Hwk 07 Solutions L12a

Due on Oct 30, 2020

```
## Warning: package 'kableExtra' was built under R version 4.0.3
```

Applications

Question 1

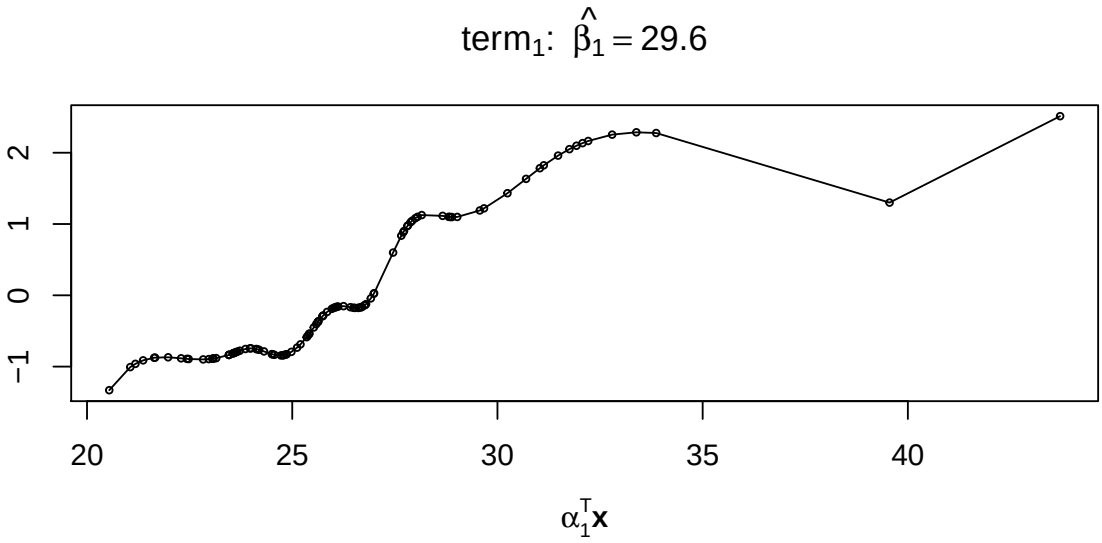

Figure 1: Spline for PPR Term in First-Order Model

(a)(b) See Figures 1 and 2 for splines from first and second-order PPR fits to predict ozone. The training SSEs are 24344 and 17850 respectively.

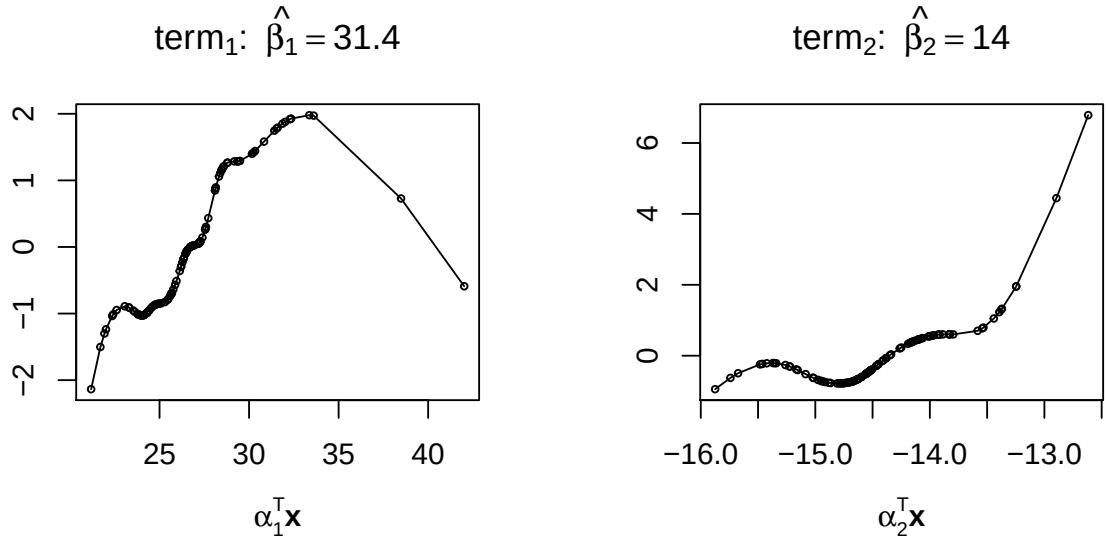

Figure 2: Splines for PPR Terms in Second-Order Model

Question 2

(a) See Table 1 for the matrix of CV MSPEs. The best model always has either 1, 4 or 5 terms, and is usually one of the first two.

(b) (c) See Figures 3 and 4 for boxplots of the MSPEs and RMSPEs of the various PPR models.

(c) Based on the evidence in these boxplots, I would use a PPR model with 1 or 4 terms. The 4-term model is simpler than the roughly equivalent 5 term model. The 1-term model is even simpler, and could qualify as best since it has a slightly lower median. Note, however, that it has a single large outlier, which is a little concerning.

Table 1: CV MSPEs for Tuning PPR

1 terms	2 terms	3 terms	4 terms	5 terms
197	115	111	82	88
260	251	249	239	251
393	457	495	434	434
158	191	160	85	81
235	417	380	385	385
191	282	286	290	290
165	186	293	287	282
550	690	719	713	713
773	500	491	491	491
495	465	411	411	411

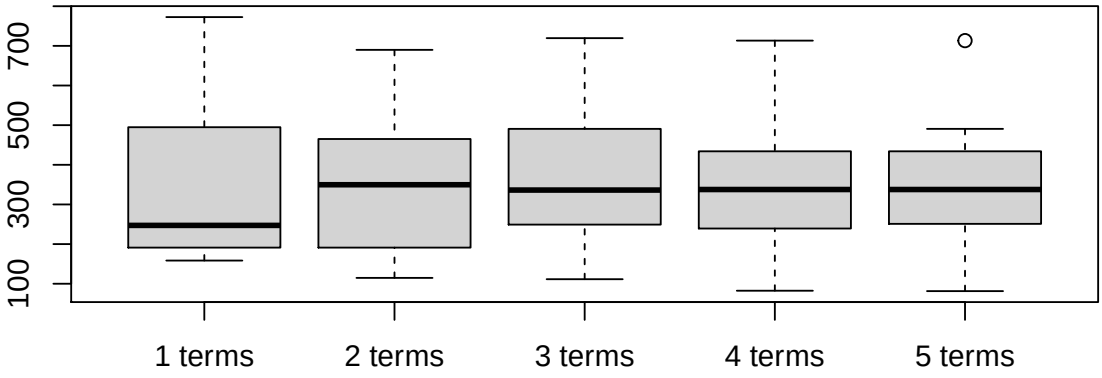

Figure 3: Boxplots of CV MSPEs for Tuning PPR

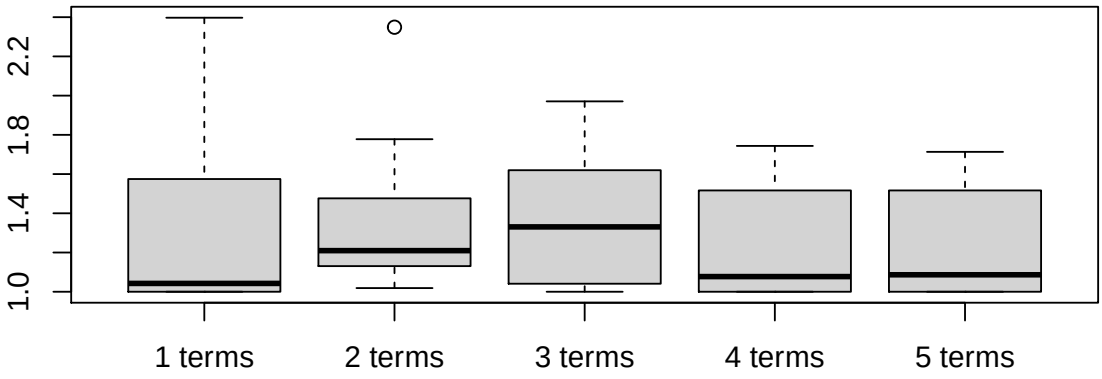

Figure 4: Boxplots of CV RMSPEs for Tuning PPR

Question 3

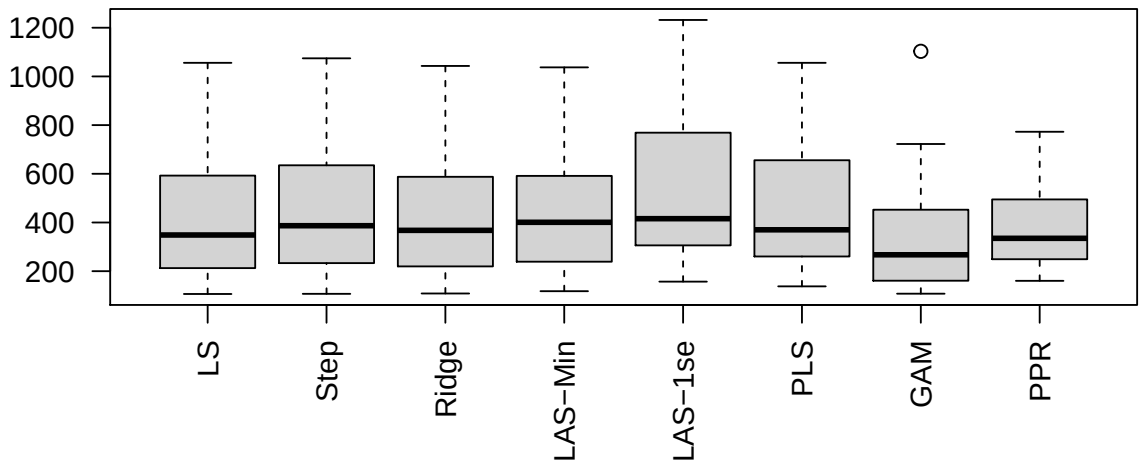

Figure 5: MSPE Boxplots

(a) (b) See Figures 5 and 6 for boxplots of the various models. PPR tends to perform well relative to the best model, but GAM has the smallest average MSPE.

(b) The chosen tuning parameter values for PPR are as follows.

```
##  Fold 1  Fold 2  Fold 3  Fold 4  Fold 5  Fold 6  Fold 7  Fold 8  Fold 9 Fold 10
##       1       3       1       3       3       4       5       1       1       1
```

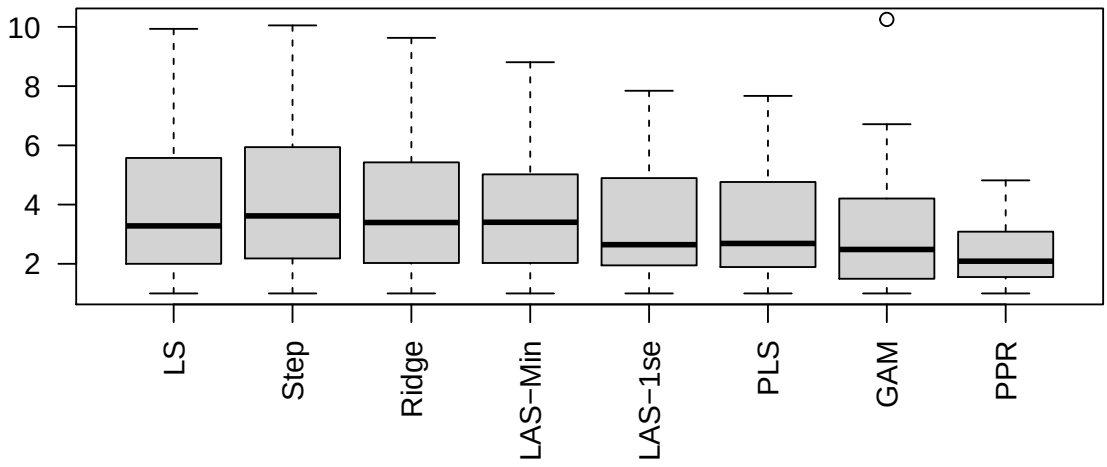

Figure 6: RMSPE Boxplots