Comments on revision

John Tipton

September 2, 2016

Response to reviewers

- Page 3, bullet 2: familiar to statisticians

- Page 3 bullet 6, end of paragraph: As shown in Hanks

- Page 5, bullet 1, end of paragraph: we can refine our definitions

- Page 10, bullet 2: We have integrated

Manuscript comments

- Line 56: Are we really isolating the autocorrelation or just accounting for it?

- Line 75-76: We first introduce the concept of basis functions then show how basis functions facilitate first-order and second-order model specifications

- Line 88: add transpose $(depth_1, \ldots, depth_n)'$

- Line 106: why not write explicitly $\mathbf{z}_2 = \mathbf{z}_1^2$

- Line 107: which can facilitate interpretation, increase computational efficiency, and improve numerical stability of estimation algorithms.

- Line 127: The reduced correlation can improve performance of the estimation algorithm (recall issues with variance inflation factors in linear regression), demonstrating how choice among equivalent basis expansions can be beneficial.

- Line 148: generates autocorrelation over the space of interest x.

- Line 192: include an effect

- Line 208 could be accounted for by explicitly modeling

- Eq(10): t has not been defined

- Lines 241-253: Sometimes the dependence on ϕ is explicit $(\mathbf{Z}(\phi), \mathbf{R}(\phi))$ and sometimes the dependence is implicit $(\mathbf{Q}, \mathbf{\Lambda})$. I could see this as confusing to a beginner, especially at line 251 where $\mathbf{Z}(\phi) = \mathbf{Q}(\phi)$. This might lead one to ask what the difference is between $\mathbf{Q}$ and $\mathbf{Q}(\phi)$.

- Example one has subheaders second-order and first-order. You can include these at lines 375 and 388 of example two and lines 423 and 450 for consistency. I also think this would aid in use of the paper as a quick reference for examples.

- Lines 437-440: this sentence feels out of place here as it is not related to predictive skill of the model. Maybe move to line 432 or perhaps a better fit is line 456 - because there is no equivalent kernel, we use the predictive process. . .

- Line 455: basis coefficients are correlated in a reduced dimension of geographic space.

- Line 497: have demonstrated, there are many cases where the two approaches. . .

- Line 533: discontinuities seems incorrect. Maybe try "is thought to have local influence, then the basis functions that capture nearby structure and have .."

- Line 586: R packages