$\lambda \in$
Λ
support vector machines
?
?
?

$$\min_{x \in X, y \in^k} F(x,y) \qquad upperlevel$$
$$s.t. \quad G(x,y) \leq 0 \qquad .lowerlevel$$
$$y \in_{y \in Y} f(x,y)$$
$$s.t. \quad g(x,y) \leq 0$$

(1)

F
f
$^{n} \times^{k}$
G
g
$^{n} \times^{k}$
L
l
upper outer level
lower inner level
?
solution map
$S(x) =$
$\{y \in^k |$
y
?
?
?
?
x, y
λ, C
?
?
?
$\tilde{X} \subset^n$
feature input space
output domain
$Y =$
$\{-1, 1\}$
data points
labels
examples
response
target function
$f(x)$
training data
(X, Y)
$P(x, y)$
x
y
?
?
?
?
risk minimization
risk functional

$$R(\lambda) = \int \mathcal{L}(y, f_\lambda(x)) dP(x,y)$$