Class Dec 10, 2021

1. Optimize $H(X|Y)$

2. Used Bayes rule to expand.

$$\sum p(x) \left\{ \sum_y p(y|x) \ln (y|x) + \sum_x \ln p(x) \right\}$$

3. Various ways to optimize $p(x)$ that fits as dim increases

Kernel. DF — erase # are effectively params!

$$\hat{p}_x(x) := \underset{\text{Exactly}}{=} p_x(x, \{x_e\}_{e=1}^{E})$$

4. $$= \frac{1}{E} \sum_{e=1}^{E} K\left(\frac{x - x_e}{h}\right)$$

5. Reasonable from kernel.

$$K = e^{(x - x_e)^2 / h} \qquad h = 2\sigma^2$$

← new param.

6 -> N body prob:

$$\frac{1}{E} \sum_{s=1}^{E} \sum_{e=1}^{E} \frac{(x_s - x_e)^2}{2} \quad *$$

body force that draws nodes to each other = grad(*)

use mean to sample

Exp = mean

Max =

7. Need responsible y & x -> introduce z:

$p_x(x_e)$ or not? sum down: yes MC.

$$\sum \quad \sum_{m} p(z_n = 1 / x_e, y_n)$$

z = 0 or 1

↳ term drops out

$p(y_n | x_e) \ln p(y_n | x)$

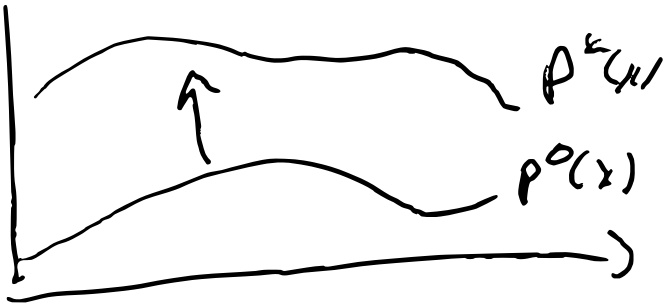
$+ \ln p_k^{(i)}(x_e)$

guess

$x_e \sim p_k^{(i)}$

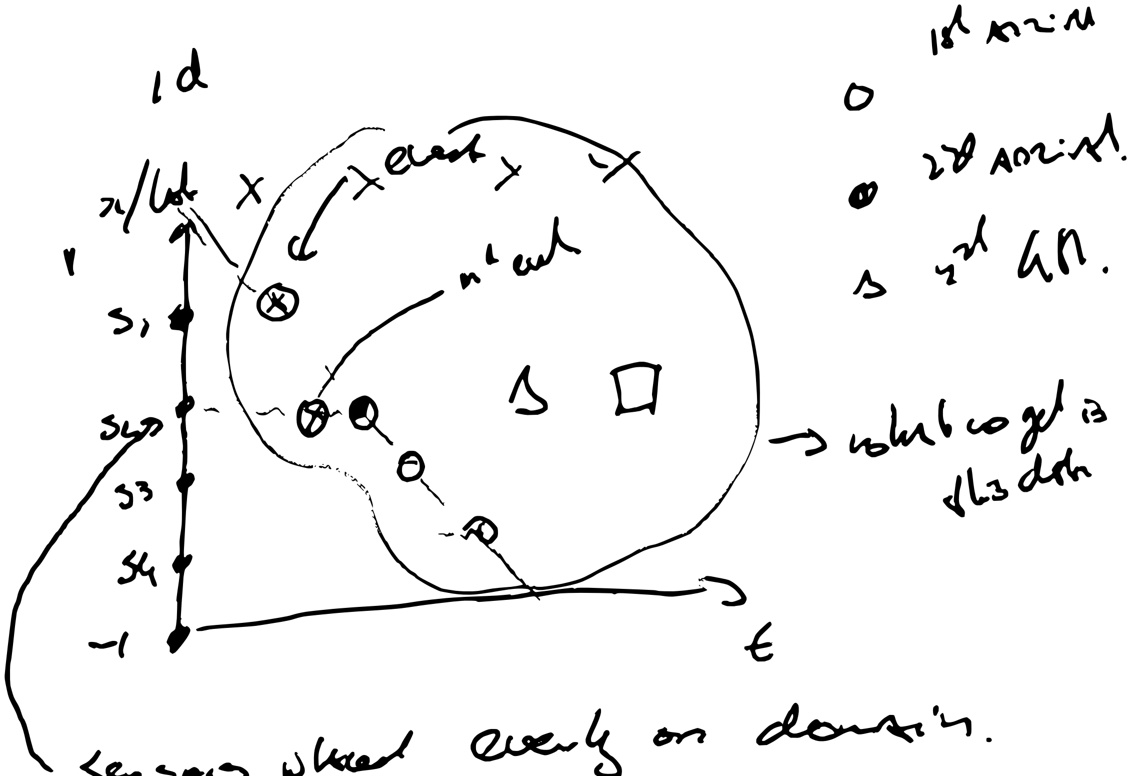
8. Event Localization.

Our procedure: assume there is an optimal $p^k(x)$



Assume we are in <u>convex</u> neighborhood.

Example: Nuclear explosion.



sensors placed evenly on domain.

→ density plot → get velocity.

inputs: time + location of event.

given event: calculate travel time to sensor.

deviations from model:

wave propagation seismic wave —
↳ non-deterministic path.

only path-dependent parameterization of density.

x_c : particles we've hypothesized when
X the card could have happened.

-> calculate travel time ->

compare to width

know time t, know travel time

-> generate arrival time pred

tracked width

-> calc likelihood

$p(y_m | x_c)$ -> big or small.

-> move all particles.

-> assign feature will change.

↳ pred how close they arrival time

use as a weight

same time : weight = 1

bias by association -> cause particles to go
to different colors.

-> prob 1 : no [illegible] in certain place
-> sampling more ?