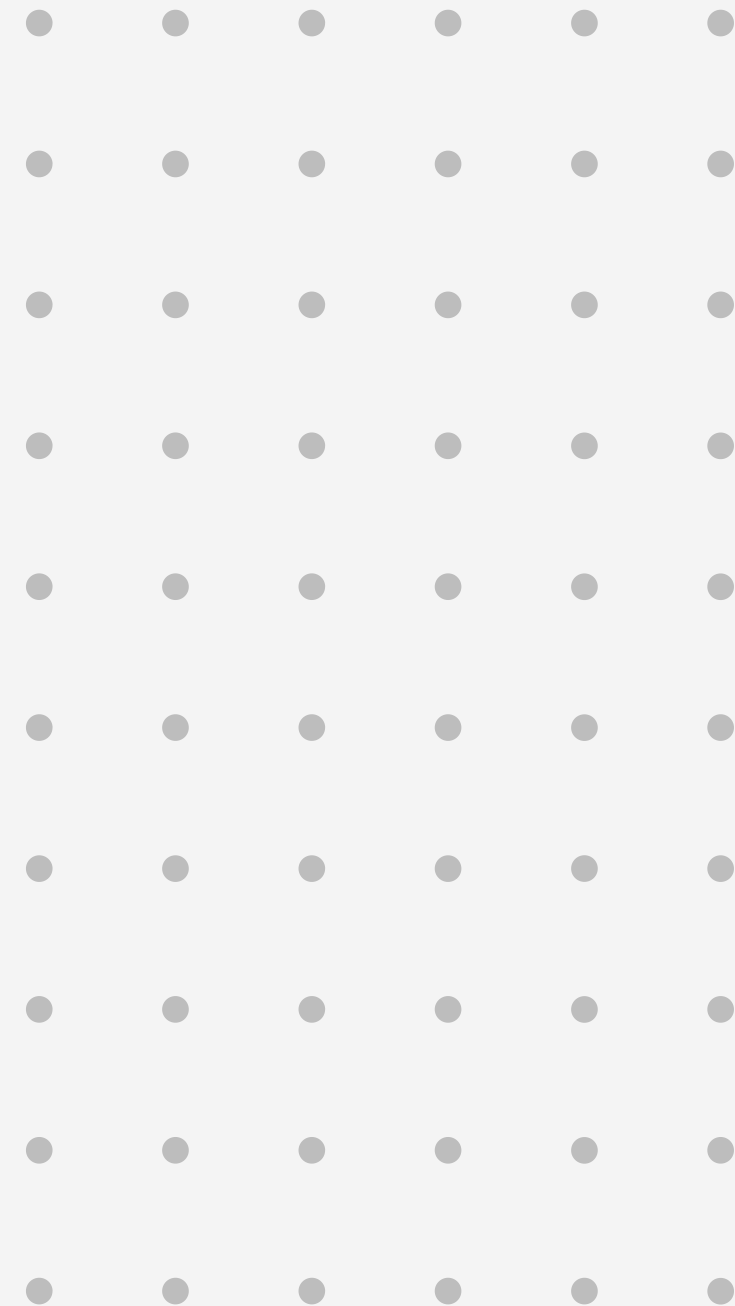




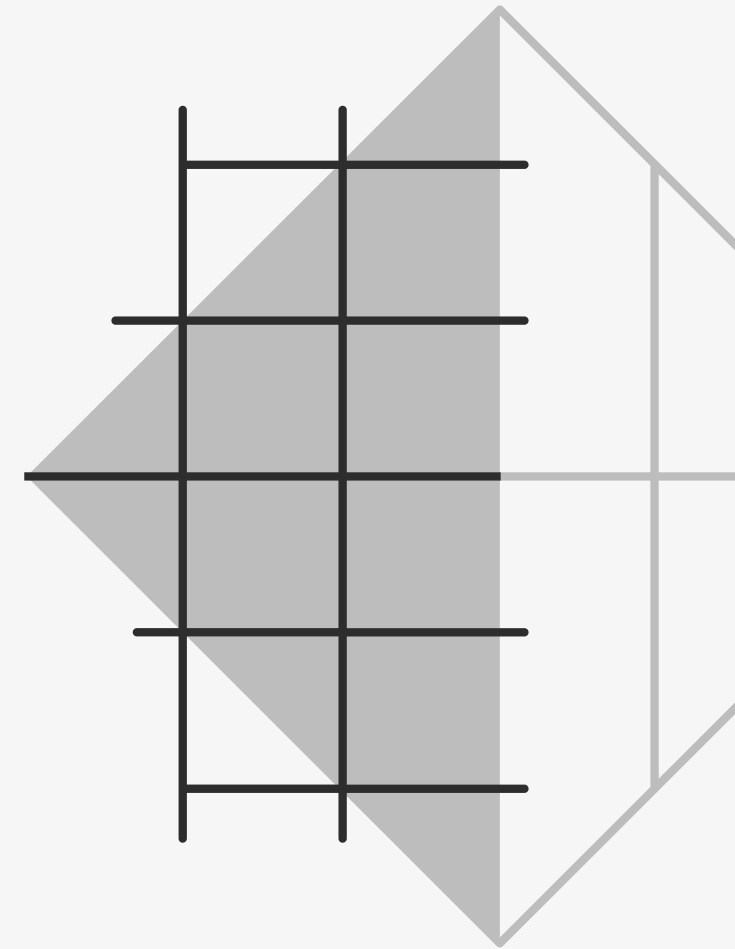
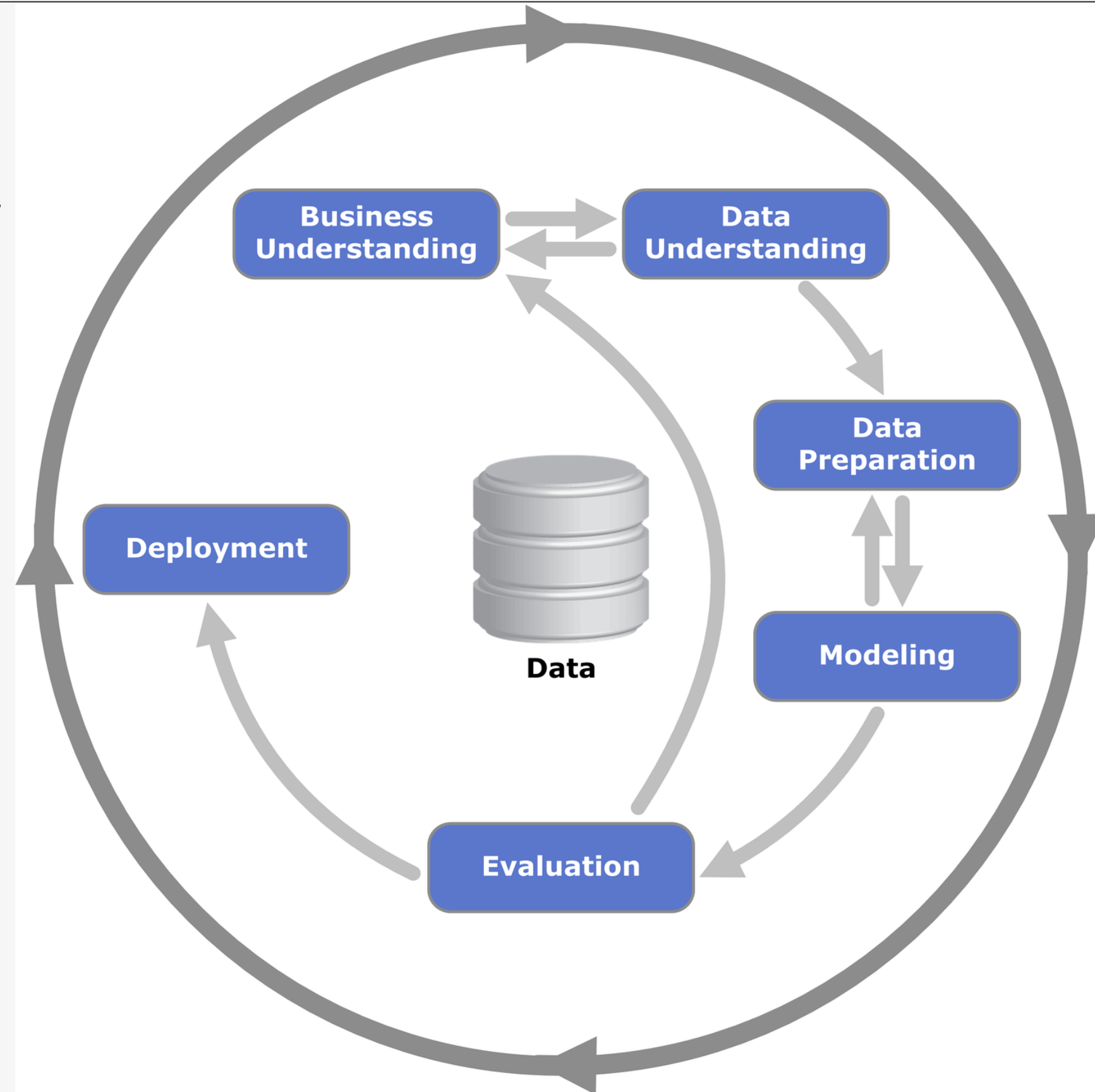
Covid New Deaths Prediction

Data Science
CRISP DM

2022 Sep 23
Krittinaphat Srisuwan



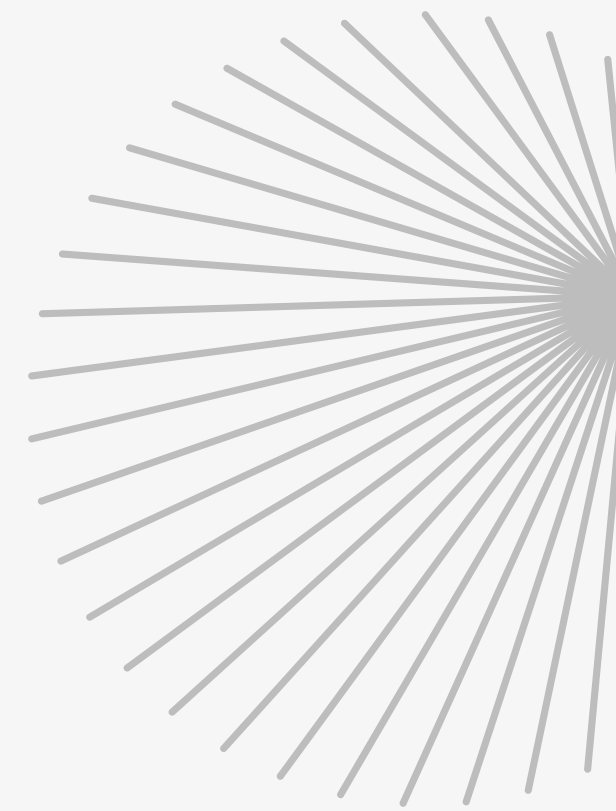
Design





Business Understanding

- Business type : Government's statistic analysis center
- Question : Will the increment of vaccination amount make new death patients amount decreased?
- Understand the problem or business opportunity
 - How much does the vaccination amount effects the new deaths number?
 - If those are up or down, will the new deaths number decreased?
- Set outputs or goals
 - Understand what makes new deaths number increased or decreased.
 - Able to predict the new deaths number from given parameters.
- Analytical Method
 - Visualization
 - Machine Learning Prediction





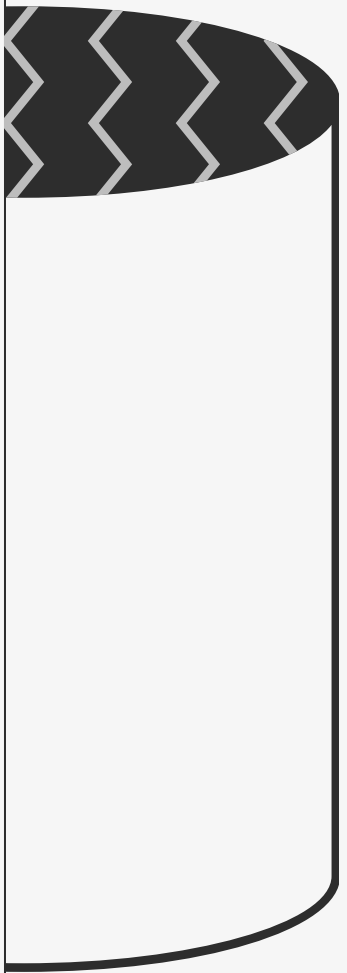
Data Understanding

- Period / Duration : Covid-19 Thailand Data recorded since 2020/04/01
- Unit of analysis : Thailand daily covid record.
- Data size : 870 records
- Features : Country, ISO_CODE, Population, PopulationDensity, median_age, aged_65_older, aged_70_older, gdp_per_capita, extreme_poverty, cardiovasc_death_rate, diabetes_prevalence, female_smokers, male_smokers, handwashing_facilities, hospital_beds_per_thousand, life_expectancy, human_development_index, Vaccination, Covid-19 new cases, year, month, date, total_cases, total_deaths, reproduction_rate
- Target : New Death





Data Preparation

- 
- Selection : Covid-19 Thailand Data recorded since 2020/04/01
 - Cleaning : Data Imputation
 - Transform : Standardized scale



Modeling

- Scaled data with StandardScaler
- Regressor Models
 - Ensemble
 - RandomForestRegressor
 - GradientBoostingRegressor
 - Linear
 - LinearRegression
 - SGDRegressor
 - BayesianRidge
 - ElasticNet



Evaluation

- Benchmark models
- Evaluated in metrics; **R2, MAE, MSE, RMSE**
- The **MAE** scored model will be **selected** to deploy.



Deployment

- Deploy in a form of API; FastAPI containerized docker image.
- Testing from 5 test cases; =>

Case #1

```
{
  "total_cases": 2912347,
  "new_cases": 20420,
  "total_deaths": 22976,
  "reproduction_rate": 1.14,
  "total_test": 21146224,
  "new_tests": 76230,
  "positive_rate": 0.3476,
  "tests_per_case": 2.9,
  "tests_units": 1,
  "total_vaccinations": 123999850,
  "people_vaccinated": 53665546,
  "people_full_vaccinated": 49702406,
  "total_boosters": 20631898,
  "new_vaccinations": 159477,
  "stringency_index": 48.61,
  "population": 71601103,
  "population_density": 135.132,
  "median_age": 40.1,
  "aged_65_older": 11.373,
  "aged_70_older": 6.89,
  "gdp_per_capita": 16277.671,
  "extreme_poverty": 0.1,
  "cardiovasc_death_rate": 109.861,
  "diabetes_prevalence": 7.04,
```

```
    "female_smokers": 1.9,
    "male_smokers": 38.8,
    "handwashing_facilities": 90.67,
    "hospital_beds_per_thousand": 2.1,
    "life_expectancy": 77.15,
    "human_development_index": 0.777,
    "year": 2022,
    "month": 3,
    "day": 17
```

```
"Response": {
  "NewDeathPredicted": 39
}
```

Error : 9.3%

2022

3

1

35

Case #2

```
{
  .... "total_cases": 1448792,
  .... "new_cases": 14555,
  .... "total_deaths": 15124,
  .... "reproduction_rate": 0.93,
  .... "total_test": 13221709,
  .... "new_tests": 52375,
  .... "positive_rate": 0.2602,
  .... "tests_per_case": 3.8,
  .... "tests_units": 1,
  .... "total_vaccinations": 43342103,
  .... "people_vaccinated": 28436015,
  .... "people_full_vaccinated": 14285995,
  .... "total_boosters": 0,
  .... "new_vaccinations": 0,
  .... "stringency_index": 55.09,
  .... "population": 71601103,
  .... "population_density": 135.132,
  .... "median_age": 40.1,
  .... "aged_65_older": 11.373,
  .... "aged_70_older": 6.89,
  .... "gdp_per_capita": 16277.671,
  .... "extreme_poverty": 0.1,
  .... "cardiovasc_death_rate": 109.861,
  .... "diabetes_prevalence": 7.04,
```

```
.... "female_smokers": 1.9,
.... "male_smokers": 38.8,
.... "handwashing_facilities": 90.67,
.... "hospital_beds_per_thousand": 2.1,
.... "life_expectancy": 77.15,
.... "human_development_index": 0.777,
.... "year": 2021,
.... "month": 9,
.... "day": 17
```

```
{
  "Response": {
    "NewDeathPredicted": 205
  }
}
```

Error : 8.47%

2021	9	17	189
------	---	----	-----