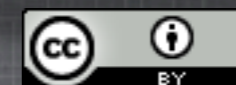


SYNTHETIC WIND GENERATION DATA

Using K-Nearest-Neighbor Approach



Photo by Jesse Millan, Wind Turbines in Condon

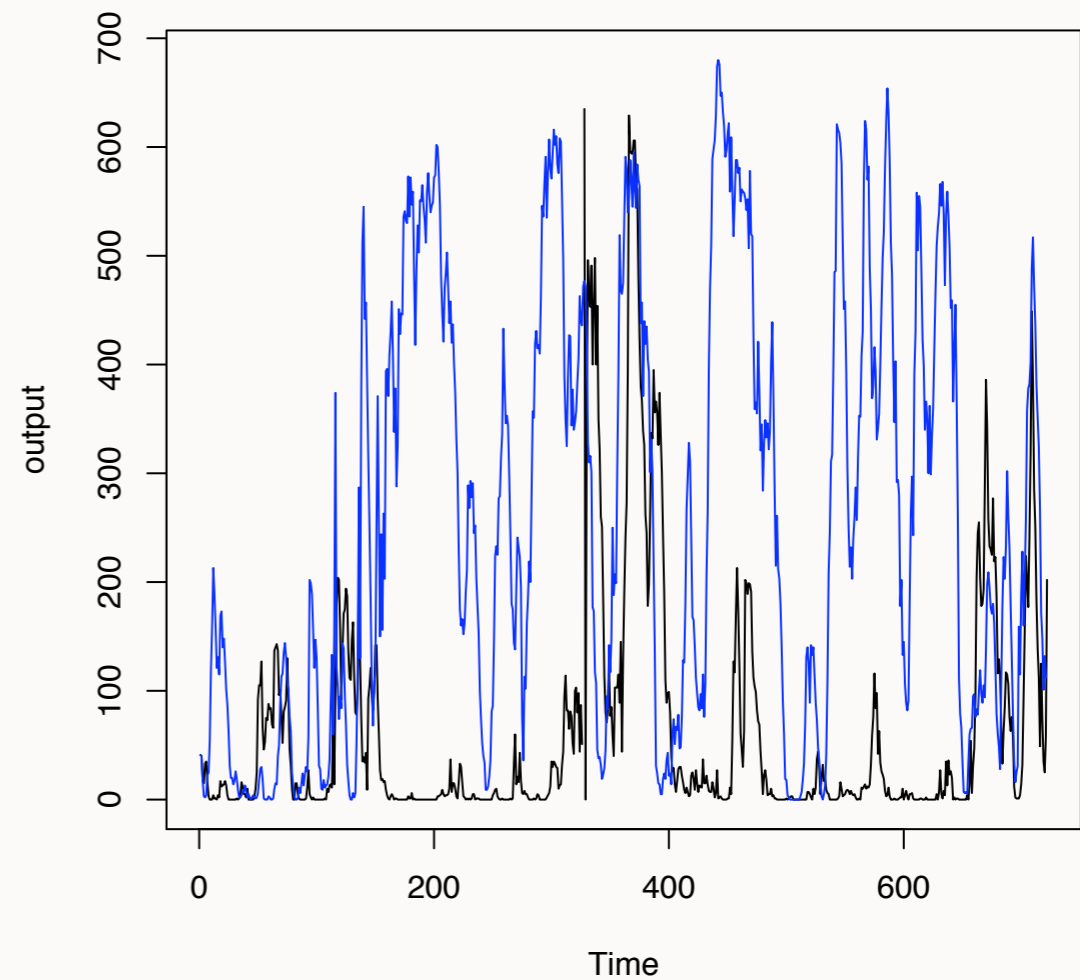


K-NEAREST NEIGHBOR BOOTSTRAP PROOF OF CONCEPT

- As a proof of concept, we created two one month synthetic records.
- We used the observed generation for the BPA wind fleet from the first six months of 2007.
- One record was correlated with temperatures in the load centers one was not.

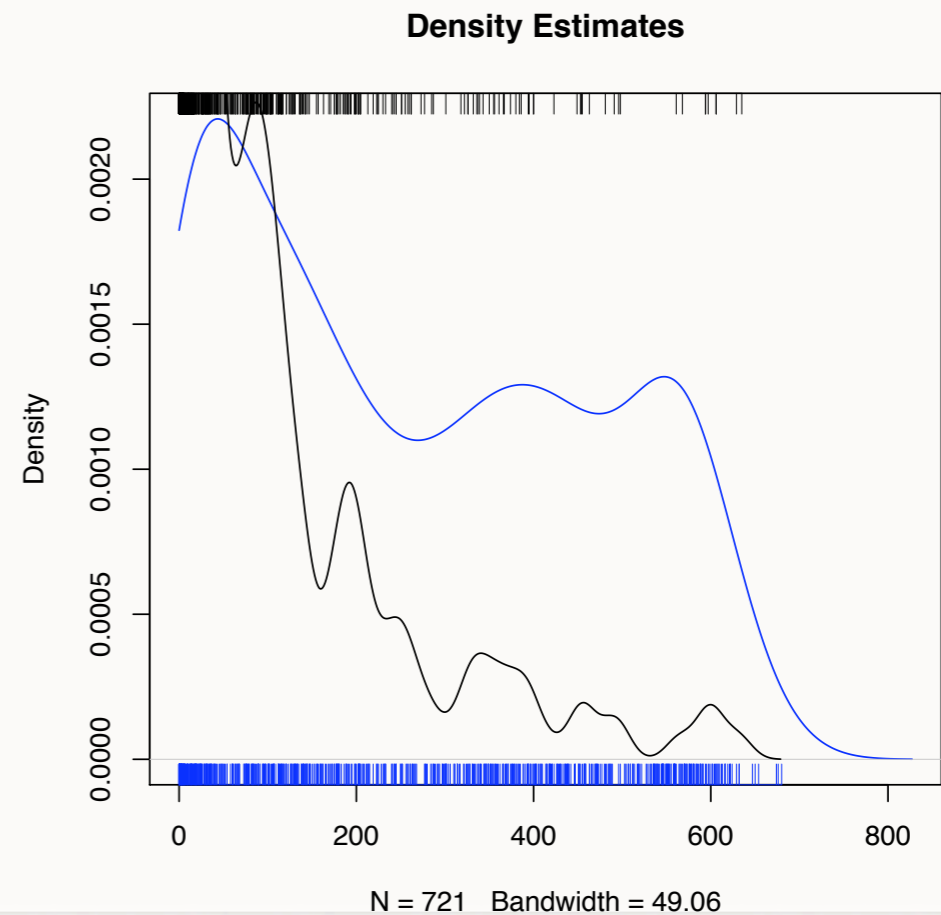
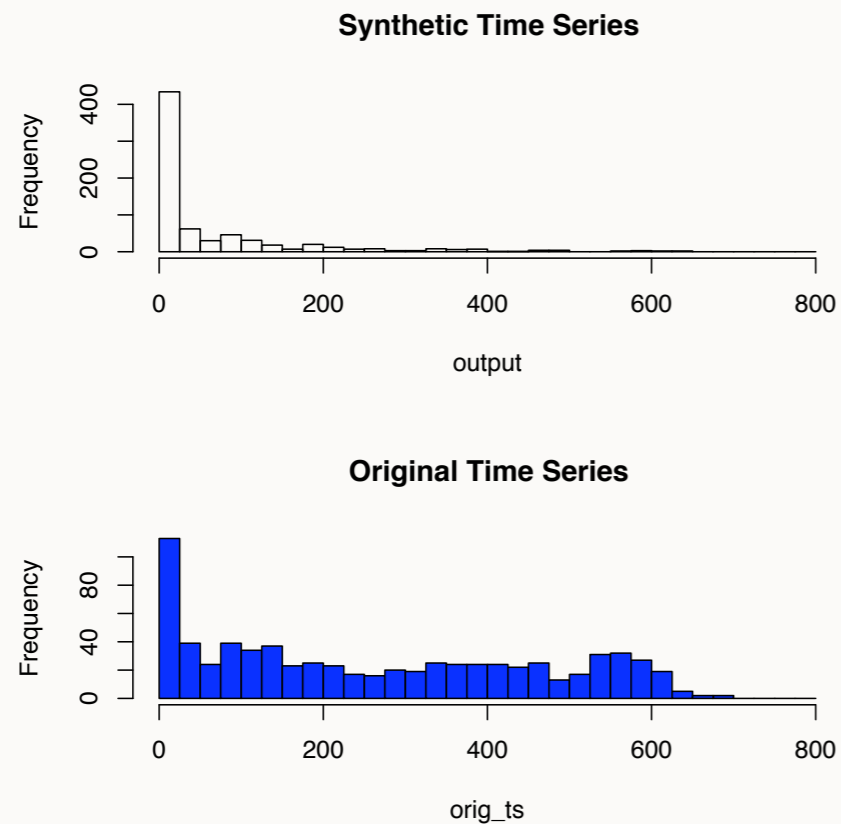
K-NN RECORD WITHOUT LOAD CENTER TEMPERATURES

- Observed Time Series is in blue from 5/29/2007 to 6/28/2007
- Synthetic record is in black, based on K-NN approach using 2 lags



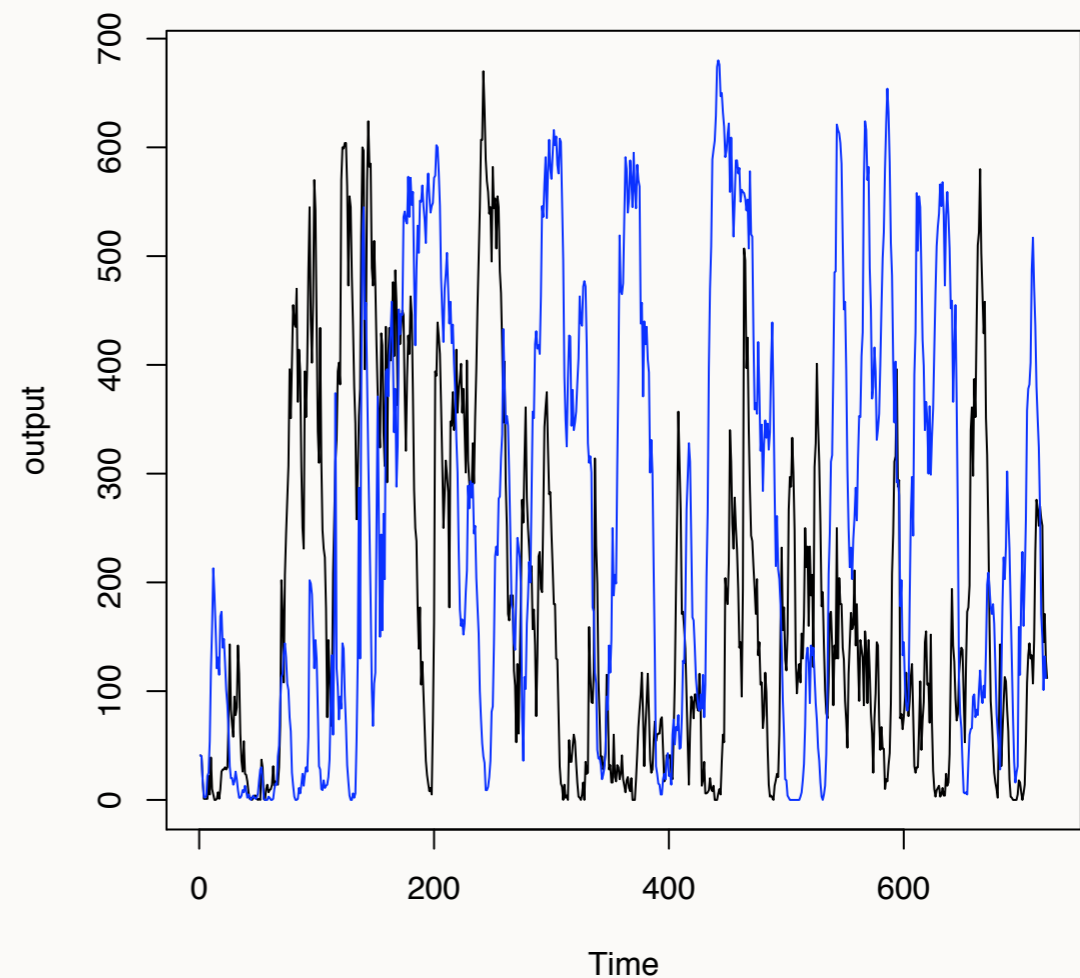
DISTRIBUTIONAL CHARACTERISTICS

- Distributional characteristics can vary with this approach.
- Running the simulation several times shows this manner of estimation gives results that are sometimes over and sometimes under the observed density.



K-NN RECORD WITH LOAD CENTER TEMPERATURES

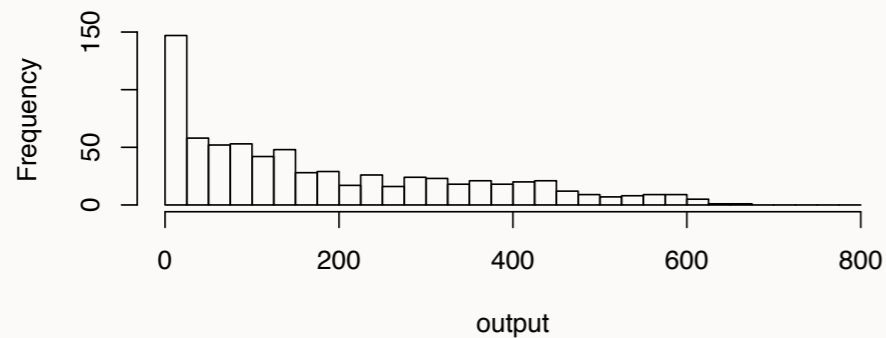
- Observed Time Series is in blue from 5/29/2007 to 6/28/2007
- Synthetic Time Series in Black, based on K-NN approach with correlation to load center temperatures



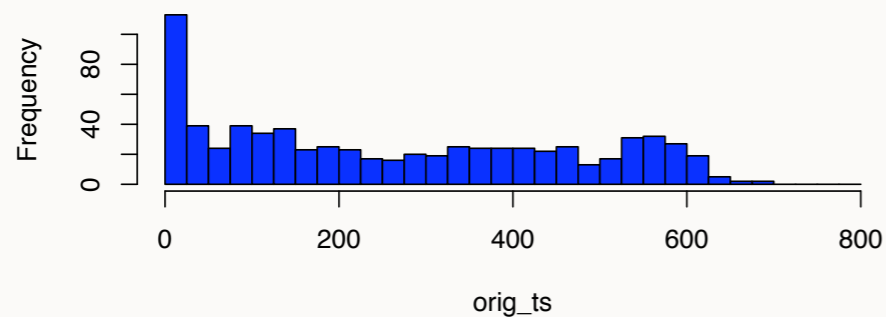
DISTRIBUTIONAL CHARACTERISTICS

- Distributional characteristics are closer with this approach.
- Estimates are still above and below but tend to remain closer to the observed without recreating the observed.

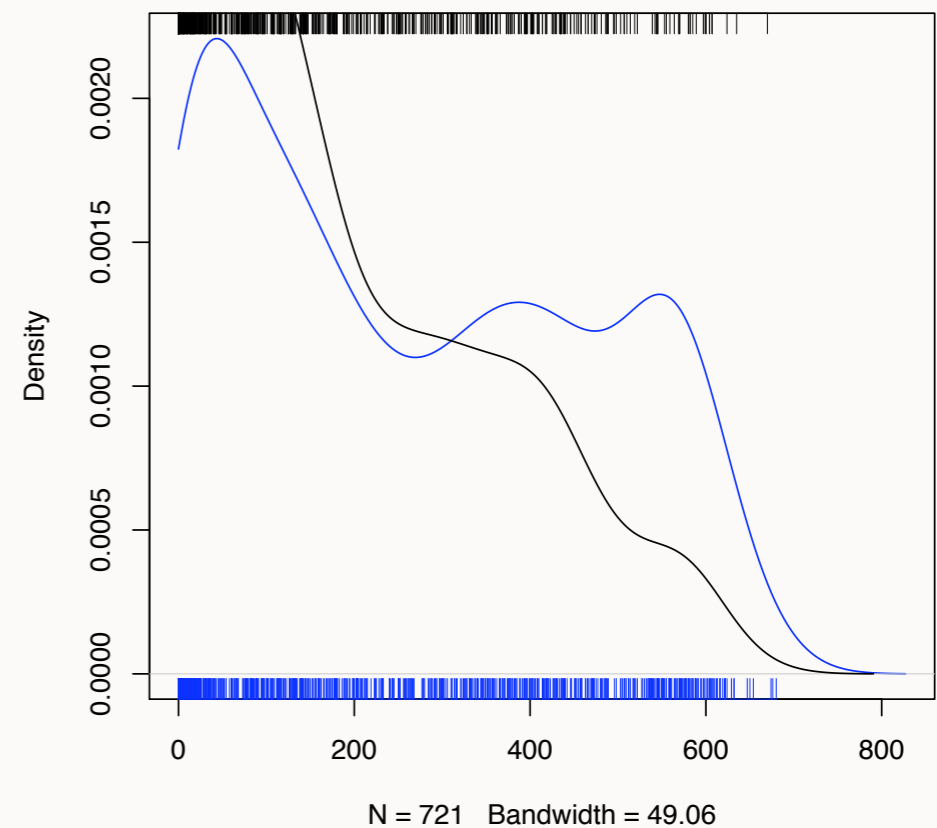
Synthetic Time Series



Original Time Series



Density Estimates



CONCLUSIONS

- This approach looks extremely viable.
 - Distributional characteristics over many runs show the fundamental data structure is preserved.
- The adjustment for temperature shows definite improvement in the distributional characteristics and captures potential correlations with the load center temperatures.

NEXT STEPS

- Genesys testing:
 - Create two records one with temperature correlations and one without.
 - Currently I have the data to do this from 1973 through 2007.
 - Compare to other synthetic records.