ADS 506 — Week 5 Submission: Storytelling with Shiny

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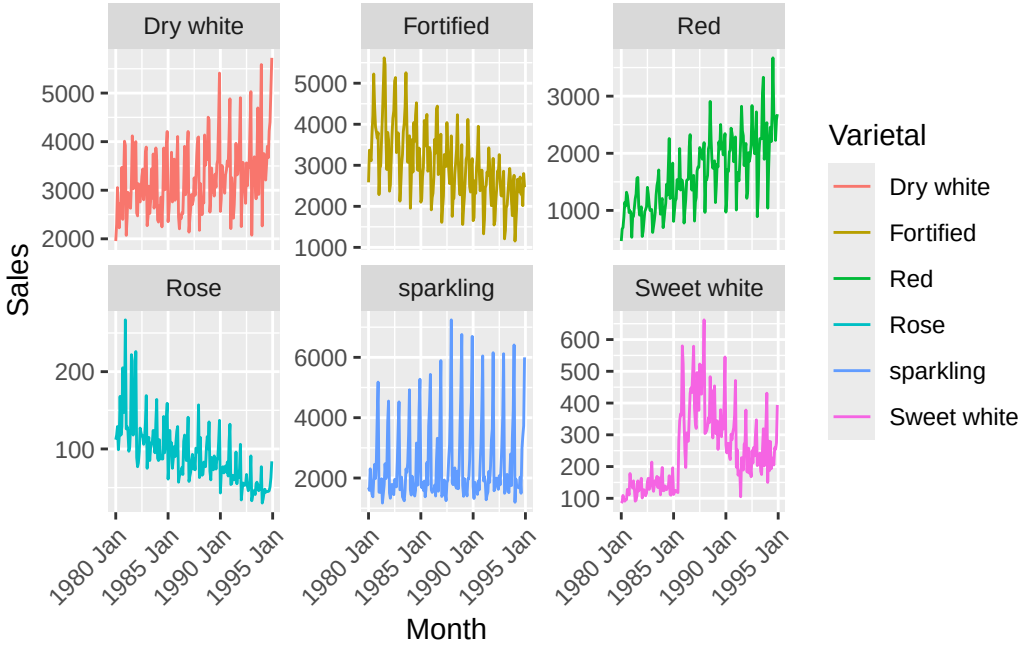
Data import / preparation

```
# A tsibble: 1,080 x 3 [1M]
# Key:       Varietal [6]
      Month Varietal  Sales
      <mth> <chr>     <dbl>
 1 1980 Jan Dry white  1954
 2 1980 Feb Dry white  2302
 3 1980 Mar Dry white  3054
 4 1980 Apr Dry white  2414
 5 1980 May Dry white  2226
 6 1980 Jun Dry white  2725
 7 1980 Jul Dry white  2589
 8 1980 Aug Dry white  3470
 9 1980 Sep Dry white  2400
10 1980 Oct Dry white  3180
# i 1,070 more rows
```

Data visualization



Data Splitting

Model fitting

Built multiple models for each varietal using auto ETS and auto ARIMA.

```
                                  [,1]
Varietal                          "Dry white"
TSLM(Sales ~ trend() + season()) TSLM
ETS                               ETS(M,N,M)
ARIMA                             ARIMA(0,0,0)(0,1,1)[12] w/ drift
                                  [,2]
Varietal                          "Fortified"
TSLM(Sales ~ trend() + season()) TSLM
ETS                               ETS(M,A,M)
ARIMA                             ARIMA(0,0,0)(2,1,1)[12] w/ drift
                                  [,3]
Varietal                          "Red"
TSLM(Sales ~ trend() + season()) TSLM
ETS                               ETS(M,A,M)
ARIMA                             ARIMA(1,0,1)(0,1,1)[12] w/ drift
                                  [,4]
Varietal                          "Rose"
```

Varietal	.model	RMSE	MAE	MAPE
Dry white	ARIMA	326.12	230.17	7.33
Fortified	ARIMA	283.03	209.55	6.84
Red	ARIMA	194.55	139.48	8.95
Rose	ARIMA	19.39	13.07	13.98
Sweet white	ARIMA	50.59	35.58	13.85
sparkling	ARIMA	355.07	247.00	11.06
Dry white	ETS	318.36	243.41	7.64
Fortified	ETS	285.23	222.32	7.10
Red	ETS	177.65	132.50	8.33
Rose	ETS	17.13	12.04	12.25
Sweet white	ETS	44.57	31.26	12.97
sparkling	ETS	349.91	254.85	11.01
Dry white	TSLM(Sales ~ trend() + season())	315.52	243.12	7.74
Fortified	TSLM(Sales ~ trend() + season())	286.21	222.37	7.21
Red	TSLM(Sales ~ trend() + season())	197.68	152.57	10.94
Rose	TSLM(Sales ~ trend() + season())	18.46	13.11	13.95
Sweet white	TSLM(Sales ~ trend() + season())	100.88	81.03	35.50
sparkling	TSLM(Sales ~ trend() + season())	367.66	267.89	11.38

```
TSLM(Sales ~ trend() + season()) TSLM
ETS                              ETS(M,A,M)
ARIMA                            ARIMA(3,0,0)(2,1,0)[12] w/ drift
                                 [,5]
Varietal                         "Sweet white"
TSLM(Sales ~ trend() + season()) TSLM
ETS                              ETS(M,A,M)
ARIMA                            ARIMA(2,0,0)(0,1,1)[12]
                                 [,6]
Varietal                         "sparkling"
TSLM(Sales ~ trend() + season()) TSLM
ETS                              ETS(M,N,M)
ARIMA                            ARIMA(0,0,1)(0,1,2)[12] w/ drift
```

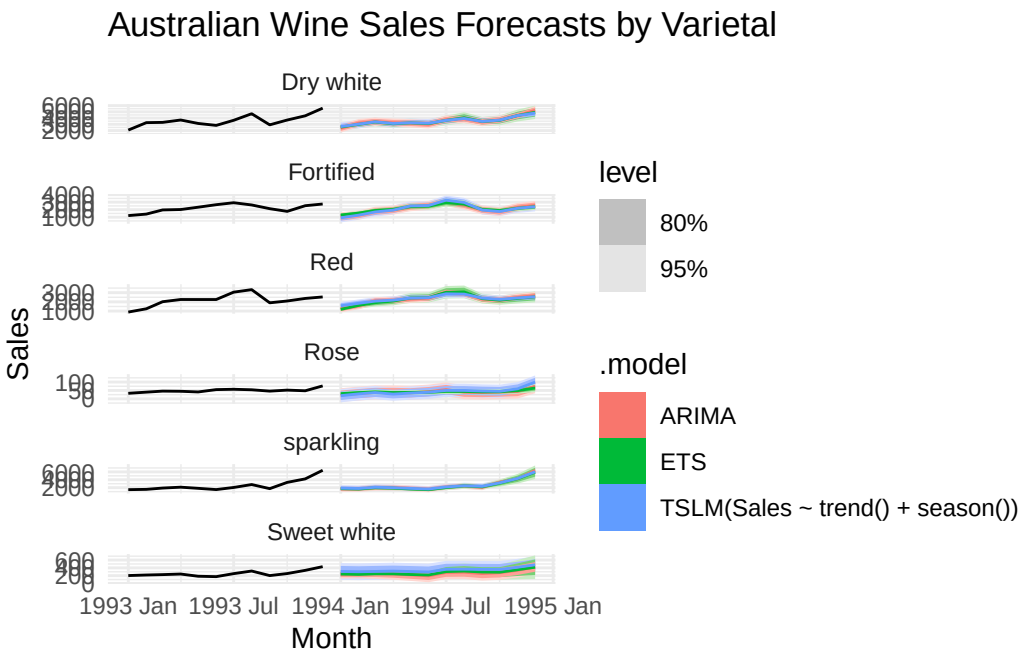
The fitted models successfully report the required specifications: each varietal includes an ETS component form (e.g., ETS(M,A,M)) and a clearly identified ARIMA structure with full seasonal orders (e.g., ARIMA(0,0,0)(0,1,1)[12] w/ drift), which meets the MVP requirement for model specification.

Varietal	.model	RMSE	MAE	MAPE
Dry white	ARIMA	484.39	420.06	10.26
Fortified	ARIMA	328.50	266.46	11.65
Red	ARIMA	257.86	202.54	8.63
Rose	ARIMA	9.21	8.12	16.80
Sweet white	ARIMA	51.27	45.49	21.12
sparkling	ARIMA	461.46	363.62	18.19
Dry white	ETS	562.69	510.79	12.71
Fortified	ETS	318.90	242.65	10.24
Red	ETS	297.16	255.37	10.43
Rose	ETS	8.38	6.10	11.07
Sweet white	ETS	61.11	53.32	24.69
sparkling	ETS	444.48	338.62	17.58
Dry white	TSLM(Sales ~ trend() + season())	556.28	497.74	12.37
Fortified	TSLM(Sales ~ trend() + season())	426.53	362.69	16.25
Red	TSLM(Sales ~ trend() + season())	319.28	249.00	11.79
Rose	TSLM(Sales ~ trend() + season())	9.19	7.59	16.42
Sweet white	TSLM(Sales ~ trend() + season())	112.76	104.20	47.74
sparkling	TSLM(Sales ~ trend() + season())	459.05	353.39	19.10

Training accuracy

Forecasting accuracy

Forecast visualization



Report generation