Kernal Estimation (cont)

- should use an appropriate pointwise variance (ie, variance of gaussian curve representing a particular sample)
  - balance coverage of deadspace vs. redundant coverage of other samples' "turf"

Idea ...? - use system of equations st. each std. is dependent on each other

11/16/2017

Idea - estimate cdf instead, then derive

- order points ~~prob space value~~ order/n ⇒ prob. space value = cdf range
  - sample value ⇒ cdf domain
- perform fit to some function space: st. - $F(x) \in [0,1]\ \forall x$
  - $F'(x) \geq 0\ \forall x$
  - polynomial
  - ~~harmonic series~~
  - ? something w/ fewer degrees of freedom...?
  - polynomial req's: ~~$a_{2i} = 0\ \forall i$?~~ ie, $e^x = 1 + 2x + \ldots$

    $\int \cos x + 2 = \int 3 - \frac{x^2}{\ldots} + \frac{x^4}{\ldots}$
  - ~~Legendre polynomials, shifted on [0,1]~~
    - valid option
    - orthogonality → reduced complexity in curve fitting
  - → do not ensure monotonic est.
- I-splines
  - ensure monotonic-ness
  - smoother result (based on choice of knott-count)

11/20/2017

- Theory - let $X = \{X_1, X_2, \ldots, X_n\}$ be n i.i.d. samples of X,
  - let σ_X be an ordering s.t. $X_{\sigma_X(i)} \leq X_{\sigma_X(i+1)}\ \forall i \in [1, n-1]$,
  - let $p_{\sigma(i)} := p(X < X_{\sigma_X(i)})$

    → the most likely value for $p_{\sigma_X(i)}$ is $\frac{i-1}{n-1}$

    (since $X_{\sigma(i)}$ has exactly $i-1$ samples less than it)

    → specifically, $\mathcal{L}(\theta_i \mid x_i) = \theta_i^{i-1} \cdot (1-\theta_i)^{n-i}$

    → $\hat{\theta}_i = \frac{i-1}{n-1}$

- estimate of cdf should maximize the likelihood of the estimated probability-space value for each sample observed

  → ? use weights on each sample $\propto \frac{d^2}{d\theta^2} \mathcal{L}_i(\hat{\theta}_i)$?