Report for GDP Prediction

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# Objective:

Our project is aimed to predict GDP growth rate monthly from 2020-01 to 2020-06 under Covid\_19 pandemic affect. We are able to find GDP growth rate on quarterly basis from 2011-Q1 to 2020-Q1 for US and China, and 2011-Q1 to 2019-Q4 for Germany, Japan, Mexico, Turkey. Following are the steps how we achieve our goal:

## Unaffected GDP:

First, we need to change quarterly data to monthly data simply by divided by 3.

Since Covid\_19 happened in early 2020, we could use data before 2020 to predict the GDP unaffected by Covid\_19 by simply linear regression model. And the result for that is quite acceptable, R2 for the model (for all countries) are greater than 98%.

## Affected GDP:

### Influence factor:

Since 2020-Q1 GDP for China and USA are published, and it is affected by COVID\_19, so we could use that to estimate the influence of COVID\_19. We use influence factor to quantify this impact:

Influence Factor:

Since we have 3 months data for compute factor, we take average for compute Country Influence Factor:

Country Influence Factor:

And compute factor for China and USA.

### Similarity matrix:

A picture containing grass, green, ready, lot

Description automatically generatedNow we get both factor from China and US, We could use these factor to predict GDP for the rest of the countries according to their cluster based on Covid\_19 data, here is the result:

|  |  |
| --- | --- |
| 0 | USA |
| 1 | Germany |
| 2 | Japan |
| 5 | Mexico |
| 3 | China |
| 4 | Turkey |

We assume the similarity within the same cluster is 1, and China and US have the most dissimilarity, similarity + dissimilarity = 1. And the distance between the nearby cluster is

0.33, so we get the following similarity matrix:

And by multiply similarity with US and China influence factor, we can predict the future GDP by :

# Result:

We make prediction till 2022\_01

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A close up of a map

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