Forecasting Framework

Setting up the approach

Forecasting framework

Define:

- What do I want to forecast?
- When do I want the forecast?
- What data do I have available?

What to forecast

To start, we need to decide **what** we want to forecast.

For example:

- Sales per country/product vs total sales?
- Energy demand per household vs per city?
- Daily temperature or hourly temperature?

What to forecast

	Sales			
Time	**UK**	**Spain**	**Australia**	**Belgium**
30/03/20	200	100	330	120
31/03/20	220	120	300	135
01/04/20	230	150	335	133
02/04/20	235	175	340	200

	Sales
Time	**Total**
30/03/20	450
31/03/20	775
01/04/20	848
02/04/20	950

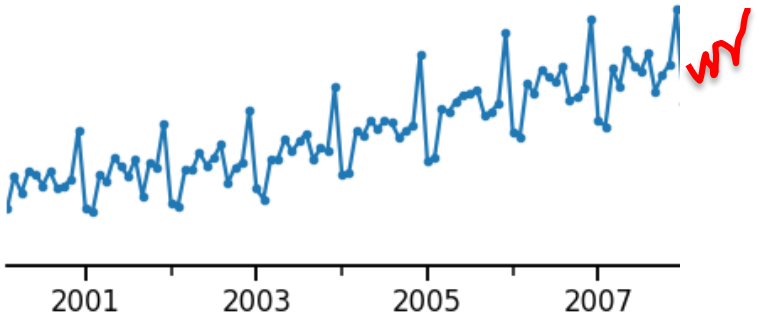
We may need to group / aggregate our time series.

The forecasting horizon

How far in advance we want our predictions / forecast to be?

Forecast point:

- Forecast weekly sales for next week?
- Daily energy demand for tomorrow?
- Hourly stock price next hour?



Forecasting window:

- Forecast weekly sales for next 3 weeks?
- Forecast daily energy demand over the next 7 days?
- Hourly stock price in the next 6 hours?

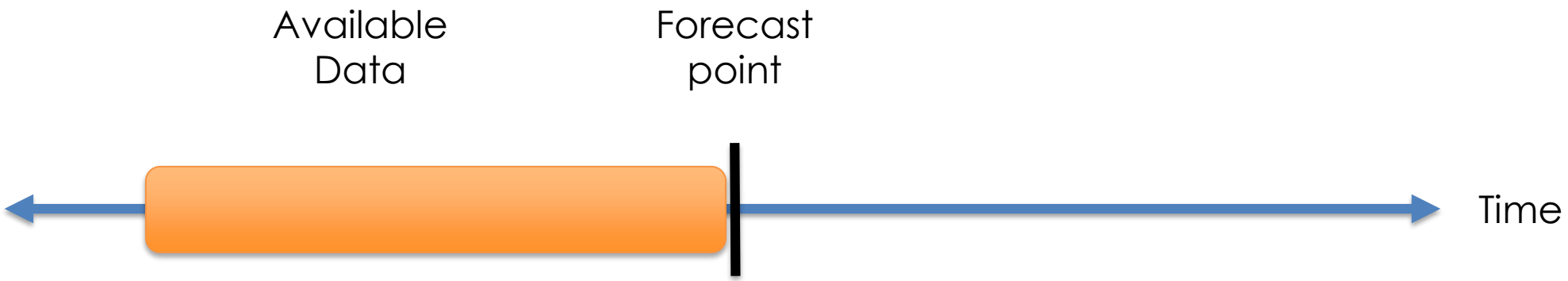
The available data

What data do we have **up to** (but not including) the time of forecast?

For example:

- Sales revenue up to last week.
- Energy demand up to yesterday.
- Stock prices up to now.

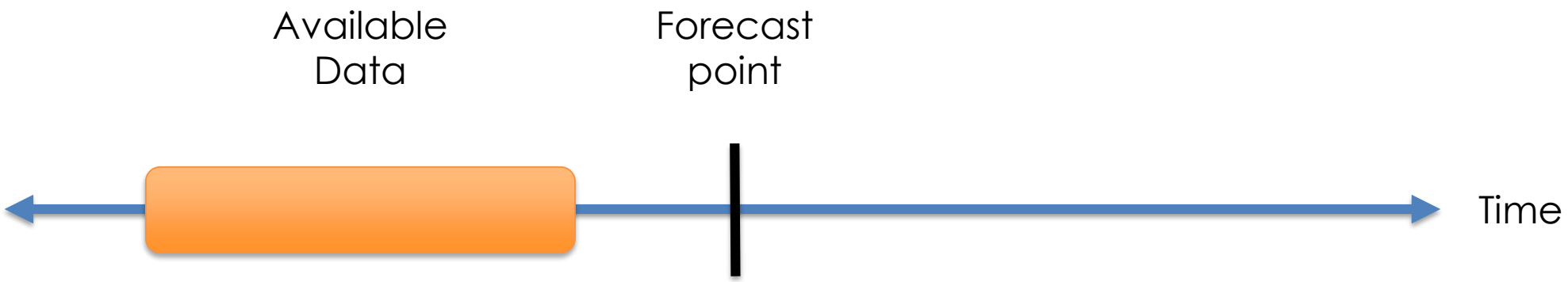
Forecasting Framework



In the simplest case,

- We have data up to a certain point in time.
- We want to forecast 1 single point ahead.
- E.g., forecast sales next week with weekly sales data up to last week.

Forecasting Framework



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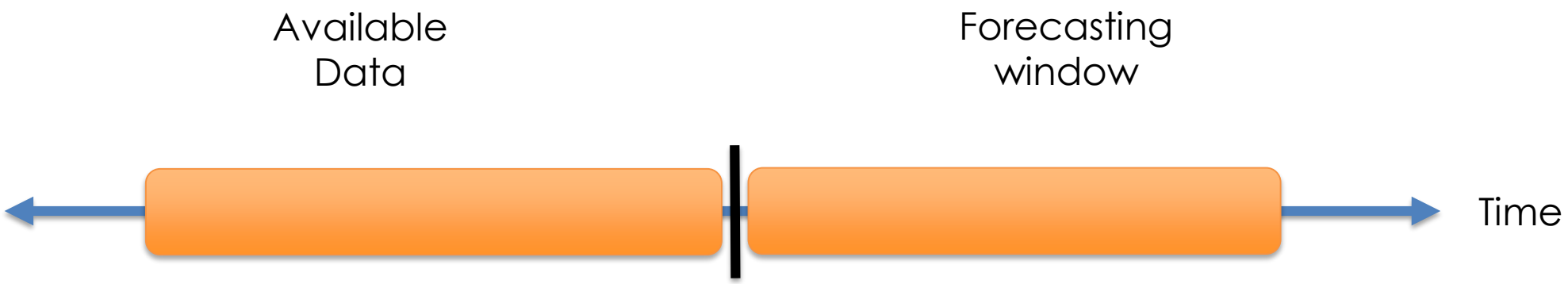

- We have data up to a certain point in time.
- We want to forecast various points ahead.
- E.g., forecast weekly sales in the next 3 weeks, with weekly sales data up to last week.

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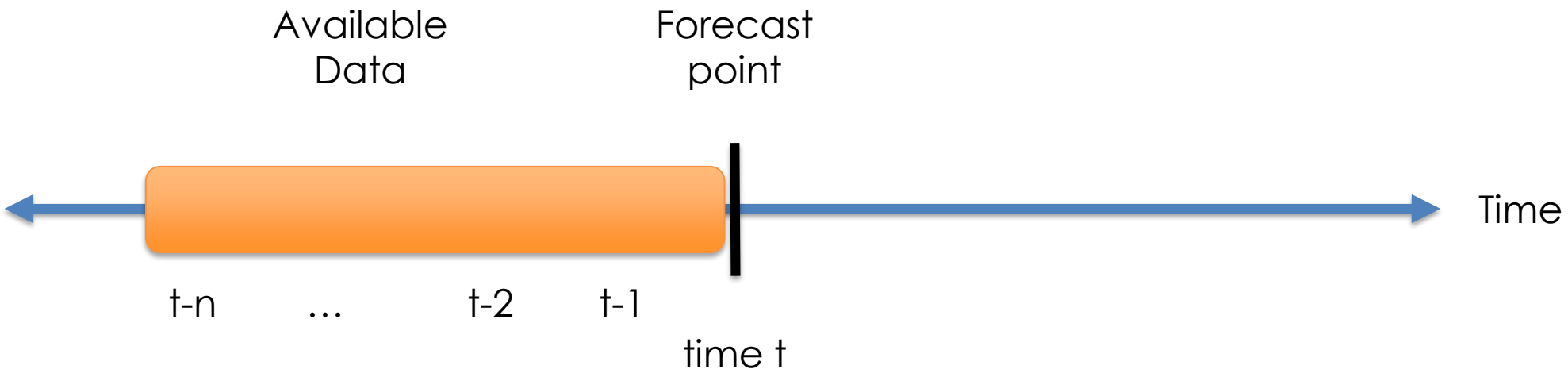
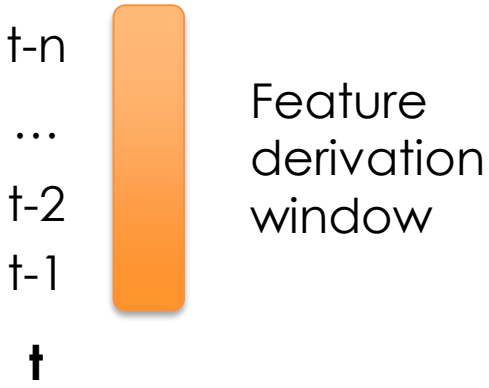


- We want to predict a value at time ***t***.
- We can use previous data, that is t-1, t-2, etc.

Feature derivation window

Time	Sales
30/03/20	200
31/03/20	220
01/04/20	230
02/04/20	235
03/04/20	?



We extract features only from the feature derivation window.

Forcasting models should be trained on available data.

Feature derivation window

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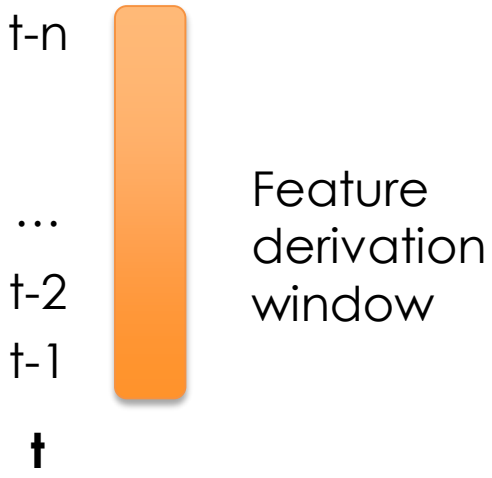
03/04/20	220
03/04/20	?



We extract features only from the feature derivation window.

The feature derivation window changes for each time point.

Feature derivation window

	Predictors						
Time	Var 1	Var 2	Var 2	Var 4	Var 5	Var 5	Sales
30/03/20	3	30	15	50	0.2	0	200
31/03/20	3	31	16	10	0.2	0	220
01/04/20	4	1	17	0	0.19	1	230
02/04/20	4	2	19	5	0.17	0	235
03/04/20	4	3	?	?	?	?	?

t-n
…
t-2
t-1
t

Feature derivation window

Features that we know ➔ date (independent of derivation window

Future unknown features ➔ can only extract from the feature derivation window.

Summary

- Define what we want to forecast.
- Define the forecasting horizon
- Define available data
- Future unknown features can be created only from data available up to the forecasting point.