ارب سلير - ٢٣ ٢٩٤ مدة كلاف سوم سياساك الملك اللو
ارس سلر - ۲۳۲۹۴ مده که تلاف سوم ساسای املی اللو
AI \Z
Exercise 1: we know that $P(\chi,\chi \theta) = \prod_{n=1}^{N} (\pi_k N(\chi_n \mu_n, \chi_k))^5$
Also, using chain rule me have: P(x,2/0) = P(z/x,0). P(x)
Those, using chard have me name: P(21, 2/4)=
Pinizial
=> P(z/x,9) = P(x,z/9) However the P(x,z/9) that we
P(n)
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colculated above is a joint distribution. What we mant is P(xn, Zk=119).
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Because the samples were drawn i.i.d, the joint distribution can be
de composed into non-conditional marginal multiples. Therefore: 15
일반들은 위에 계속하면 및 1912년 1912년 1일
P(xn, Zk=110) = (Tk N(xn) /k, 2k) = Tk N(xn) /k, 2k)
-> P(ZK x, 9) = P(Zk=1 x, 9) = TK N(Xn (Kk)
가게 하는데 아이들이 아이들에게 되었다. 그렇게 되었다면 그렇게 되었다면 되었다면 되었다면 하는데 아이들이 사람이 되었다면 그렇게 되었다면 그렇게 되었다면 그렇게 되었다면 그는데 이렇게 되었다면 그리다는데 그렇다면 그렇게 되었다면 그렇지 않는데 그렇지 없는데 그렇지 않는데 그렇지 없는데 그렇지 않는데 그렇게
And because x is drawn from a GMM it's pelf is: ITIL Northwested)
P(Zulxi, 0) = The N(xil Mic, 2u)
2 7 N(M, 1/2, L)
25
. 현실하는 전 하다 그런 사람들은 기계를 가는 그리고 있는 요즘이다. 그리고 있는 그리고 있는데 그림을 하면 보고 있다면 보다를 보고 있는데 그리고 있는데 사람들이 되는데 바다를 하고 있습니다. (i

Exercise 2:
a) Because 8/2(Xn) is calculated in the E-step we regard it as a constant
in the M-step. Therefore we want to maximize (10) wort the
for all KEK with a constant resposibility.
Because only one of the K terms are meaningful for taking the derivative
w.r.t. to each k, the function is then simplified to: 10
and that of its and it the the same is the same of the transition of the same
(19)= / Tk(Xn) (In The + In N(Xn Mus Zk)) for some specific liek.
Additionally the Inthe term is irrelevant to this derivative and finally:
$\hat{L}(9) = \frac{1}{2} \mathcal{J}_{k}(\lambda_{n}) \ln \mathcal{N}(\lambda_{n} \mathcal{P}_{k}, \lambda_{k}) $ (I)
3(10) = 3(2 74/2/n) In (-12 1/2/4/2 (2n-1/4) /2/4 (2n-1/4) /3/44
= 0 (1 7 k Xn) [ln - 1 /2 (1 /2 1 /2 20 /2 2 1 /2 20 /2 2 2 2 2 2 2 2 2 2
x'Ax form
$= \frac{1}{2} \frac{\partial k}{\partial k} (\chi_n) \left[-\frac{1}{2} (\gamma_0 - \mu_k) \frac{1}{2} \frac{1}{k} (\gamma_n - \mu_k) \right] / \frac{N}{2 \mu_k} = \frac{1}{2} \frac{\chi_k}{k} (\chi_n) \frac{1}{2 \mu_k} (\gamma_n - \mu_k) = 0$
Because The 12h1 is a constant me can multiply both sides by Zie from right 25
and gets // N/ (xn) (xn-/k)=0=- / N/ (Mn) / k + / N/ (Mn) xn =0
$ \frac{1}{\sqrt{2}} \int_{\mathbb{R}^{n}} \chi_{n} ^{2} = \frac{1}{\sqrt{2}} \int_{\mathbb{R}^{n}} \chi_{n} ^{2} \int_{\mathbb{R}^{n}} \chi_{n}$
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161	Starting from (I) from part a), i.e.,
	2(9) = 1 8k(Mn) In N(Xn Mk > 2k)
me h	rane: $\frac{\partial^2 (0)}{\partial \xi_k} = \frac{\partial (\xi \partial_k (x_n) \int_{n=1}^{\infty} \frac{1}{(z_n)^{d_2} \xi ^{\frac{1}{2}}} e^{-\frac{1}{2} (M_n - M_n) \frac{1}{2k} (M_n - M_n)}$
	N (だびk(xm)[- = ln(2a)- = ln 1を - = (x-4k) でん (xn-4k)])/の人k
	$\frac{1}{3} \frac{1}{2} \frac{1}$
V	
	$\frac{(\gamma_n - \mu_k)^T \mathcal{L}_k}{(\gamma_n - \mu_k)^T \mathcal{L}_k} = -\frac{1}{2} \frac{(\gamma_n - \mu_k) (\gamma_n - \mu_k)^T \mathcal{L}_k}{(\gamma_n - \mu_k)^T \mathcal{L}_k}$ Symmetrical $-\frac{1}{2} \frac{(\gamma_n - \mu_k)(\gamma_n - \mu_k)^T \mathcal{L}_k}{(\gamma_n - \mu_k)^T \mathcal{L}_k}$
	$\frac{191}{32\mu} = \frac{1}{2} \frac{1}{2$
multiple N	ying from left and right by Zu =>
立える	(mn) [(mn-Mk)(mn-Mk) - 24 24 24] 50 =>
りなりんし	(Mn) A - & Toking) Share -> In & Toking) A
二人人	$\frac{1}{2} \frac{3k(n_n)(n_n-\mu_{ie})(n_n-\mu_{ie})^T}{2k(n_n)}$
	n=1