MANIPULATING TIME SERIES DATA IN R: CASE STUDIES

Advanced Features of xts

Finding Endpoints

- endpoints() indexes last observation per interval

```
> years <- endpoints(unemployment, on = "years")

> unemployment[years]

                    us       ma
Dec 1976  7.650000 8.200000
Dec 1977  6.400000 6.200000
Dec 1978  6.000000 5.700000
Dec 1979  6.000000 4.900000
Dec 1980  7.200000 5.100000
```

Apply by Period

- period.apply() extends apply functions to time

```
> period.apply(unemployment,
               INDEX = years,
               FUN = mean)

                     us       ma
Dec 1976 7.654167 9.633333
Dec 1977 7.016667 7.804167
Dec 1978 6.066667 6.220833
Dec 1979 5.945833 5.516667
Dec 1980 7.200000 5.629167
```

Sports Data

- Boston sports games, 2010 through 2015

Source: https://commons.wikimedia.org/

Let’s practice!

Indexing Commands in xts

Extracting the Index

- .index() extracts raw time index

```
> .index(unemployment)

 [1] 189302400 191980800 194486400 197164800
 [5] 199756800 202435200 205027200 207705600
 [9] 210384000 212976000 215654400 218246400
[13] 220924800 223603200 226022400 228700800
[17] 231292800 233971200 236563200 239241600
```

Weekday Observations

- .indexwday() gives the weekday of each observation

```
> .indexwday(sports)

 [1] 0 2 3 5 6 0 1 3 4 5 6 0 1 2 3 4 5 6 0 1 2 3 5 6
[25] 0 1 2 3 4 5 6 0 1 2 3 5 6 0 1 2 3 4 5 6 0 1 2 3
[49] 4 5 6 0 2 3 4 5 6 0 1 2 3 4 5 6 ...
```

- Select only Sunday games

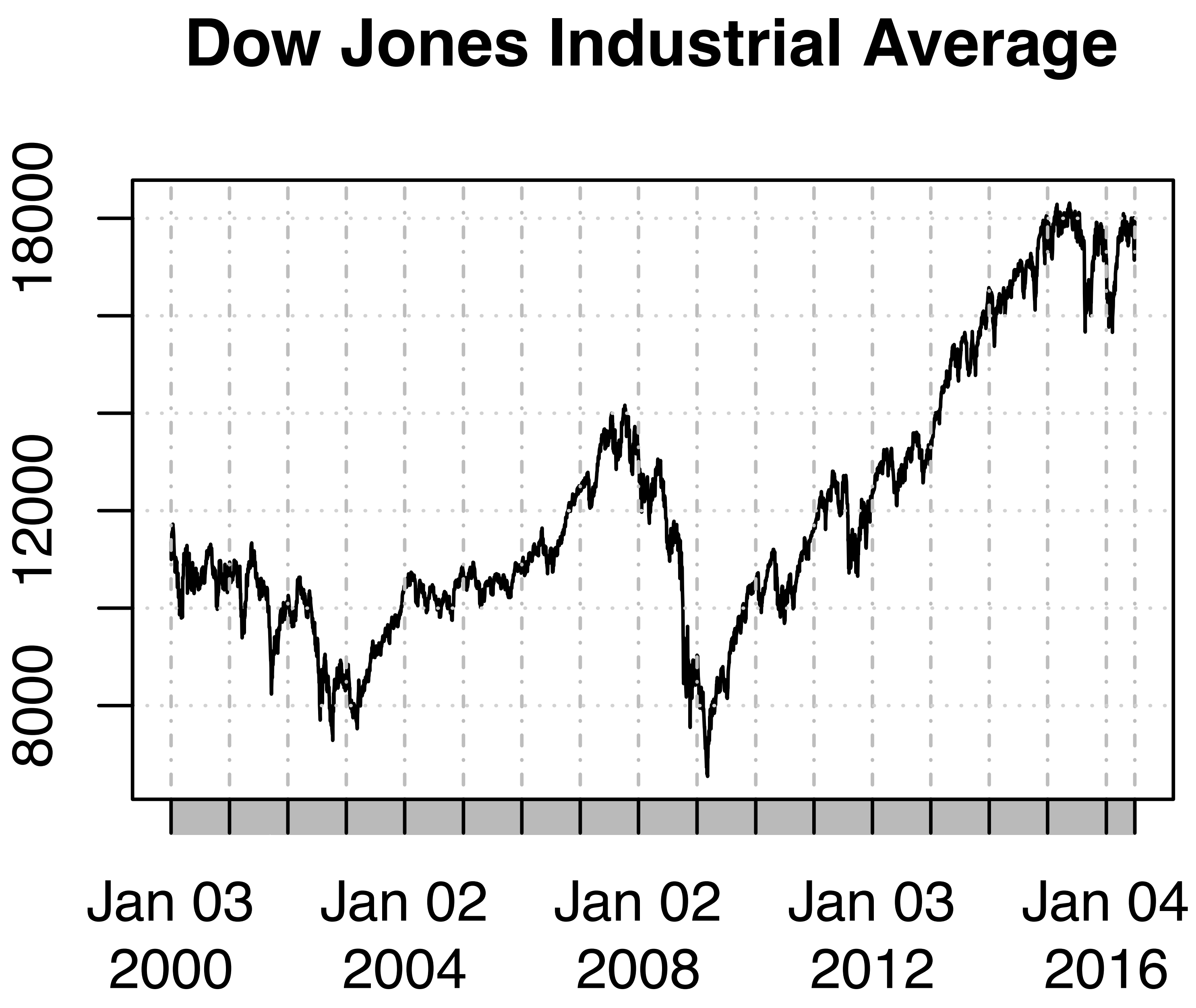
```
> sunday_games <- which(.indexwday(sports) == 0)
```

Let's practice!

Congratulations!

Time Series Data

- Weather patterns
- Sports scores
- Portfolio returns
- Commodity prices
- User data



Source: https://finance.yahoo.com

Thank you!