




Time Series

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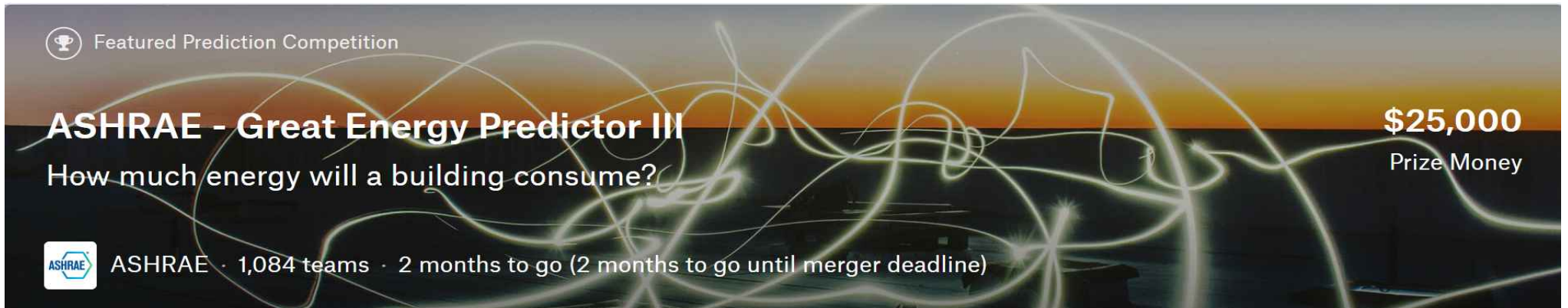
2. MODEL INTRODUCTION

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Project - Great Energy Predictor III

The banner features a background image of a city skyline at night with glowing, abstract white lines overlaid. On the left, a trophy icon is next to the text 'Featured Prediction Competition'. The main title 'ASHRAE - Great Energy Predictor III' is in large white font, followed by the subtitle 'How much energy will a building consume?'. On the right, '\$25,000 Prize Money' is displayed. At the bottom left, the ASHRAE logo is shown next to the text 'ASHRAE · 1,084 teams · 2 months to go (2 months to go until merger deadline)'.

Featured Prediction Competition

ASHRAE - Great Energy Predictor III

How much energy will a building consume?

\$25,000
Prize Money

ASHRAE · 1,084 teams · 2 months to go (2 months to go until merger deadline)

Launch
11 days ago



<https://www.kaggle.com/c/ashrae-energy-prediction/overview>

Project - Data

building_meta.csv

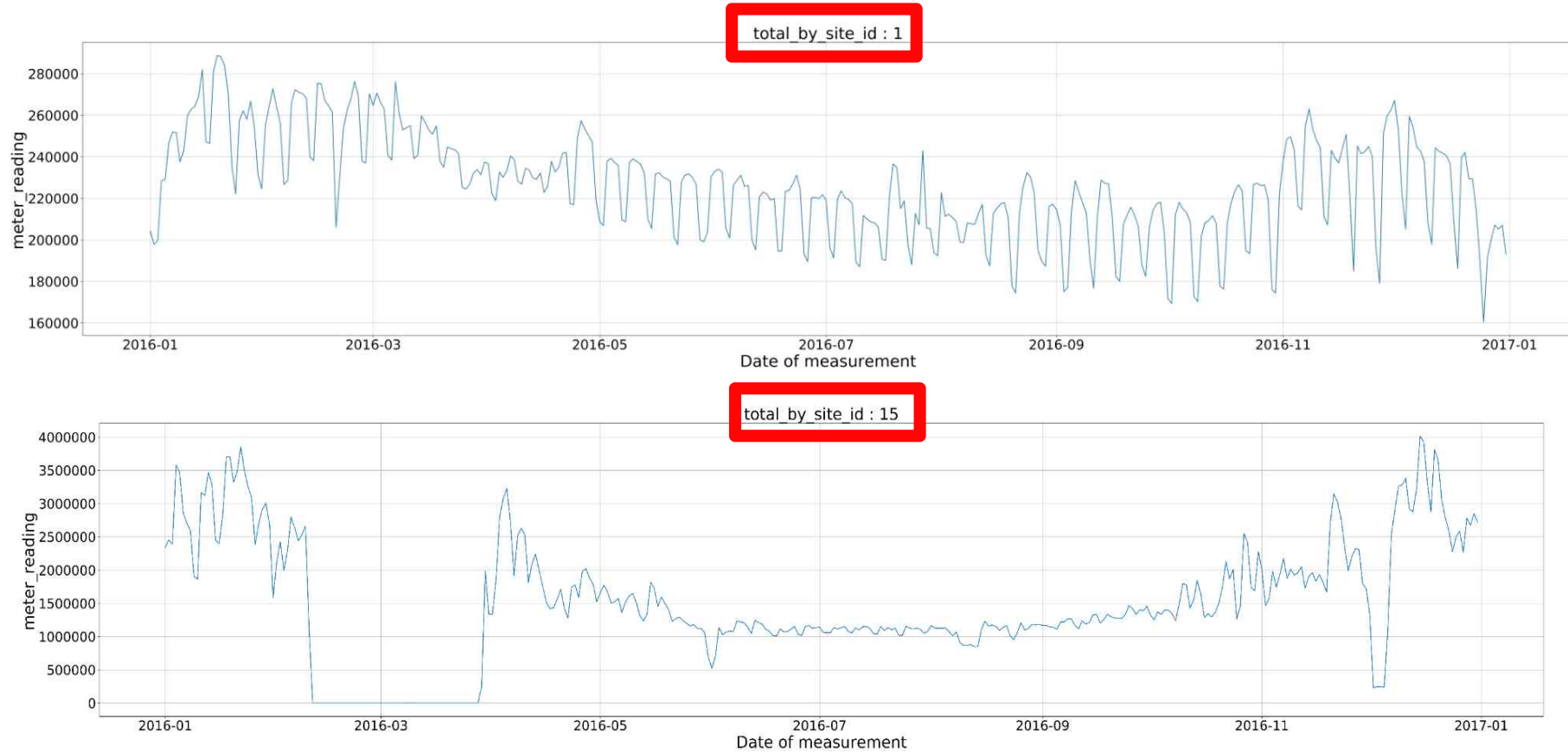
- `site_id` - Foreign key for the weather files.
- `building_id` - Foreign key for `training.csv`
- `primary_use` - Indicator of the primary category of activities for the building based on [EnergyStar property type definitions](#)
- `square_feet` - Gross floor area of the building
- `year_built` - Year building was opened
- `floor_count` - Number of floors of the building

weather_[train/test].csv

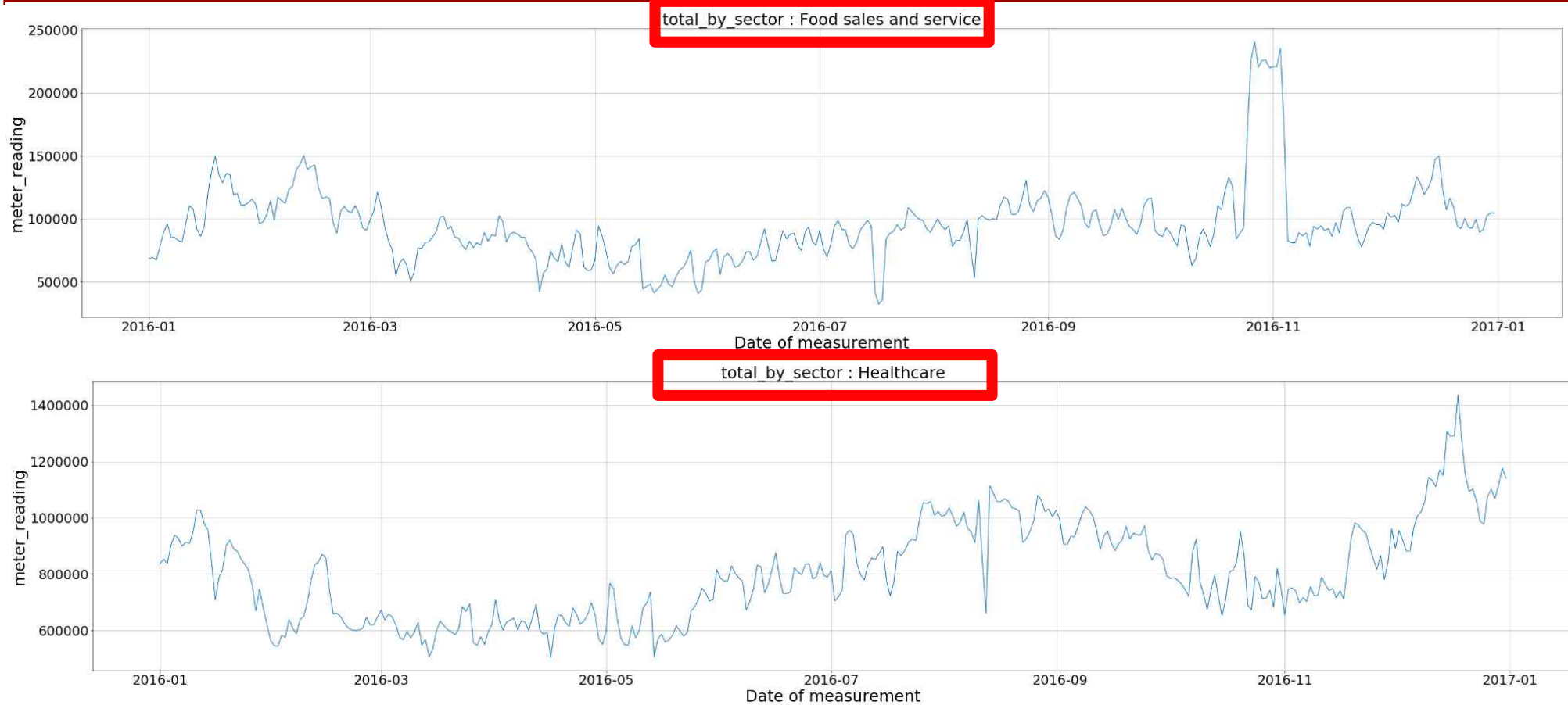
Weather data from a meteorological station as close as possible to the site.

- `site_id`
- `air_temperature` - Degrees Celsius
- `cloud_coverage` - Portion of the sky covered in clouds, in [oktas](#)
- `dew_temperature` - Degrees Celsius
- `precip_depth_1_hr` - Millimeters
- `sea_level_pressure` - Millibar/hectopascals
- `wind_direction` - Compass direction (0-360)
- `wind_speed` - Meters per second

Project - Visualization (Per site)



Project - Visualization (Per sector)



Project - Visualization



Project - Visualization (Temperature in Jan 1st, 2016)



Project - Visualization



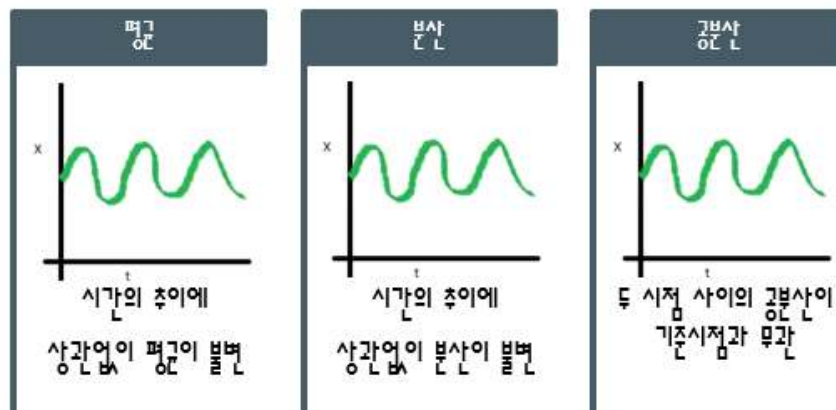
기온 데이터의 **PCA** 결과를
기반으로 한 시각화 결과

=> **미국**과 유사한 형태를 띠고 있다는
내용 발견

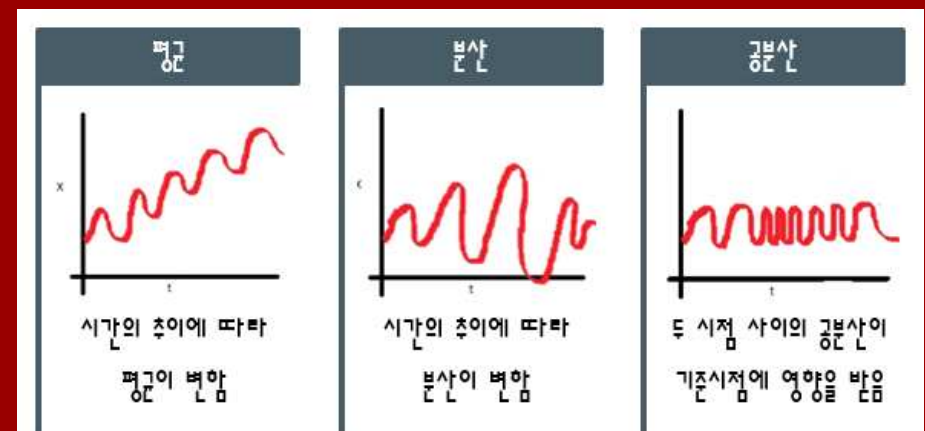
이외에도 다양한 시각화 및 **EDA**를 통해
각 변수의 특성 및 관계를 분석해나가는
것이 관건

Model 1 – ARIMA (Auto-Regressive Integrated Moving-Average)

Stationary Series



Non-Stationary Series



Model 1 – ARIMA (Auto-Regressive Integrated Moving-Average)

AR (Auto-Regression) :

이전 관측값이 이후 관측값에 영향을 주는 모형

$$AR(1) : X_t = \phi X_{t-1} + \epsilon_t$$

I (Integrated) : 누적 의미

MA (Moving-Average) :

관측값이 이전의 연속적인 오차항의 영향을 받는 모형

$$MA(1) : X_t = \epsilon_t - \beta_1 \epsilon_{t-1}$$

ARIMA(p, d, q)

$$\hat{y}_t = \mu + \phi_1 y_{t-1} + \dots + \phi_p y_{t-p} - \beta_1 \epsilon_{t-1} - \dots - \beta_q \epsilon_{t-q}$$

- $\mu = \text{constant}$
- $\phi_1 y_{t-1} + \dots + \phi_p y_{t-p} : AR \text{ terms (lagged values of } y)$
- $-\beta_1 \epsilon_{t-1} - \dots - \beta_q \epsilon_{t-q} : MA \text{ terms (lagged values of } y)$
- $\hat{y}_t = Y_t, \text{ if } d = 0$
- $\hat{y}_t = Y_t - Y_{t-1}, \text{ if } d = 1$
- $\hat{y}_t = (Y_t - Y_{t-1}) - (Y_{t-1} - Y_{t-2}), \text{ if } d = 2$

Model2 – RNN based models

We can process a sequence of vectors \mathbf{x} by applying a **recurrence formula** at every time step:

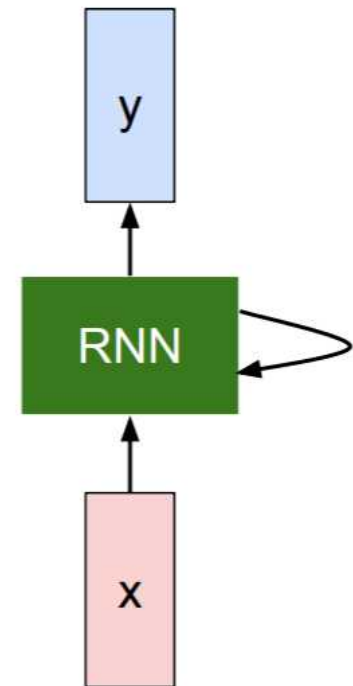
$$\boxed{h_t} = \boxed{f_W}(\boxed{h_{t-1}}, \boxed{x_t})$$

new state

some function with parameters W

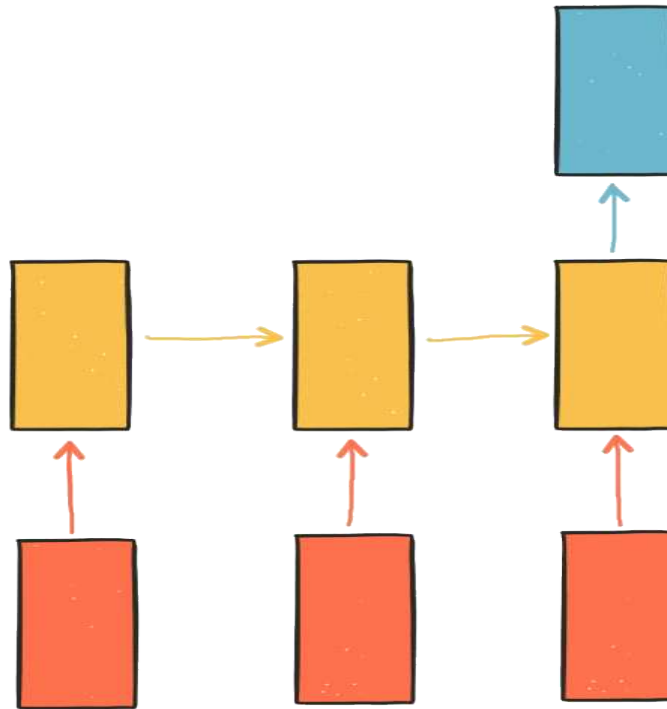
old state

input vector at some time step



출처 : http://cs231n.stanford.edu/slides/2019/cs231n_2019_lecture10.pdf

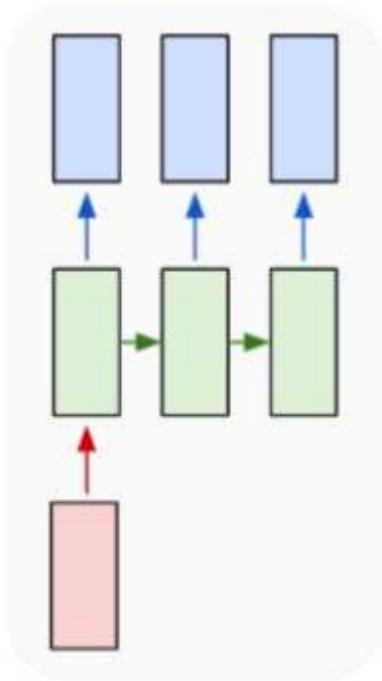
Model2 – RNN based models



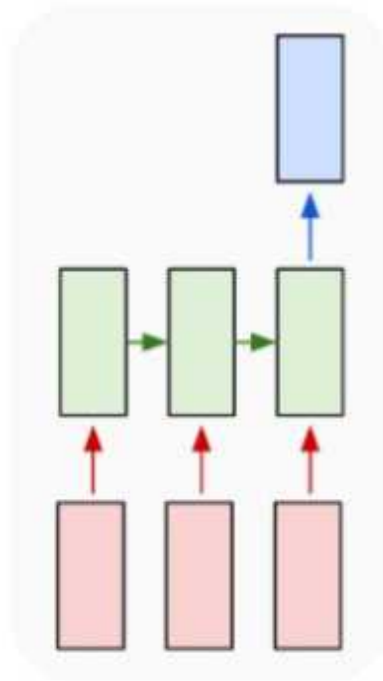
RNN Diagram

Model2 – RNN based models

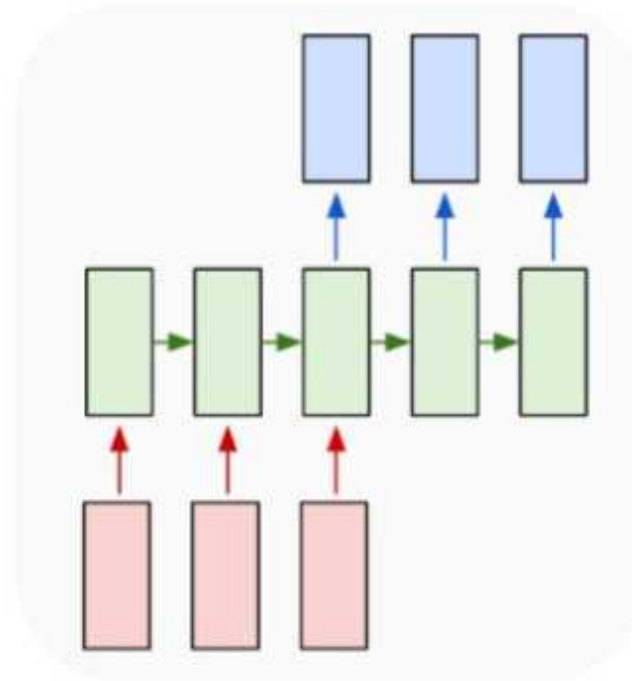
one to many



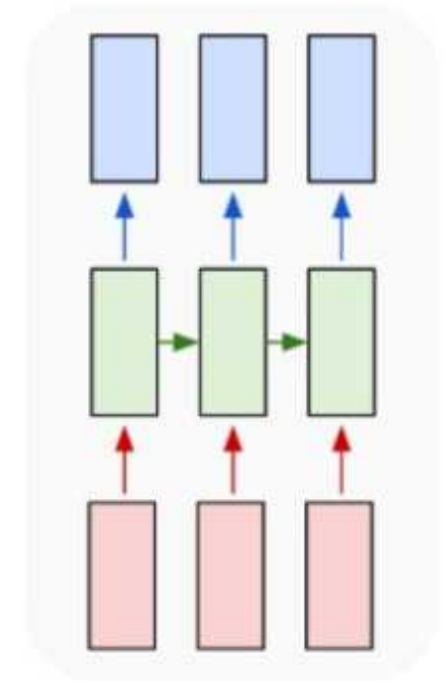
many to one



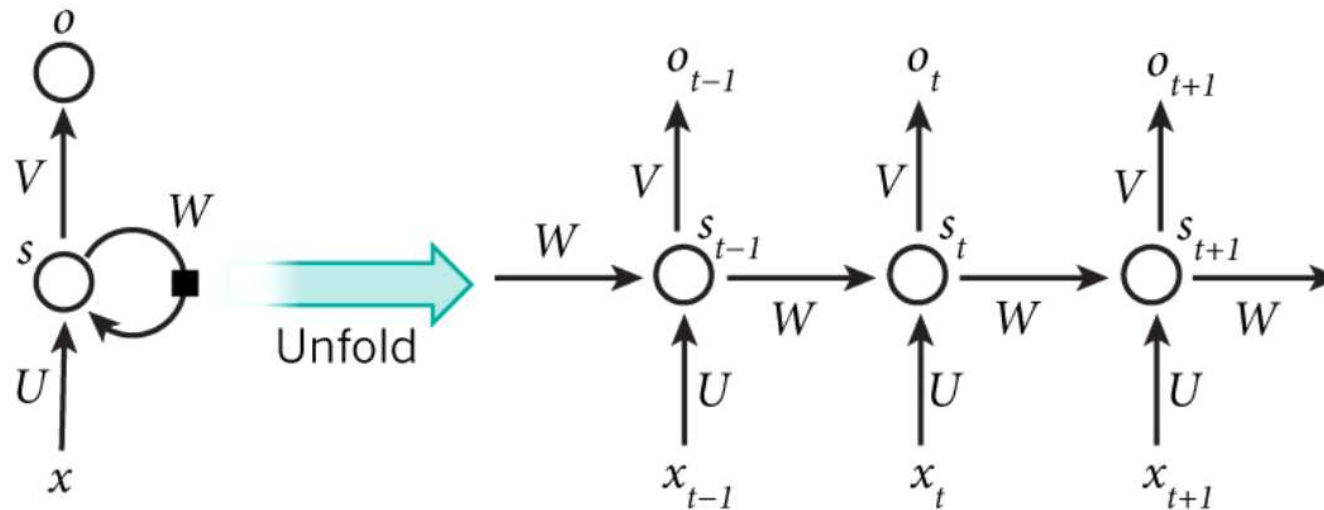
many to many



many to many



Model2 – RNN based models



출처 : <https://aikorea.org/blog/rnn-tutorial-1/>

1. Model study

2. Processing & EDA

DATA CAMP

INTERACTIVE COURSE


Introduction to Time Series Analysis in Python

[Continue Course](#)

4 hours | 17 Videos | 59 Exercises | 20,335 Participants | 4,850 XP

INTRODUCTION TO
TIME SERIES
ANALYSIS IN PYTHON


COUSERA

 완료하는 데 3시간 필요

Sequences and Prediction

Hi Learners and welcome to this course on sequences and prediction! In this course we'll take a look at series data -- where values change over time, like the temperature on a particular day, or the number

[모두 표시](#)

 10개 동영상 (총 33분), 3 readings, 3 quizzes

[모두 보기](#)

Project Plan



A stylized illustration of a person from the chest up, wearing a grey suit jacket, a white shirt, and a dark tie. The person's face is partially visible, showing a red mouth and a purple circular element. A large, black-outlined speech bubble is positioned on the left side of the image, pointing towards the person's mouth. Inside the speech bubble, the text "Do you have any question?" is written. The background is a solid light yellow color.

Do you
have any
question?

Thank you
for your attention.