6/8/21 ①

vs variant of OMP (boosted!) $A \in \mathbb{R}^{30}$ $\{-1,0,1\}$

why $\sigma_j \to 0$ bad as $n \sim D$. n subset size of N.

good for all sparsities $s\log(N/s)$ s = sparsity.

100 solves per var.
L1 also slow.
Sig. Proc.

close in L^1 far in L^2.

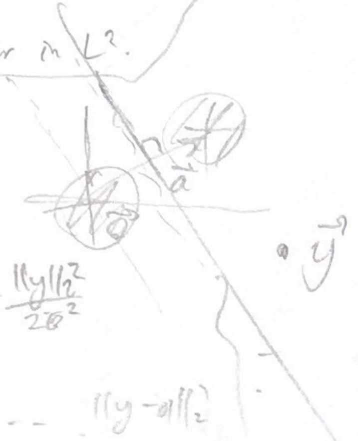
$\vec{x}\cdot\vec{a} = 0$

$x \cdot a = \frac{a}{2}\cdot a$ $a^T x = \frac{1}{2}\|a\|_2^2$

$a^T y > \frac{1}{2}\|a\|_2^2$ → class a.

$\leq$ class 0

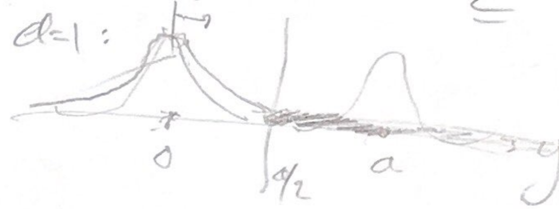
compare likelihoods



$p(\vec{y}\,|\,\vec{0}) = \frac{1}{(\sqrt{2\pi}\sigma)^d} e^{-\frac{\|y\|_2^2}{2\sigma^2}}$

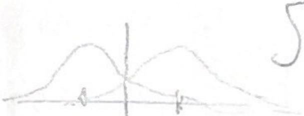
$p(\vec{y}\,|\,\vec{a}) = \ldots \|y-a\|_2$

$d=1$:



$\frac{a}{2\sigma}$ std devs away

$\int_{a/2\sigma}^{\infty} \frac{1}{\sqrt{2\pi}} e^{-t^2/2}\,dt = $ erfc? $= \varepsilon$



class

	0	$\vec{a}$
0	$1-\varepsilon$	ε
a	ε	$1-\varepsilon$

is
$p(y|\vec{0})\,p(\vec{0}) \geq p(\vec{y}|\vec{a})\,p(\vec{a})$

priors

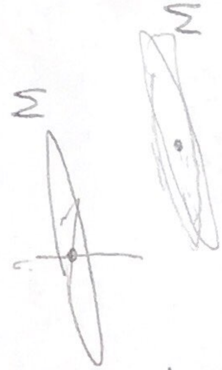
$p(\vec{0}) + p(\vec{a}) = 1$ Bayes version

→ penalty table

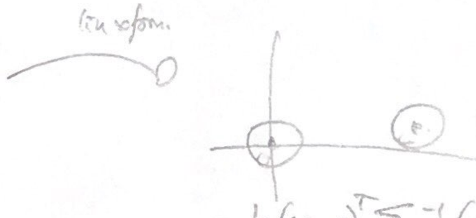
0	10
1	0

min $\mathbb{E}$(penalty) under arrival rates $p(\vec{0}), p(\vec{a})$.

Σ Σ



lin. xform.



$p(\vec{y}) = \frac{1}{(2\pi)^{d/2}\sqrt{\det \Sigma}} e^{-\frac{1}{2}(y-a)^T \Sigma^{-1}(y-a)}$

Asked Tanya to fix up $a^T y \geq c$. what is c in case of prior, or in case of penalty table.

4N(?) diff classes.

Planes  signal.

$\vec{y} = a_{t_0,R_0} + \vec{\varepsilon}$ noise iid gauss

method: $\min_{t,R} \|y - a_{t,R}\|^2$

← method 0.

trans. $t_0 \in \{1,2,\ldots N\}$. $R_0 \in \{0, \pi/2, \pi, \frac{3\pi}{2}\}$.

Σ

k code up LDA to test. FP & FN rates.

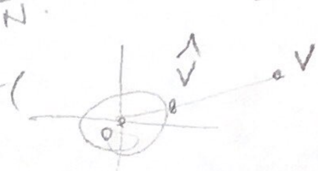
$$\min_{t,R} \; -2\langle y, a_{t,R}\rangle + \|a_{t,R}\|^2$$

given $V \in \mathbb{R}^N$

mean $V_m := \dfrac{\sum_{i=1}^{N} V_i}{N}$

def: $\hat{V} := \frac{1}{c}(V - V_m)$

c s.t. $\|\hat{V}\|^2 = 1$



Niko does: $\boxed{\text{method 1}}$ $\min_{t,R} \; -2\langle \hat{y}, \hat{a}_{t,R}\rangle$

¿not quite equivalent? pf it.

equiv to $\max_{t,R} \langle \hat{y}, \hat{a}_{t,R}\rangle$ cross-correlation

Niko's ways: $\boxed{\text{meth. 2}}$ $f(t) := \max_{R} \langle \hat{y}, \hat{a}_{t,R}\rangle$ at each t.

if $f(t) > \tau$ (threshold) then $\tilde{R} := \arg\max_{R} \langle \hat{y}, \hat{a}_{\tilde{t},R}\rangle$ & $\tilde{t}, \tilde{R}$ is candidate.

FP & FN rates for a given τ

$g(t) := \operatorname{mean}_{R} \langle \hat{y}, \hat{a}_{t,R}\rangle$

$h(t) = \operatorname{var} \langle \hat{y}, \hat{a}_{t,R}\rangle$

$\sim \mathcal{N}(0,1)$

$j(t) := \dfrac{f(t) - g(t)}{\sqrt{h(t)}}$

$\boxed{\text{meth. 3}}$ $j(t) > \tau$ then candidate.