Mandha_663_EX13

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2022-11-21

```
library(dplyr); library(fable); library(tsibble)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
## Loading required package: fabletools
```

```
##
## Attaching package: 'tsibble'
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, union
```

```
library(feasts); library(ggplot2); library(tidyr)
```

```
library(IDDA)
data(state.long)
```

```
state.ts <- as_tsibble(state.long, key = State)
```

```
## Using `DATE` as index variable.
```

```
state.ts <- as_tsibble(state.long, key = State) %>%
group_by(State) %>%
mutate(Infected = Infected/1000) %>%
mutate(YDA_Infected = lag(Infected, order_by = DATE)) %>%
mutate(YDA_Death = lag(Death, order_by = DATE)) %>%
mutate(Y.Infected = Infected - YDA_Infected) %>%
mutate(Y.Death = Death - YDA_Death) %>%
mutate(cum_infected = cumsum(Infected))%>%
mutate(cum_death = cumsum(Death)) %>%
dplyr::filter(!is.na(Y.Infected)) %>%
dplyr::filter(!is.na(Y.Death)) %>%
dplyr::select(-c(YDA_Infected, YDA_Death))%>%
filter(State=="Virginia")
```

```
## Using `DATE` as index variable.
```

```
Virginia.ts <- state.ts %>%
dplyr::filter(State == "Virginia") %>%
dplyr::select(Infected, Death, cum_infected, cum_death, Y.Death, Y.Infected)
```

```
## Adding missing grouping variables: `State`
```

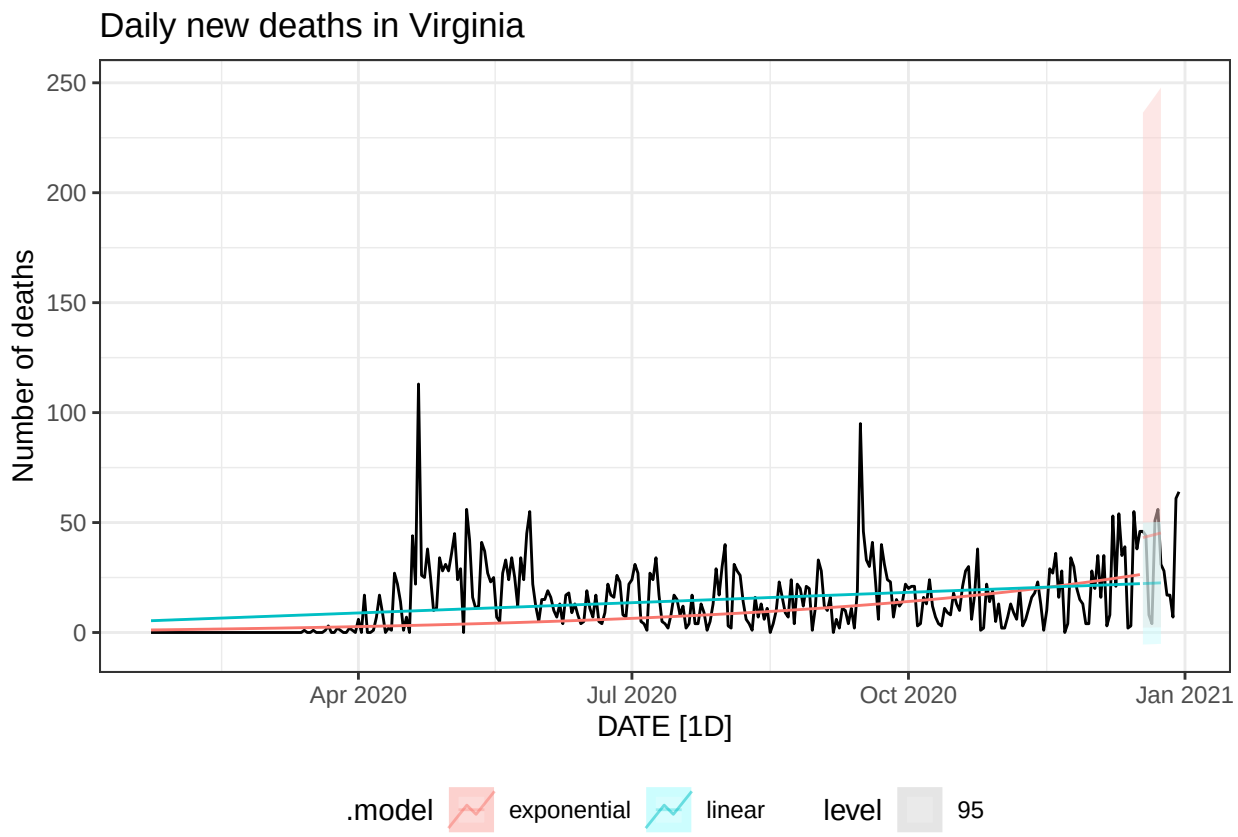
```
ets_fit <-Virginia.ts %>%
model(ETS(Y.Death ~ error("A") + trend("N") + season("N"), opt_crit =
"mse"))
```

```
train <- Virginia.ts %>%
  filter_index("2020-01-23" ~ "2020-12-17")
n <- nrow(train)
```

```
le_trends <- train %>%
  model(
    linear = TSLM(Y.Death ~ trend()),
    exponential = TSLM(log(Y.Death + 1) ~ trend()),
  )
fc_trends <- le_trends %>% forecast(h = 7)

##Making Predictions

Virginia.ts %>%
  dplyr::filter(DATE < train$DATE[n] + 14 ) %>%
  autoplot(Y.Death) +
  geom_line(data = fitted(le_trends),
            aes(y = .fitted, color = .model)) +
  autolayer(fc_trends, alpha = 0.5, level = 95) +
  labs(y = "Number of deaths", title = "Daily new deaths in Virginia") +
  theme_bw() +
theme(legend.position = "bottom")
```




```
lm_fit <- train %>%
  model(lm = TSLM(Y.Death ~ log( Death + 1)))
report(lm_fit)
```

```
## Series: Y.Death
## Model: TSLM
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -18.9774  -8.4556  -0.5574   5.0881  99.6260
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)      0.4229     1.6135   0.262    0.793
## log(Death + 1)   2.2416     0.2415   9.282   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 13.25 on 328 degrees of freedom
## Multiple R-squared: 0.208,   Adjusted R-squared: 0.2056
## F-statistic: 86.15 on 1 and 328 DF, p-value: < 2.22e-16
```