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FORECASTING

PRINCIPLES AND PRACTICE

A comprehensive introduction to the latest forecasting methods using R. Learn to improve your forecast accuracy using dozens of real data examples.



3RD EDITION

 **OTexts**
Open Texts Publishing

2. Time series graphics

2.6 Scatterplots

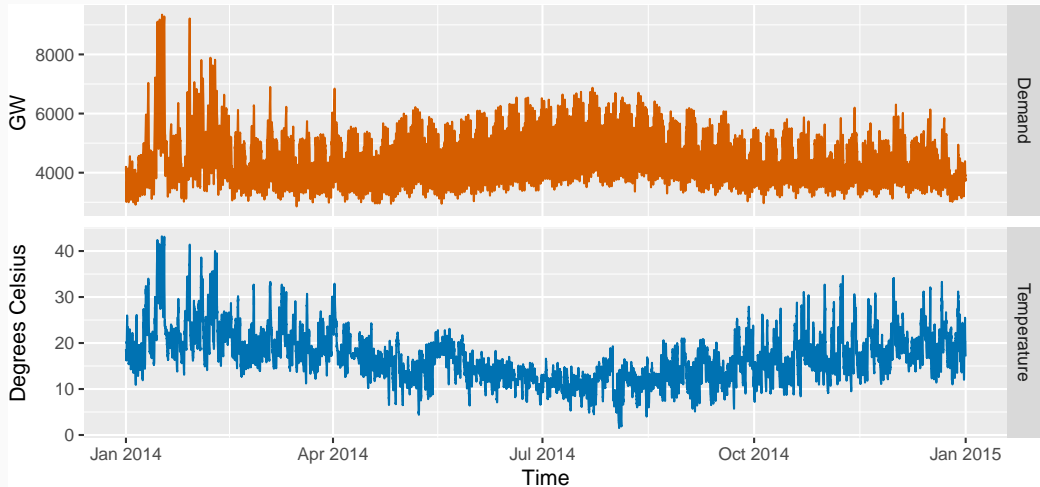
OTexts.org/fpp3/

Electricity Demand in Victoria, Australia

```
vic_elec_day_type <- vic_elec |>
  filter(year(Time) == 2014) |>
  mutate(Day_Type = case_when(
    Holiday ~ "Holiday",
    wday(Date) %in% 2:6 ~ "Weekday",
    TRUE ~ "Weekend"))
vic_elec_day_type
```

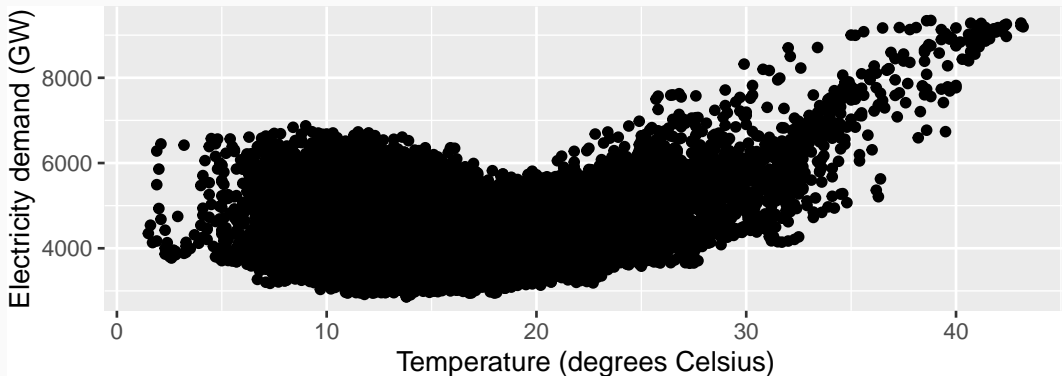
```
## # A tsibble: 17,520 x 6 [30m] <Australia/Melbourne>
##   Time                Demand Temperature Date      Holiday Day_Type
##   <dtm>                <dbl>         <dbl> <date>    <lgl>    <chr>
## 1 2014-01-01 00:00:00  4092.          18.7 2014-01-01 TRUE    Holiday
## 2 2014-01-01 00:30:00  4198.          18.1 2014-01-01 TRUE    Holiday
## 3 2014-01-01 01:00:00  3915.          18.2 2014-01-01 TRUE    Holiday
## 4 2014-01-01 01:30:00  3673.          17.9 2014-01-01 TRUE    Holiday
## 5 2014-01-01 02:00:00  3498.          17.6 2014-01-01 TRUE    Holiday
## 6 2014-01-01 02:30:00  3339.          16.8 2014-01-01 TRUE    Holiday
## 7 2014-01-01 03:00:00  3204.          16.3 2014-01-01 TRUE    Holiday
## 8 2014-01-01 03:30:00  3100.          16.6 2014-01-01 TRUE    Holiday
```

Time plots



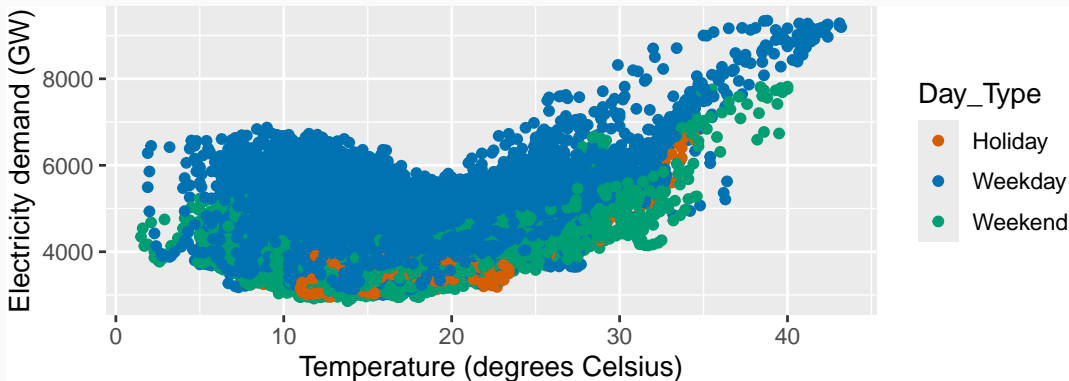
Scatterplots

```
vic_elec_day_type |>  
  ggplot(aes(x = Temperature, y = Demand)) +  
  geom_point() +  
  labs(x = "Temperature (degrees Celsius)", y = "Electricity demand (GW)")
```



Scatterplots

```
vic_elec_day_type |>
  ggplot(aes(x = Temperature, y = Demand, colour = Day_Type)) +
  geom_point() +
  labs(x = "Temperature (degrees Celsius)", y = "Electricity demand (GW)")
```



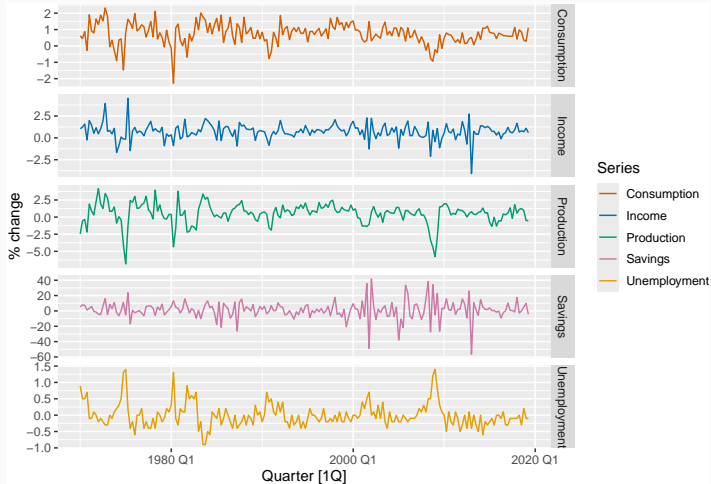
Correlation coefficient

Measures the extent of a linear relationship between two variables (y and x).

$$\blacksquare r = \frac{\sum_{t=1}^T (y_t - \bar{y})(x_t - \bar{x})}{\sqrt{\sum_{t=1}^T (y_t - \bar{y})^2} \sqrt{\sum_{t=1}^T (x_t - \bar{x})^2}}$$

■ Lies between -1 and 1

US consumption expenditure



US consumption expenditure

```
us_change |> GGally::ggpairs(columns = 2:6)
```

