

ADS 506 - Time Series

Fall 2023 - Week 3 OH

Dave Hurst

Agenda

- Assignment 2.1 Review
 - Re-using code (**fpp3** framework)
 - Caching computations
 - Reminders
- Assignment 3.1 Hints
- Quiz and Assignment prep → Erin

Assignment 2.1 - Re-using code

```
1 # Use the full data set to fit the best model
2 fortified_fit_full <- fortified |>
3   model(
4     etsMAM = ETS(Fortified ~ error("M") + trend("A") + season("M"))
5   )
6
7 # forecast the next two months
8 fortified_fc_full <- fortified_fit_full |>
9   forecast(h = 2)
10
11 # print the last two months of the forecast (this is the answer to the ques
12 fortified_fc_full |>
13   as_tibble() |>
14   select(.model, Month, Forecast = .mean)
```

A tibble: 2 × 3

	.model	Month	Forecast
	<chr>	<mth>	<dbl>
1	etsMAM	1995 Jan	1267.
2	etsMAM	1995 Feb	1534.

Assignment 2.1 - 5.8 → 6.6

```
1 # Use the full data set to fit the best model
2 fortified_fit_full <- fortified |>
3   model(
4     tslm = TSLM(Fortified ~ trend() + season()) ## 6.6 change
5   )
6
7 # forecast the next two months
8 fortified_fc_full <- fortified_fit_full |>
9   forecast(h = 2)
10
11 # print the last two months of the forecast (this is the answer to the ques
12 fortified_fc_full |>
13   as_tibble() |>
14   select(.model, Month, Forecast = .mean)
```

A tibble: 2 × 3

	.model	Month	Forecast
	<chr>	<mth>	<dbl>
1	tslm	1995 Jan	837.
2	tslm	1995 Feb	1192.

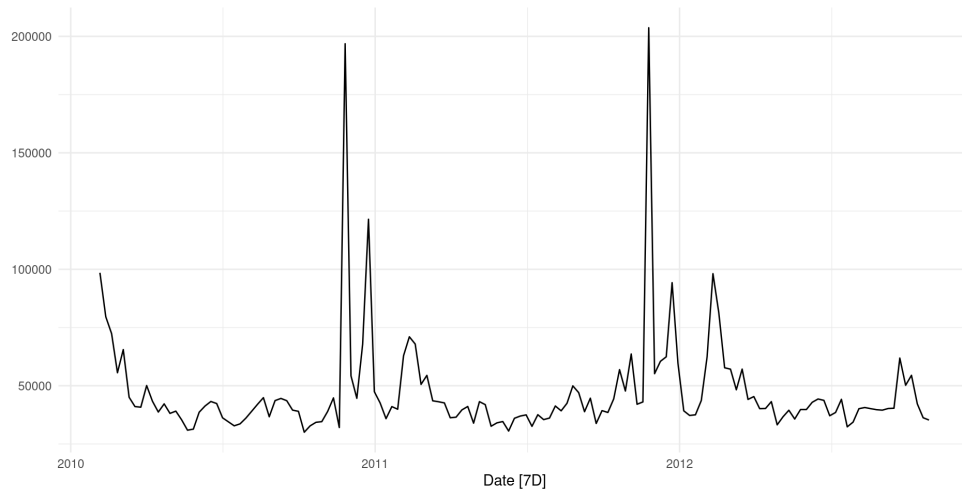
Assignment 2.1 - Caching Computations

```
1 # create training/validation sets for the model (include at least one year
2 trn_period <- (max(fortified$Month) |> as.Date() - years(1))
3 fortified_trn <- fortified |>
4   filter(Month <= yearmonth(trn_period))
5   #filter_index(. ~ '1993 Dec') #alternative method
6
7 # fit an ETS model to the training set (try different models to find the be
8 fortified_fit <- fortified_trn |>
9   model(
10     hw = ETS(Fortified ~ error("A") + trend("A") + season("M")),
11     etsMAN = ETS(Fortified ~ error("M") + trend("A") + season("N") ),
12     etsMAdM = ETS(Fortified ~ error("M") + trend("Ad") + season("M") ),
13     etsAAA = ETS(Fortified ~ error("A") + trend("A") + season("A")),
14     ets_auto = ETS(Fortified)
15   )
16
17 # forecast the validation period
18 tictoc::tic()
```

0.004 sec elapsed

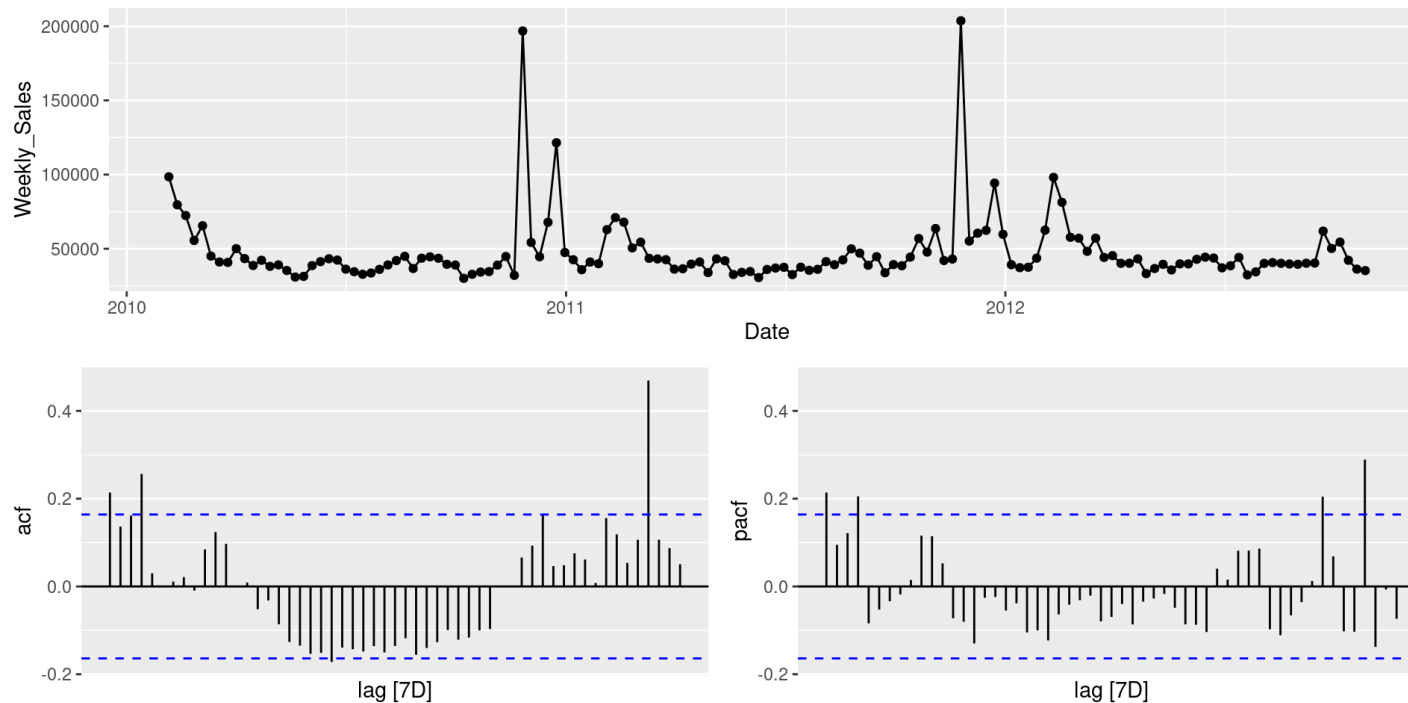
Assignment 3.1 Hints – ARIMA model selection

```
1 ws1d72 <- read_csv("WalmartStore1Dept72.csv", show_col_types = FALSE) |>
2   mutate(Date = mdy(Date)) |>
3   as_tsibble(index = Date)
4 ws1d72 |>
5   autoplot(Weekly_Sales) +
6   labs("Weekly Sales in Department #27 of Walmart Store 1",
7        y = "") +
8   theme_minimal()
```



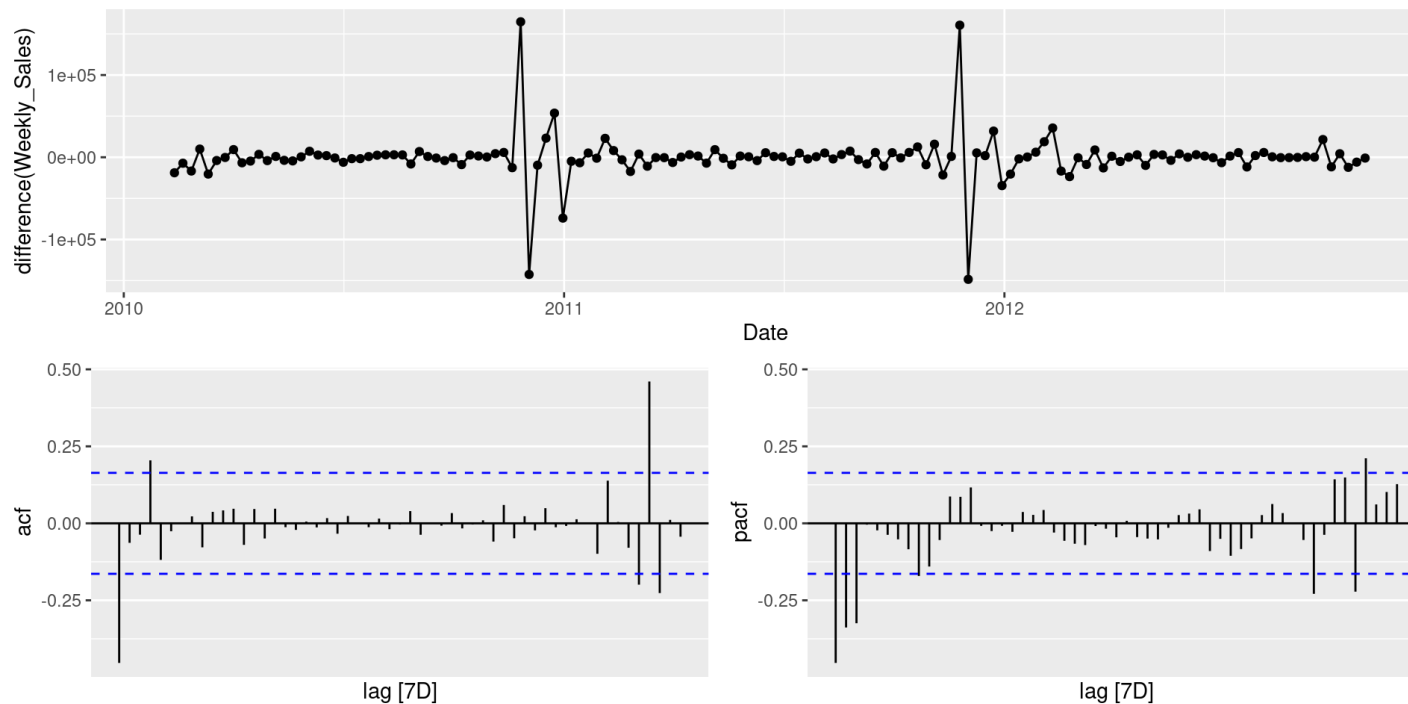
Assignment 3.1 Hints – ARIMA model selection

```
1 ws1d72 |>  
2   gg_tsdisplay(  
3     Weekly_Sales ,  
4     plot_type = "partial", lag_max = 55)
```



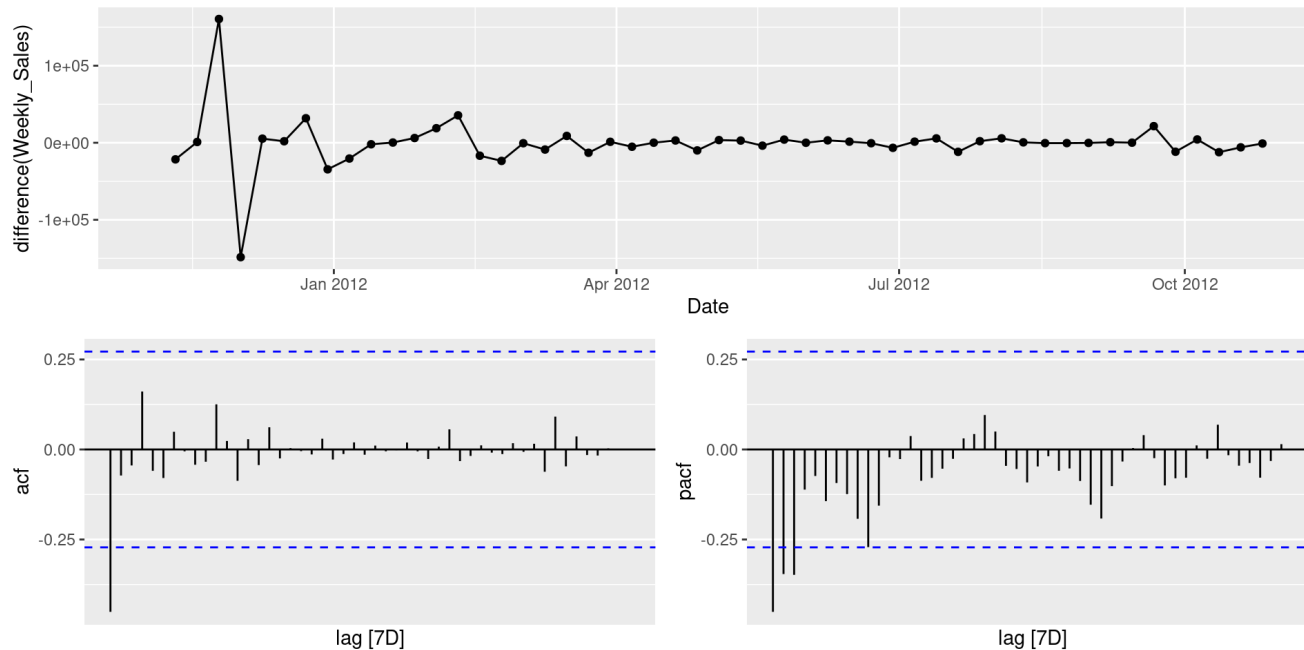
Assignment 3.1 Hints – ARIMA model selection

```
1 ws1d72 |>  
2   gg_tsdisplay(  
3     Weekly_Sales |> difference() ,  
4     plot_type = "partial", lag_max = 55)
```



Assignment 3.1 Hints – ARIMA model selection

```
1 ws1d72_trn <- ws1d72 |> filter_index("2011-11-04" ~ "2012-10-26")
2 ws1d72_trn |>
3   gg_tsdisplay(
4     Weekly_Sales |> difference() ,
5     plot_type = "partial", lag_max = 55)
```



Assignment 3.1 Hints – ARIMA model selection

```
1 ws1d72_trn_fit |>  
2   accuracy() |>  
3   knitr::kable()
```

.model	.type	ME	RMSE	MAE
x2_ar3	Training	966.3242	22305.41	12031.39
x2_ma1	Training	-139.9168	22123.01	10982.40
auto_arima	Training	-3508.9224	24622.78	13658.26
auto_arima_x2	Training	0.0000	22511.44	11804.93

Assignment 3.1 Hints – ARIMA model selection

```
1 ws1d72_trn_fit["auto_arima"] |> report()
```

Series: Weekly_Sales

Model: ARIMA(0,1,1)

Coefficients:

ma1

-0.8615

s.e. 0.0667

sigma^2 estimated as 630532632: log likelihood=-589.22

AIC=1182.44 AICc=1182.69 BIC=1186.31

