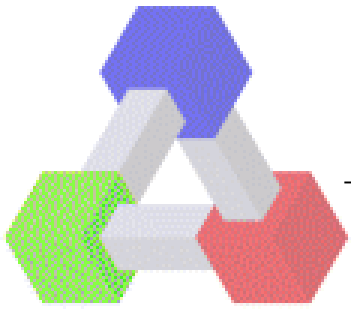
Vizualizacija

Granica odluke



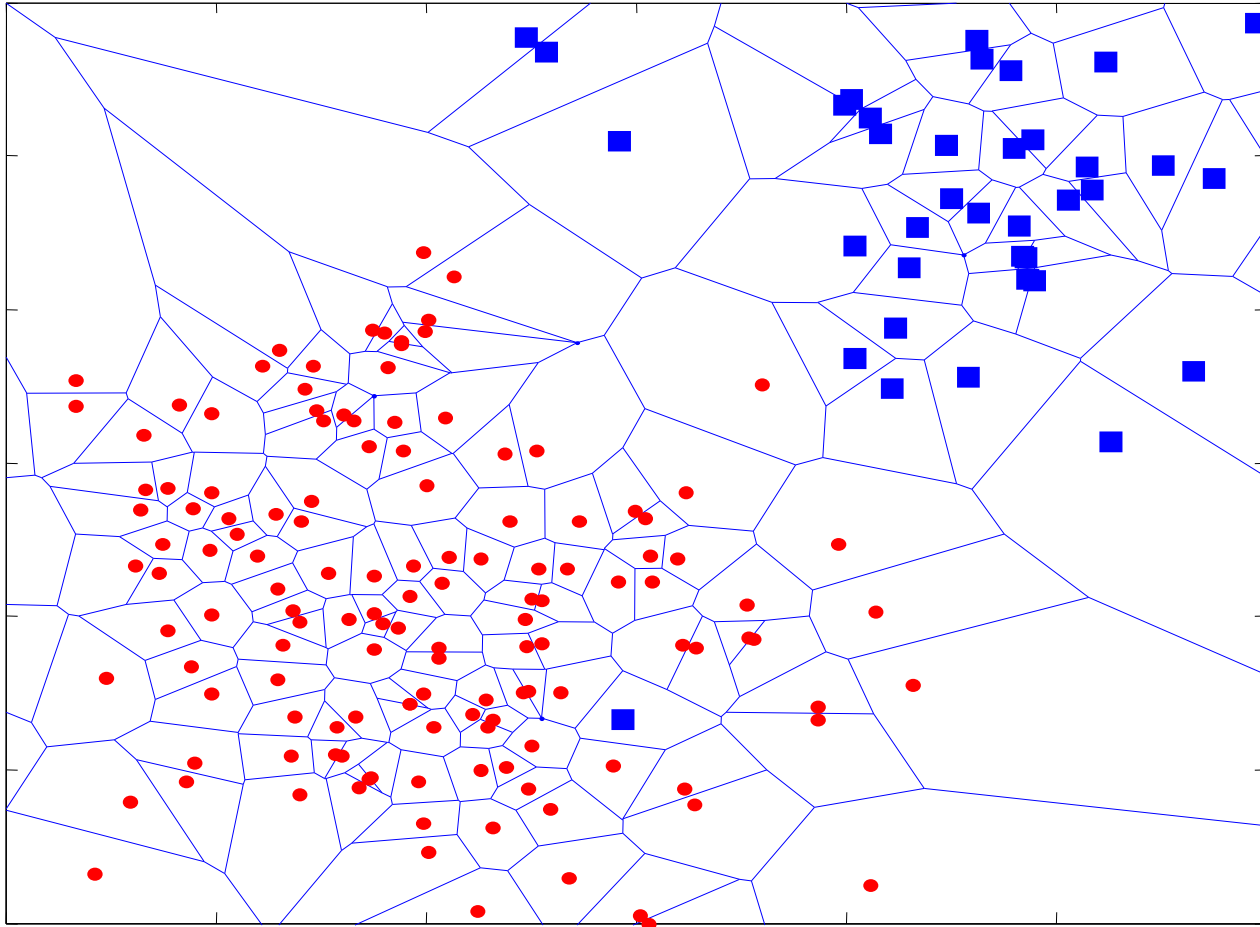
Voronoi diagrami



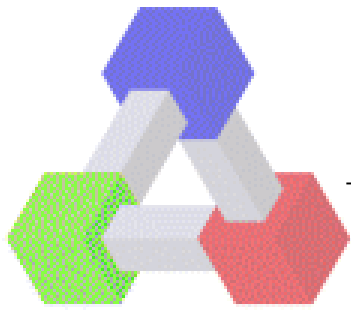


Nearest Neighbor Classifier

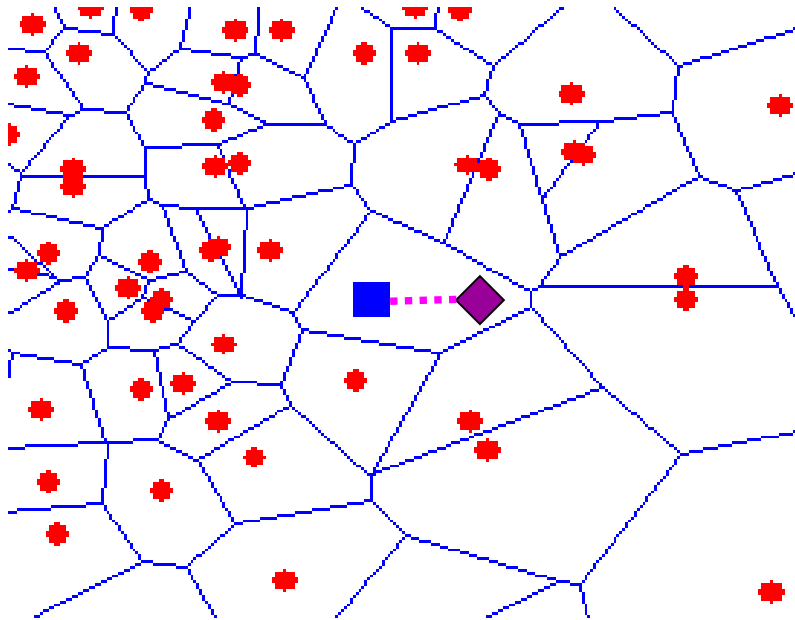
Problem



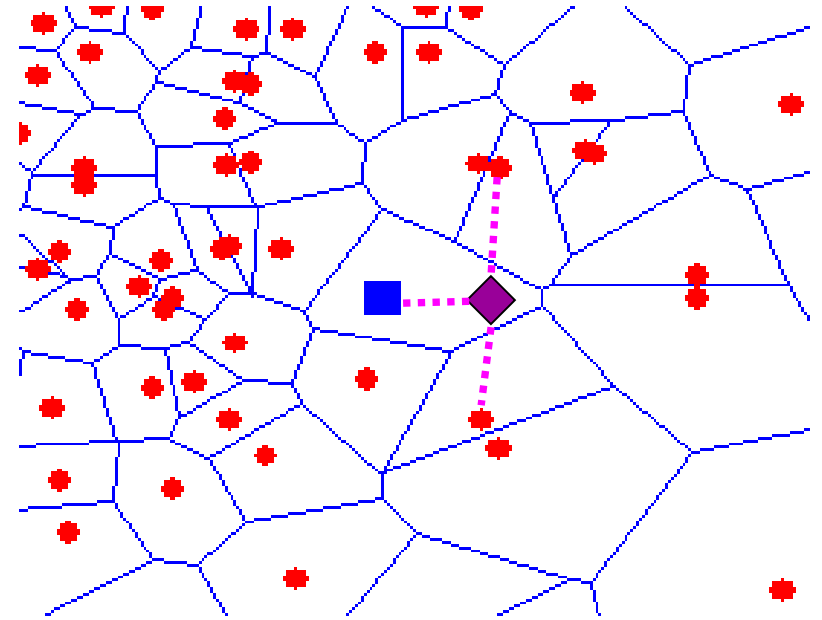
Rešenje



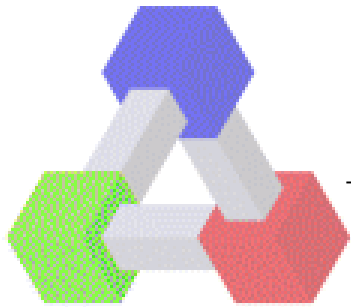
K-Nearest Neighbor Classifier



$K = 1$



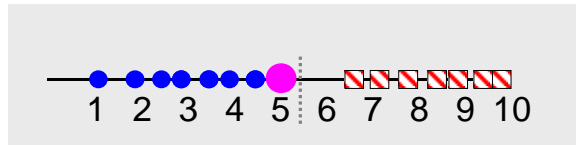
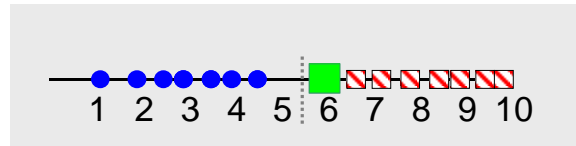
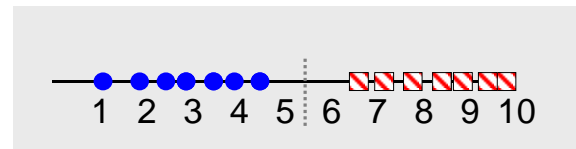
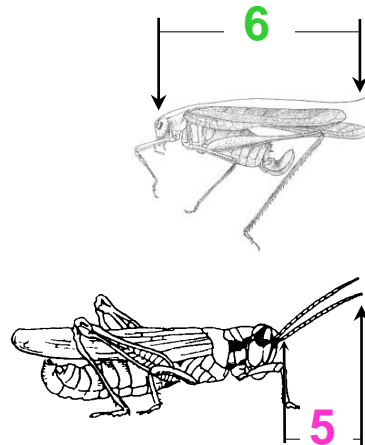
$K = 3$

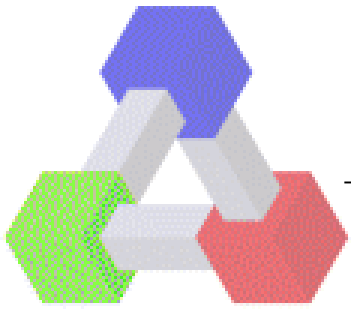


K-Nearest Neighbor Classifier

Problem: osetljiv na irelevantne osobine

Training data

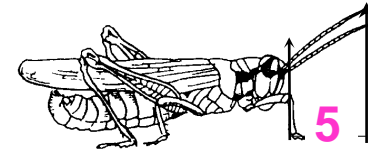
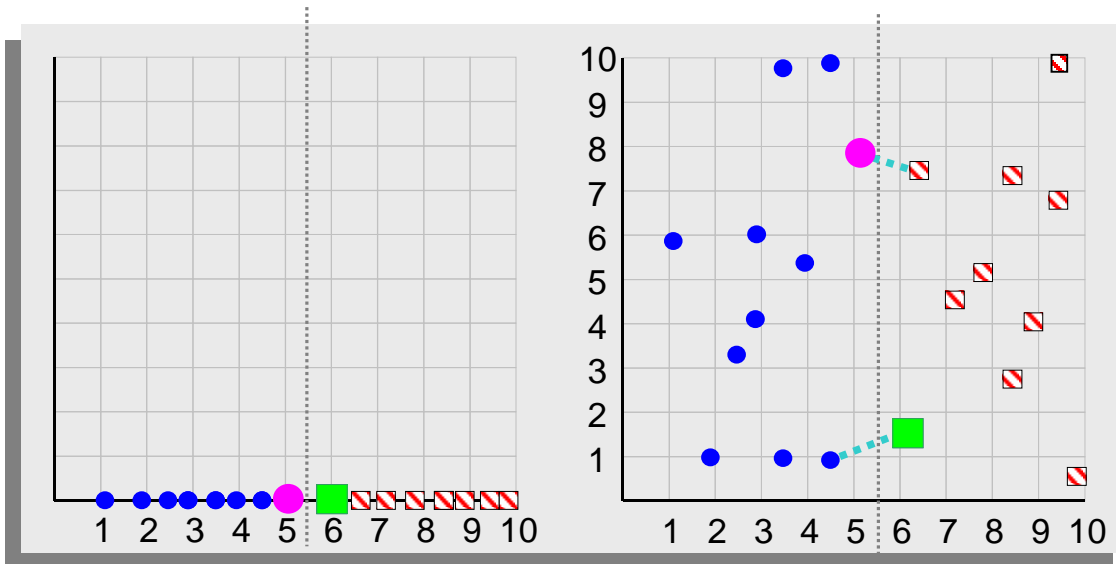
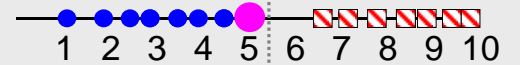
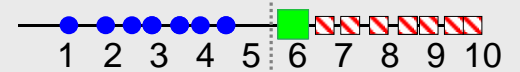
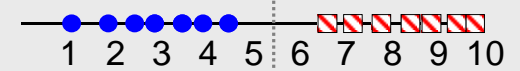
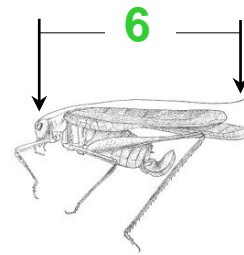




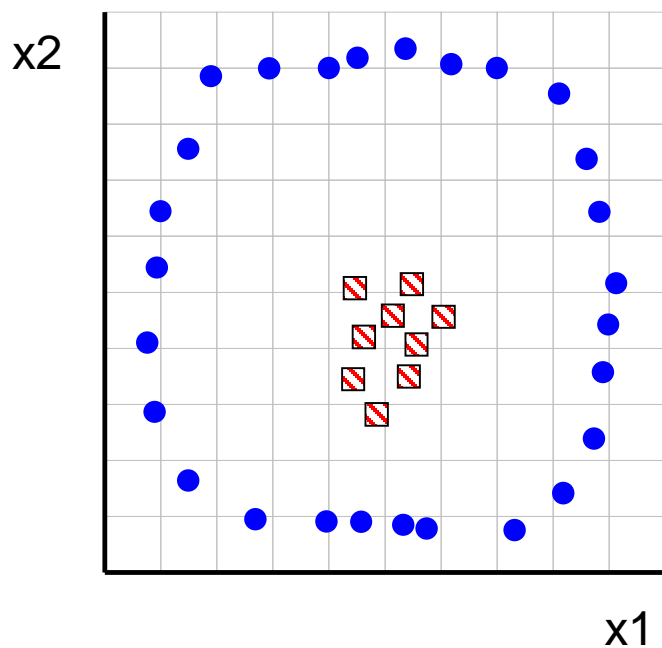
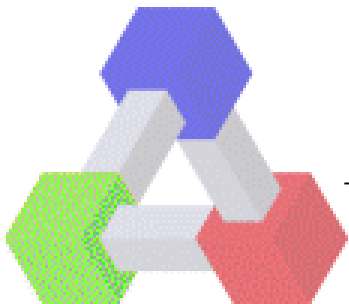
K-Nearest Neighbor Classifier

Problem: osetljiv na irelevantne osobine

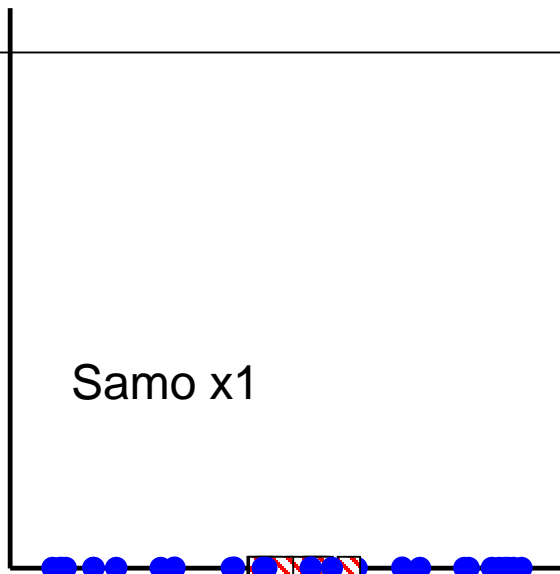
Training data



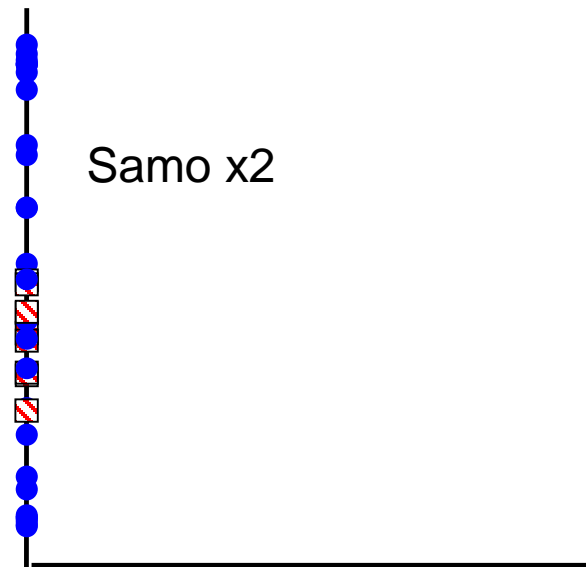
Kako odrediti bitne osobine

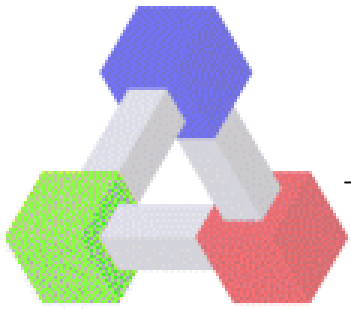


Samo x_1

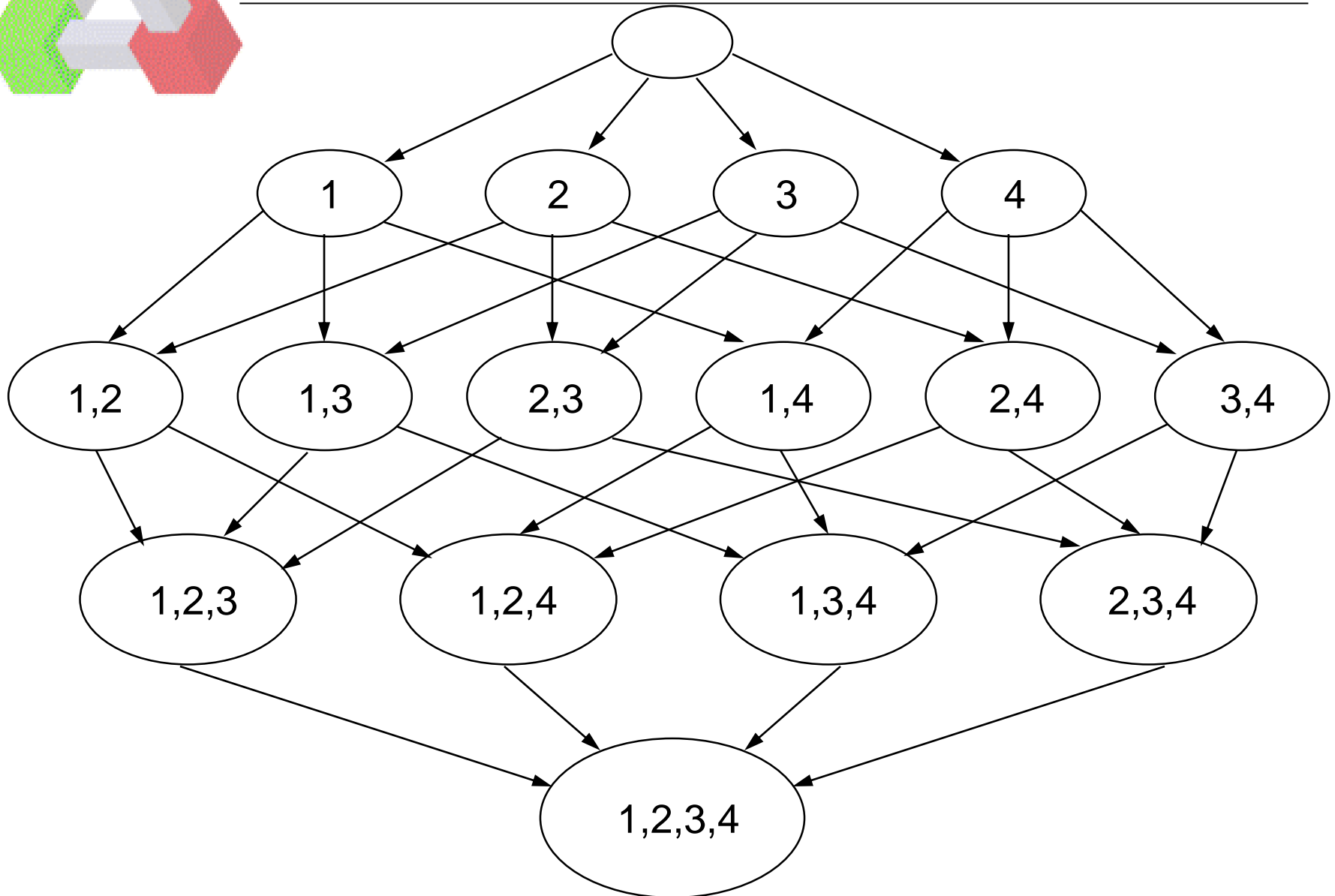


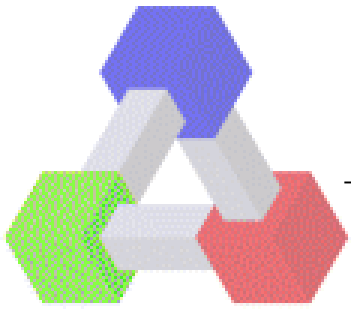
Samo x_2





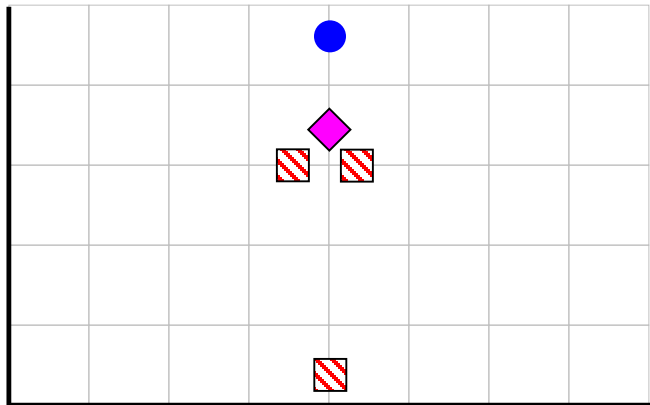
Kako odrediti bitne osobine





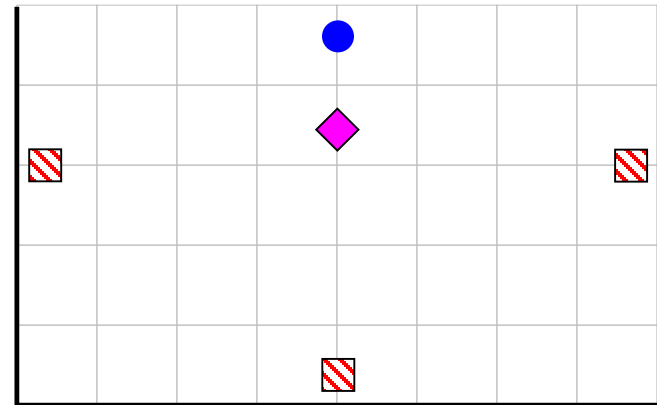
još problema

Y [\$]

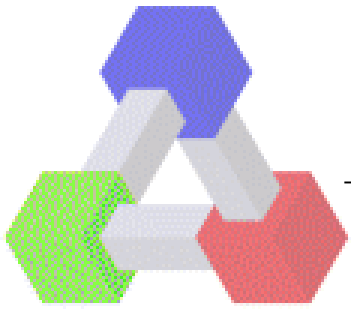


X [cm]

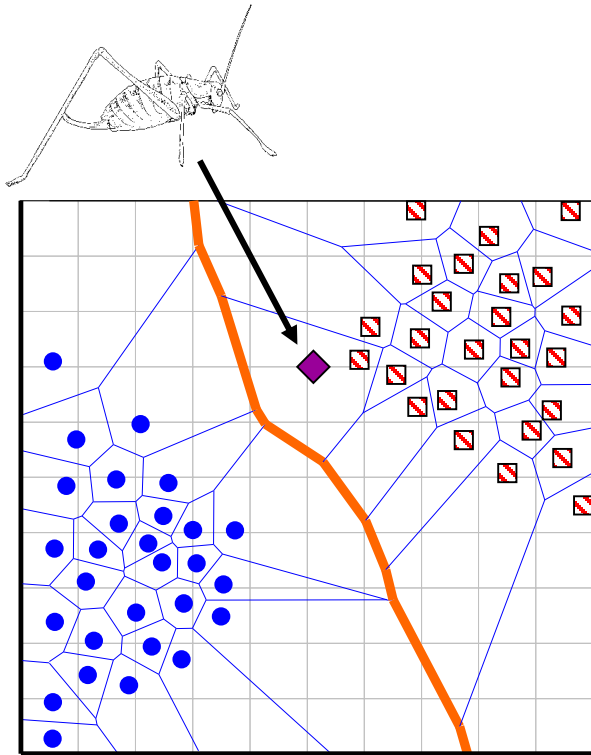
Y [\$]



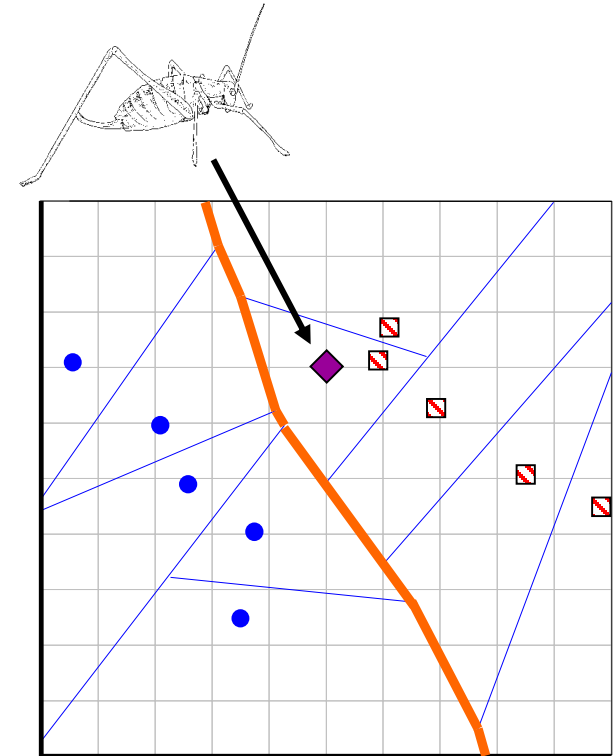
X [mm]

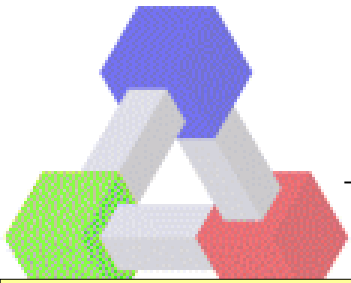


Data editing



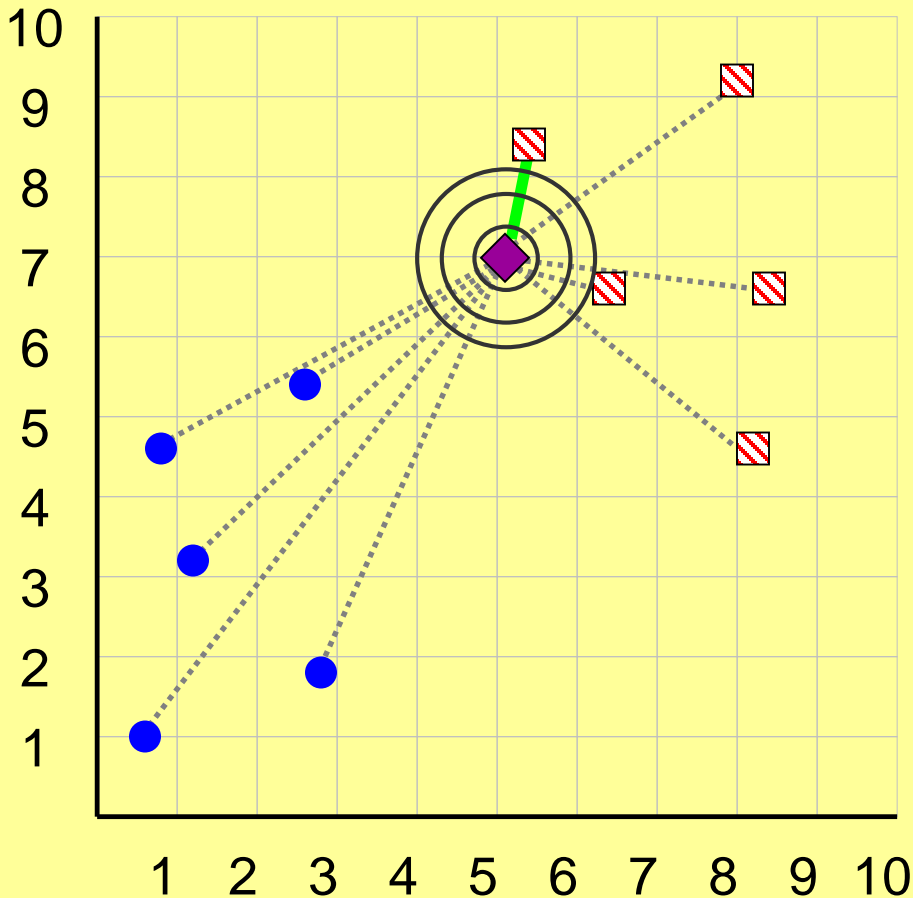
Obrisati sve primere koji su okruženi primerima iste klase





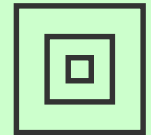
Rastojanja

$$D(Q, C) \equiv \sqrt{\sum_{i=1}^n (q_i - c_i)^2}$$

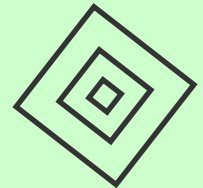


$$D(Q, C) \equiv \sqrt[p]{\sum_{i=1}^n (q_i - c_i)^p}$$

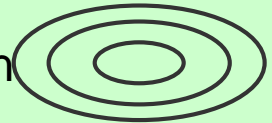
Max (p=inf)



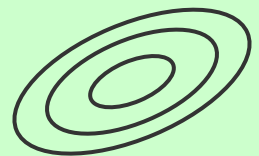
Manhattan (p=1)

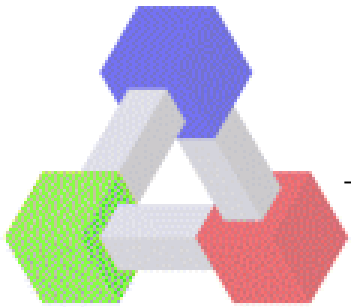


Weighted Euclidean



Mahalanobis

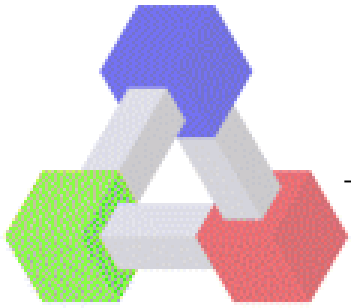




Rastojanja

ID	Name	Class
1	Gunopulos	Greek
2	Papadopoulos	Greek
3	Kollios	Greek
4	Dardanos	Greek
5	Keogh	Irish
6	Gough	Irish
7	Greenhaugh	Irish
8	Hadleigh	Irish

$edit_distance(Faloutsos, Keogh) = 8$
 $edit_distance(Faloutsos, Gunopulos) = 6$



Linearna aproksimacija

