Arima Model Performance

Gwen Rino

May 23, 2018

Model Description

This is a univariate time series model that utilizes the `auto.arima()` function to determine that the best fit ARIMA is an ARIMA(1,1,1) model.

```
# Fit model
arima.mod <- auto.arima(ts.selected[ ,"total_cases"])
summary(arima.mod)
```

```
## Series: ts.selected[, "total_cases"]
## ARIMA(1,1,1)
##
## Coefficients:
##          ar1      ma1
##       0.7116  -0.5929
## s.e.  0.0948   0.1078
##
## sigma^2 estimated as 180.9:  log likelihood=-3755.85
## AIC=7517.71   AICc=7517.73   BIC=7532.23
##
## Training set error measures:
##                       ME     RMSE      MAE MPE MAPE      MASE        ACF1
## Training set 0.001467535 13.42959 8.047587 NaN  Inf 0.2202839 0.001092614
```

Model Evaluation

I used the `forecast::tsCV()` function to cross validate this model using the forecast evaluation on a rolling origin method. I forecast at three horizons: 1 week ahead, 6 weeks ahead, and 6 months ahead. As expected, the MAE increases with a longer horizon forecast, from 7.9 for a 1 week horizon to 29.1 for a 6 month horizon.

```
# Function that creates forecast object
far <- function(x, h){forecast(Arima(x, order=c(1,1,1)), h=h)}

# 1 week horizon
e <- tsCV(ts.selected[ ,"total_cases"], far, h=1)
# Calculate MAE
print(paste("1 week horizon MAE = ", mean(abs(e), na.rm = TRUE)))
```

```
## [1] "1 week horizon MAE =  7.88953813950958"
```

```
# 6 week horizon
e1 <- tsCV(ts.selected[ ,"total_cases"], far, h=6)
# Calculate MAE
print(paste("6 week horizon MAE = ", mean(abs(e1), na.rm = TRUE)))
```

```
## [1] "6 week horizon MAE =  13.6528260426409"
```

```r
# 6 month horizon
e2 <- tsCV(ts.selected[ ,"total_cases"], far, h=26)
# Calculate MAE
print(paste("6 month horizon MAE = ", mean(abs(e2), na.rm = TRUE)))
```

```
## [1] "6 month horizon MAE =  29.1315613378187"
```