\perp	The tractable formulation for a piecewise
	a affine loss function L(z)=man (ajz+bj)
	The tractable formulation for a piecewise a affine loss function L(z) = man (ajz+bj) jej
	is given below.
	SND, R. ((KN 315 A))
\int	- CEBSIGHT
	inf sup Ea[l(xw, x>, y)] W QEB_(PN)
	M GERECLUS P'EP) II (HERMS) & JUS =
	= $\inf \frac{\lambda \xi + 1 \sum_{j=1}^{N} S_j}{N \lambda_j S_j}$
	Wisi no mudment les la transition de la
	Pijt, Pijalompiom issan c bare & go
	Sit Contain Pint Little + Contain 21 > 5 Si iela
	Sx (aj ŷ w - Pij +) + bj + < Pij +, ûi > = Si ie[n]
	2 2 7 8 1 8 1 7 1 1 8 9 1 7 1
	Sx (-aj ŷi w - pij -) + bj + <pij -="" πi=""> - κλ ≤ si [[N]]</pij>
	14-3, 10 Ling
	11 pij - 11 ≤ No mo no dob ich banu an min 1 €
	1 03: +11 \$ X 6 000 000 000 000000000000000000000
	Siz Ordination in happing has
	LONG POR SENT STATE OF THE MORNINGS OF THE MORNING AND A STATE OF THE MORNI
	1 211 212 11 11 11
	Here Be[P] is the warriskin ball centures $\hat{P}_N = 1 \leq S_n(\xi)$ around the emperical distribution $\hat{P}_N = 1 \leq S_n(\xi)$
	and radius is &
	and radius is &
_	· * → dual Norm
_	(\hat{n}; yi) → dual Norm (\hat{n}; yi) → dura point \(\in \mathbb{C} = \times \times \langle -1, 1 \rangle = \times \times \times \langle -1, 1 \rangle = \times \times \times \langle -1, 1 \rangle = \times \time
_	1 - COST OF MISICALIZATION
_	E→ wanestin radius.

SUP EQ[e(<w,x>,y)] QEBE(BN) $= \sup_{\Pi} \int_{\mathbb{Z}^2} \ell(\langle w, \pi \rangle, y) \prod_{\{d \leq 1, d \leq 1\}} \mathcal{E}$ IT is a joint dismibution of 2 and 3' with marginaus Q and PN S = 119> + 1d + (+119 - W 0 10) x2 S = 119> + 1d + (+119 - W 0 10) x2 S = 119> + 1d + (-119 - W 0 10) x2 -> Here we used the defination of the warrestin memic and ball and enpanded the enpectation Since we know that & has marginal.

defined by the emperical dismibution.

We can make use of this $\Pi(d\xi,d\xi') = IP(d\xi) \cdot P(d\xi|d\xi')$ = 1 \(\frac{\z}{\z} \) \(\frac{\z}{\z}{\z} \) \(\frac{\z}{\z} \) \(\frac{\z}{\z} \) \(\frac{\z}{\z}{\z} \) \(\frac{\z}{\z} \) \(\frac{\z}{\z} \) \(\frac{\z}{\z}{\z} \) \(\frac{\z}{\z} \) \(\frac{\z}{\z} \) \(\frac{\z}{\z}{\z} \) \(\frac{\z}{\z} \) \(\frac{\z}{\z} \) \(\frac{\z}{\z}{\z} \) \(\frac{\z}{\z} \) \(\frac{\z}{\z} \) \(\frac{\z}{\z}{\z} \ Q'(ds) = condinonal p.d for de girents'-ki

For simplicing let us begin by considering the inner problem

Proof

DATE:	
	-

From the above

Sup
$$L \stackrel{>}{\leq} I e(s) Q^{i}(ds)$$

Q:

 $Q_{i} = 1 \stackrel{>}{\subseteq} I = 1 \stackrel{>}{\subseteq}$

Strong dualing can be shown to hold for 2>0

$$=\inf_{\lambda, s_1} \left(\frac{\lambda z_1 + 1}{\lambda z_1 + 1} \right) \frac{z_1}{z_1}$$

We define the mansportation metric a as

when II-II is a norm in the input space and K is the cost of switching a laber

Now using the defination of the piecewise affine function L(z)= man (ajz+bj) we have the following inf 12 + 15 \$ 51 N 10 00 901 = Sup - 0j y (w, x> + bj - λ || x - x̂i || 1 x ∈ x + kx ≤ si ie [n], j ∈ [J] Using the definition of the dual Norm we inmoduce 3 pij + and pij - "Slak 23 " Ht ja 11 $\lambda \parallel 2 - \hat{\chi}_i \parallel = \inf \{ \langle p_{ij} + \chi - \hat{\chi}_i \rangle \}$ The dupings on mon sport purcher ter us consider some simplification to me Ist consmain t Sup aj ý. < w, >> + bj - \(\) 1 | 1 | ≤ Si him duby Norm

⇒ Sup aj \hat{y} < $w_1 n > + bj - inf$ < $p_{ij} + n - \hat{n}_i > \leq s_i$ $n \in X$

||Pij || * $\leq \lambda$ Smitching the sup and inf.

= inf sup $a_j \cdot \hat{y}_i < w_j > - \langle p_{ij} + \chi_j \cdot \hat{\lambda}_i \rangle$ $||p_{ij}||^* \leq \lambda \quad z \in X \qquad + b_j \leq s_i$ L(E) = mas (ojs : b) we have the fall rearranging the kims inf sup <aj ŷ w-pij + 2> 11pij +11*5 > > 6 × + < Pij + 2 i 7 + b; ≤ Si We inmodule Sx unich the indicator for the set X S(t) = 1 0 t EX d + (SW) 1 0 - 90 = inf up (<ajýw-pijt,n>
11 pij+11* st a ERd + 8 (2)) + <pij+, 2i > <18-8 TUSZ 4 bj 45 11 18-8 11 X The defination of support furction on the set X can be used (It is the conjugate of the Indicator) Sx(t) = Sup (t,7) - S(a)
AEIRd X = $\inf \left\{ \frac{w_{oup}}{\sum_{i=1}^{n} \left(a_{i} y_{i}^{2} w - p_{i} y_{i}^{2} \right)} \right\}$ $+ \frac{1}{4} \frac{1}{2} \frac{$

- 11						
\parallel		Similarly we can do me same for the				
		Similarly we can do me same for the sund consmaint.				
		⇒ inf ≤ (-ajýw-pij-)+bj+ ⟨pij-, źi pij- ≤λ	>			
		11 pii - 11 5 x x x x x x x x x x x x x x x x x				
		ig = 1 + ig = 1				
	.	The formulation now is:				
		110 11111111111111111111111111111111111				
_	1					
	$\parallel \parallel$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$				
_	$\parallel \parallel$					
4		St 2 inf (S) (aily w - pirt) + bir 10 12	*			
		St inf S (ajýw-pijt) + bj + <pij+, zi=""> si</pij+,>	iE[N]			
			je[]			
	-	1 x x - e 12 [13 + 12 + 6 - 13 + 12 x 2 + x 3				
		inf S (-a, û, w-pi, -) + b, + < Pi, -, 2i, >				
		X	*			
		11 pij - 11 & \ *				
		12 VIII VI V				
		Nows we consider the inf eup Ea(es))				
		Now- we consider the inf sup EQ(e(x)) Now- we consider the inf sup (e(x))				
_		complete form and include the decision variable for w				
_		For the constraints we can argue that that if I pij the				
_		8.+ 11pij 11, 62 and san's fier the 1sr constraint				
_		in half in the second oil as well				
_		Therefore we can do away with the inf and add pijt				
\	4	and pij - as a devicision variable.				
\	_		V - 1-44			
\						
\						

	The final formulation we get is,	The same
	- Land contraint	
	inf sup Eq[e(z)] W QEBE(PN)	The constant
	inf sup Eq[e(z)] W QEBE(PN)	San Person
	155 7 × 1511-11811	School Services
	$=\inf \lambda \xi + L \xi si$	Samuel Committee
	w, \si \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
	Pij [†] , Pij ⁻	The second second
	12 = 1 + 2 x - 3 ni	
	S-t 13 12 12 12 12 12 12 12 12 12 12 12 12 12	_
	Sx(ajýw-pijt) +bj+ (pijt, ži> < si } iel	Ì
	11 32 < 18 TH92 18 TH92 18 TH9 APPLIED	
	Sx (-aj y.w-pij-) + bj + <pij-, 217-k2<="" th=""><th></th></pij-,>	
	≤ S' ₁	_
	1 in P S (-aign-pij) + bit 5 5 1 - 2 > 1	_
_	1 Pij +)	_
	11 bil_1 = 11 x < y	
	The same of the sa	_
	Si > 10 200 M RAY Shizman SVE SMAN	_
		_
	Complete from and locallete for decision and	-
9.	Henre Proved Day and and has been a	_
_	The hand of the case of the first of	_
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