Abstract:

The Sars Cov 2 Virus Which cause covid-19 (coronavirus Disease) . Most people got infected with this virus and die. This virus is deadly This virus mutated its body so many times. For scientists, it is tough to make medication and vaccination on this virus. But They finally Made a vaccination on this but if the virus mutated its body the vaccination work successfully or not. We decided to make research on it. By using a Machine learning SVM (Support Vector Machine) Algorithm. This Algorithm set of supervised learning methods is used for classification, regression, and outliers detection. The advantages of support vector machines are Effective in high dimensional spaces. Still effective in cases where several dimensions are greater than the number of samples.

*Keywords:*sars cov 2 virus ,mutation ,vccination,SVM(support vector machine).

Introduction:

The outbreak of Covid-19(coronavirus) has resulted in pandemic infection of over 5.9 million people [1]. This positive-strand RNA Syndrome in humans(Covid-19), With between December 2019 and May 30, 2020 [1] [2].To Combat this pandemic, the World Health Organization (WHO) is coordinating global surveillance,epidemiology.

In this pandemic, the scientists work on vaccination they successfully find the vaccination. But covid-19 Mutation it bodies it tough for them to find vaccination of different variant, let understand How vaccination work.

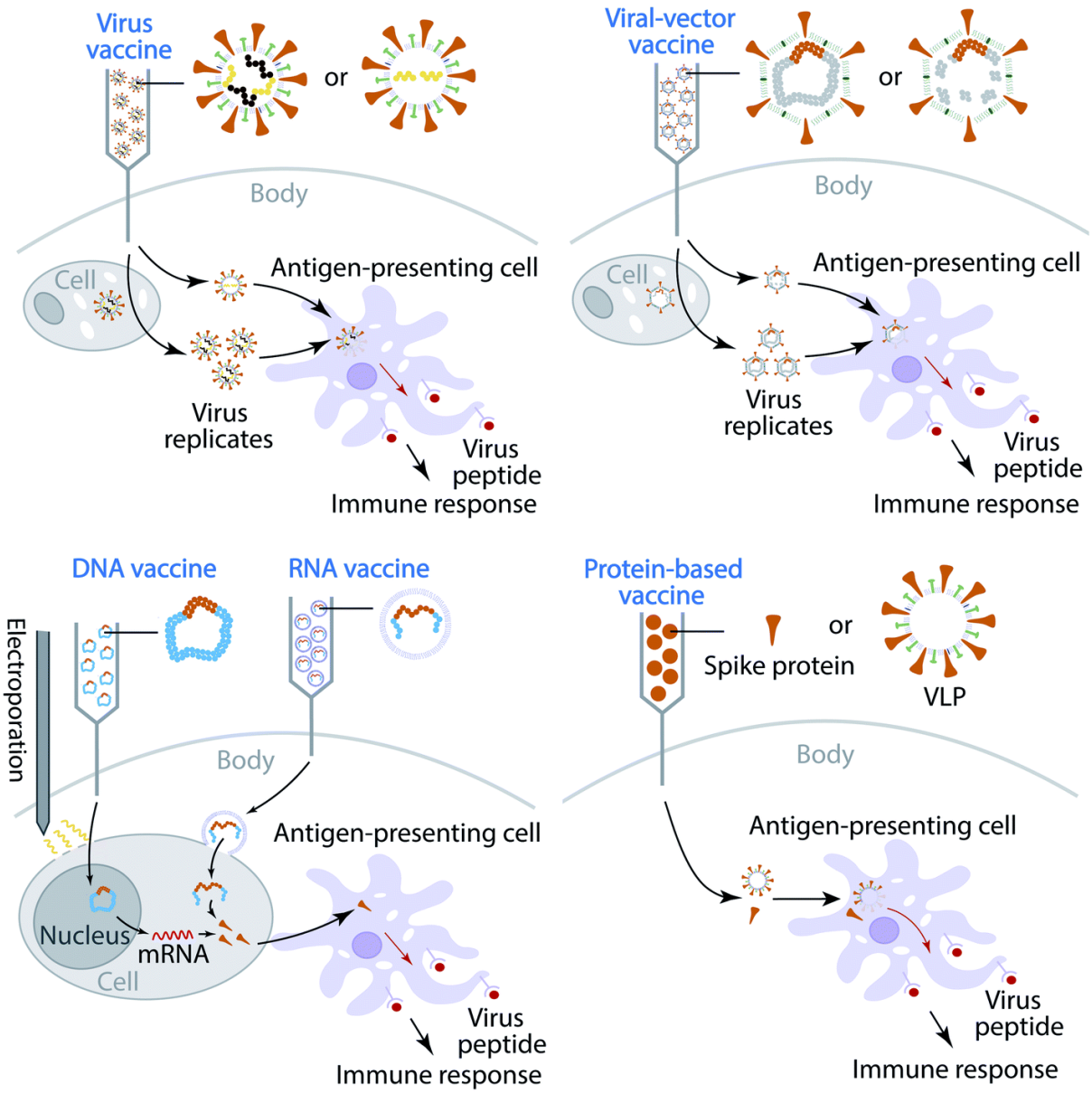


Fig-1[3]:-illustration of four types of COVID-19 vaccine that are currently in development.

There is no doubt it will going improvement in vaccination if the variant and body of the virus are changed. If it is not so many people die in this pandemic situation. With the help of AI and ML, we created a model of how vaccination affects our bodies if the virus mutated.

Our Model:

In this article, we integrated the epidemic prediction model with real global pandemic data and considered the Mutation of the virus and How it affects vaccination. The Dataset is taken from the [https://www.gavi.org/]. Let understand how growth of covid-19 affects the countries.

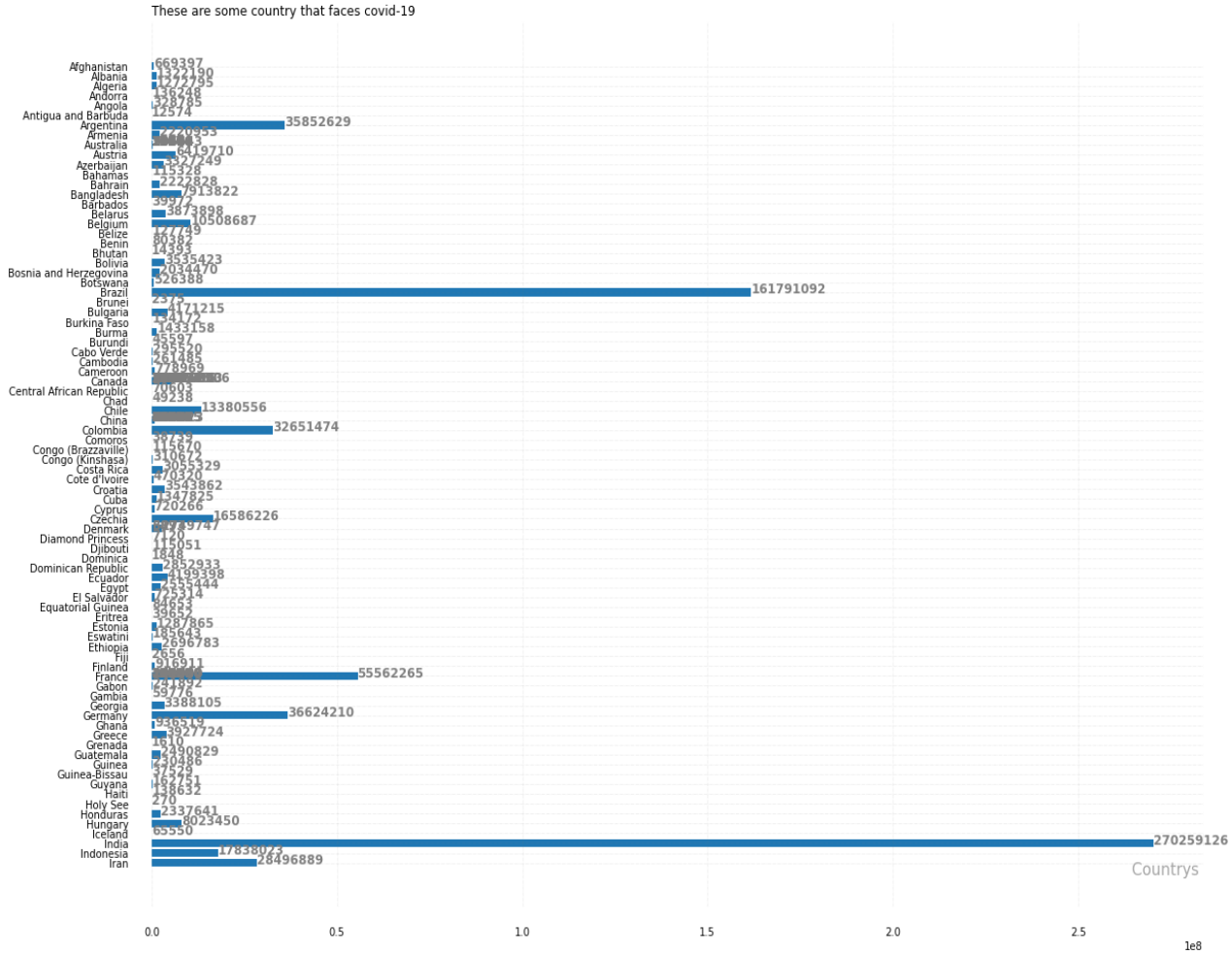
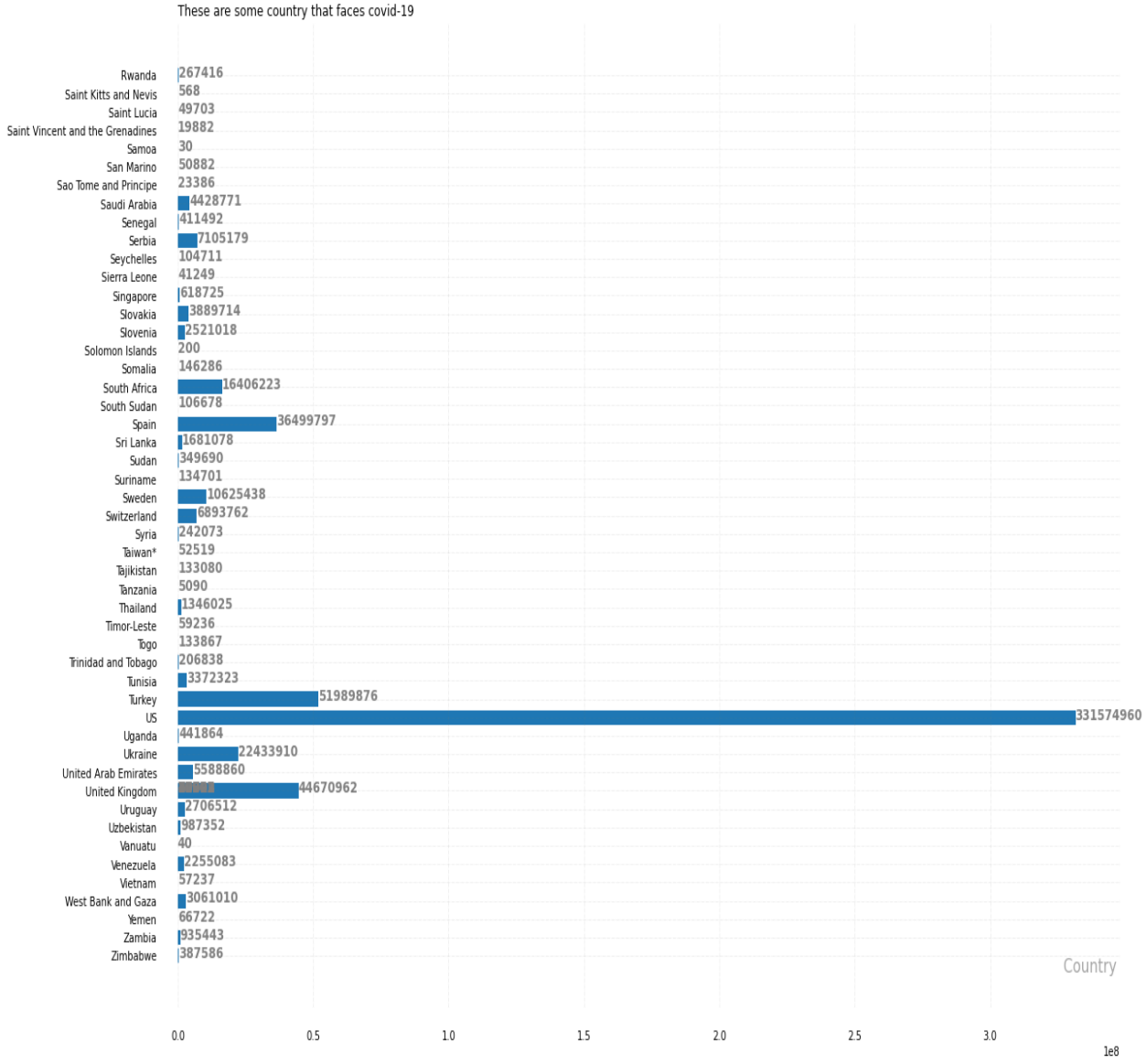


fig-2:-This data is 60 countries that affected due to covid-19


These are some country that faces covid-19
Rwanda
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
Samoa
San Marino
Sao Tome and Principe
Saudi Arabia
Senegal
Serbia
Seychelles
Sierra Leone
Singapore
Slovakia
Slovenia
Solomon Islands
Somalia
South Africa
South Sudan
Spain
Sri Lanka
Sudan
Suriname
Sweden
Switzerland
Syria
Taiwan*
Tajikistan
Tanzania
Thailand
Timor-Leste
Togo
Trinidad and Tobago
Tunisia
Turkey
US
Uganda
Ukraine
United Arab Emirates
United Kingdom
Uruguay
Uzbekistan
Vanuatu
Venezuela
Vietnam
West Bank and Gaza
Yemen
Zambia
Zimbabwe
267416
568
49703
19882
30
50882
23386
4428771
411492
7105179
104711
41249
618725
3889714
2521018
200
146286
16406223
106678
36499797
1681078
349690
134701
10625438
6893762
242073
52519
133080
5090
1346025
59236
133867
206838
3372323
51989876
331574960
441864
22433910
5588860
44670962
2706512
987352
40
2255083
57237
3061010
66722
935443
387586
Country
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1e8

The Mutation of covid-19 and its growth in the third wave

	Actual	3 Waves
184	10.0	2.768527e+03
15	10166.0	2.874462e+04
55	70603.0	1.095083e+05
74	7424.0	7.417171e+03
188	993337.0	8.300916e+05
209	19286567.0	2.177564e+07
92	32651474.0	3.062212e+07
223	4428771.0	7.460642e+06
125	241000.0	1.846669e+05
190	706223.0	5.402453e+05
116	2696783.0	2.537099e+06
218	49703.0	2.761901e+04
244	5090.0	1.350136e+04
101	16586226.0	1.292774e+07
189	5174167.0	6.159557e+06
22	3873898.0	3.528713e+06
59	10934.0	1.782998e+04
156	7303393.0	4.873831e+06
270	2255083.0	2.245193e+06
8	1240.0	6.332910e+03
63	24828.0	1.444058e+04
152	8393650.0	8.922950e+06
194	16093.0	8.335266e+03

200	53869.0	5.631077e+04
12	7498.0	2.300823e+04
173	90.0	2.977163e+03
89	9826.0	2.002178e+04
122	117530.0	1.036090e+05
7	2220953.0	2.475221e+06
215	49564464.0	5.164327e+07
220	30.0	2.787411e+03
108	2852933.0	3.371014e+06
81	6246.0	9.264995e+03
261	42892.0	4.129800e+04
236	1681078.0	8.306415e+05

205	9069769.0	9.555314e+06
240	6893762.0	6.941936e+06
259	40626.0	4.616979e+04
109	4199398.0	4.371052e+06
27	3535423.0	3.699722e+06
118	916911.0	7.602495e+05
178	142481.0	1.282309e+05
187	541057.0	1.393063e+05
224	411492.0	4.570367e+05
37	261485.0	6.308734e+04
64	2936.0	3.026595e+03
154	480384.0	3.320051e+05

Fig 4:-The Mutation of covid-19

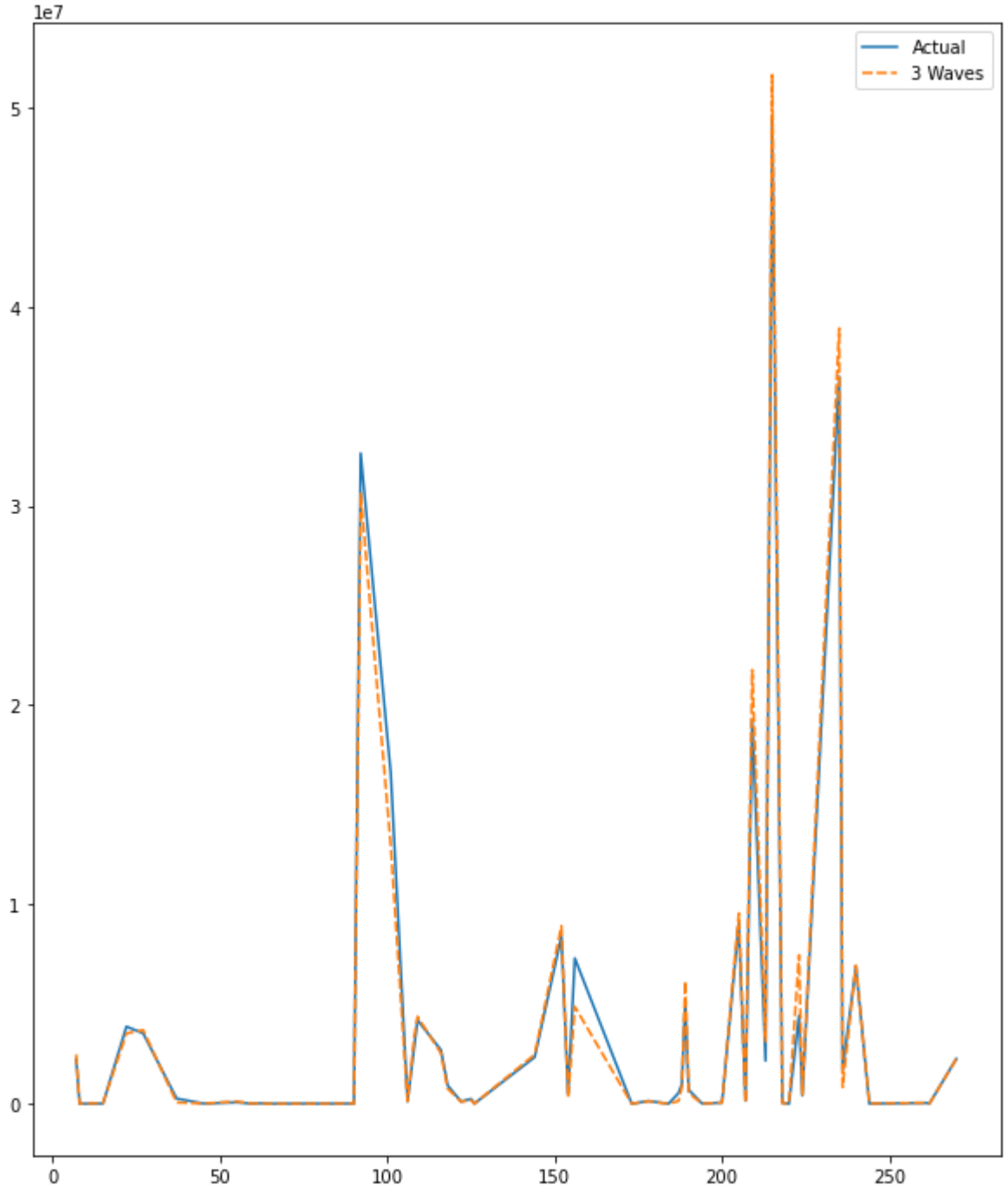


Fig-5 *The prediction growth of covid-19*

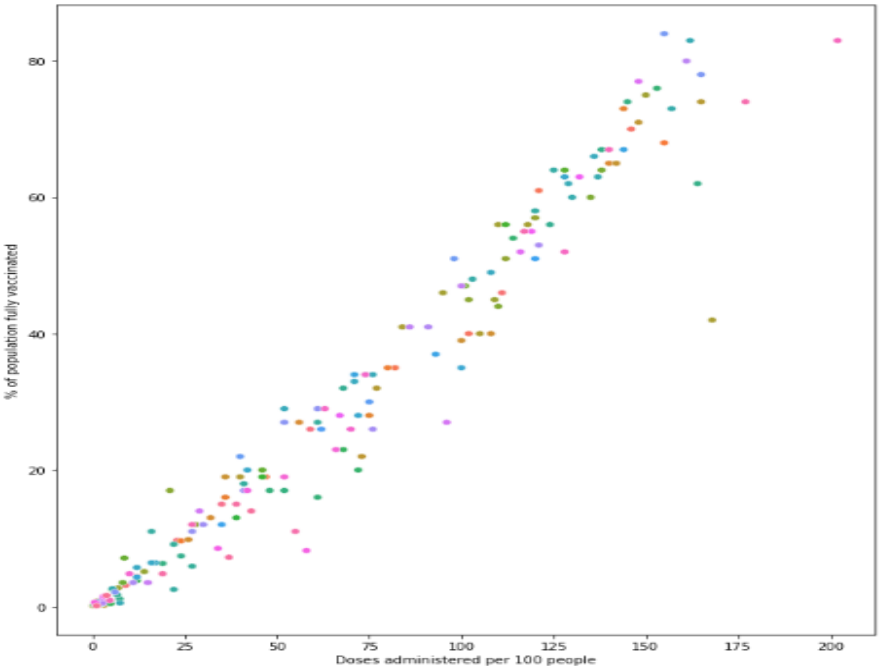
The Vaccination

Vaccines to prevent coronavirus disease 2019 (COVID-19) are perhaps the best hope for ending the pandemic. But as the U.S. Food and Drug Administration (FDA) continues approving or authorizing emergency use of COVID-19 vaccines [4].

	Country	Doses administered per 100 people	Total doses administered	% of population vaccinated	% of population fully vaccinated
0	Afghanistan	8.2	3133227.0	2.0	NaN
1	Albania	59.0	1674093.0	32.0	26.0
2	Algeria	23.0	9989662.0	14.0	9.7
3	Angola	8.9	2820134.0	5.8	3.1
4	Argentina	111.0	50010169.0	65.0	46.0
...	...	...	...	...	...
175	Vietnam	37.0	35675840.0	30.0	7.2
176	West Bank & Gaza	43.0	2001407.0	29.0	14.0
177	Yemen	1.1	322934.0	1.1	0.1
178	Zambia	3.8	670361.0	1.7	1.6
179	Zimbabwe	35.0	5166508.0	21.0	15.0

Fig:6 The Vaccination Dose In the world.

As of 29 June 2021, there had been more than 181 million reported infections with SARS-CoV-2 and nearly 4 million reported deaths from COVID-19. In May 2020, the 73rd World Health Assembly issued a resolution recognizing the role of extensive immunization as a global public-health goal for preventing, containing, and stopping transmission of SARS-CoV-2. Globally, there are now more than 125 vaccine candidates, 365 vaccine trials ongoing, and 18 vaccines against COVID-19 approved by at least one country. Published research carried out largely in high-income countries cites concerns about the safety of vaccines against COVID-19, including the rapid pace of vaccine development, as one of the primary reasons for hesitancy, but data from low- and middle-income countries (LMICs) have been limited. In this issue of *Nature Medicine*, Solis Arce et al. present data that begin to address this research gap.[5]



Afghanistan
Albania
Algeria
Angola
Argentina
Armenia
Aruba
Australia
Austria
Azerbaijan
Bahamas
Bahrain
Bangladesh
Barbados
Belarus
Belgium
Belize
Benin
Bhutan
Bolivia
Bosnia and Herzegovina
Botswana
Brazil
Brunei
Bulgaria
Burkina Faso
Cambodia
Cameroon
Canada
Cape Verde
Central African Republic
Chad
Chile
Colombia
Comoros
Congo
Costa Rica
Croatia
Cuba
Curaçao
Cyprus
Czech Republic
Denmark
Djibouti
Dominican Rep.
Ecuador
Egypt
El Salvador
Equatorial Guinea
Estonia
Eswatini
Ethiopia
Fiji
Finland
France
French Polynesia
Gabon
Gambia
Georgia
Germany
Ghana
Greece
Grenada
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hong Kong
Iceland
India
Indonesia
Iran
Iraq
Ireland
Israel
Italy
Ivory Coast
Jamaica
Japan
Jordan
Kazakhstan
Kenya
Kiribati
Kyrgyzstan
Laos
Lebanon
Lesotho
Libya
Lithuania
Luxembourg
Macau
Madagascar
Mainland China
Malawi
Malaysia
Maldives
Mali
Malta
Mauritania
Mauritius
Mexico
Moldova
Mongolia
Montenegro
Morocco
Mozambique
Myanmar
Namibia
Nepal
Netherlands
New Caledonia
New Zealand
Nicaragua
Niger
Nigeria
North Macedonia
Norway
Oman
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Republic of the Congo
Romania
Russia
Rwanda
Saint Lucia
Saint Vincent and the Grenadines
Samoa
Saudi Arabia
Senegal
Serbia
Sierra Leone
Singapore

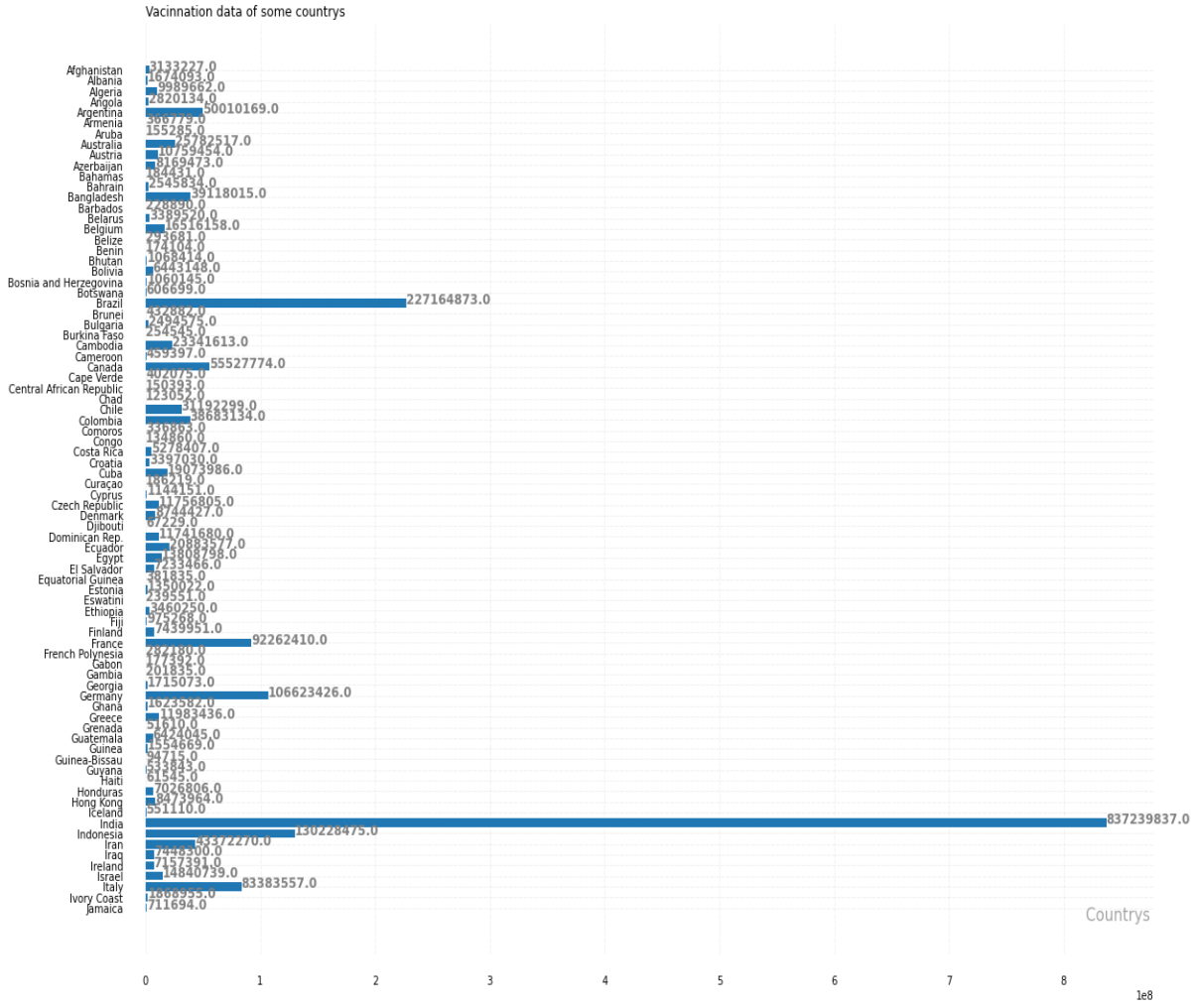


Fig-8 % of the population fully vaccinated

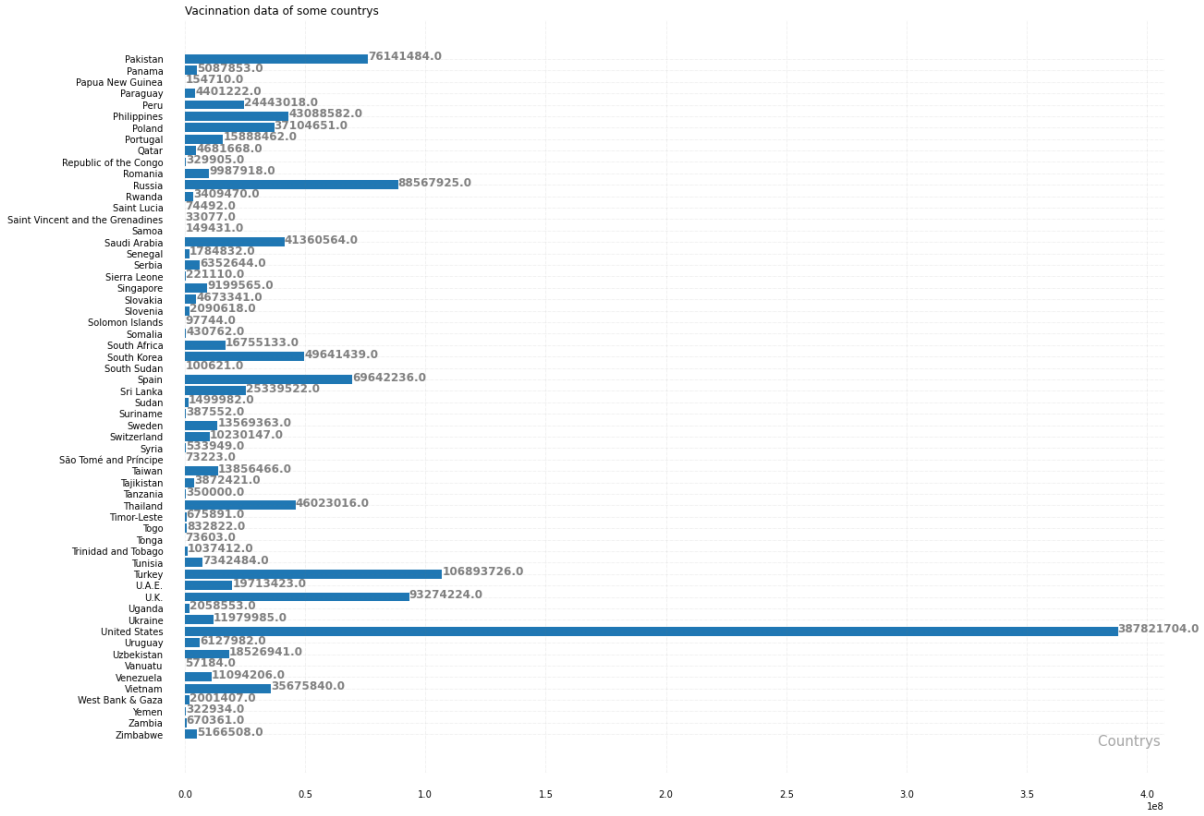


Fig-9 % of the population fully vaccinated

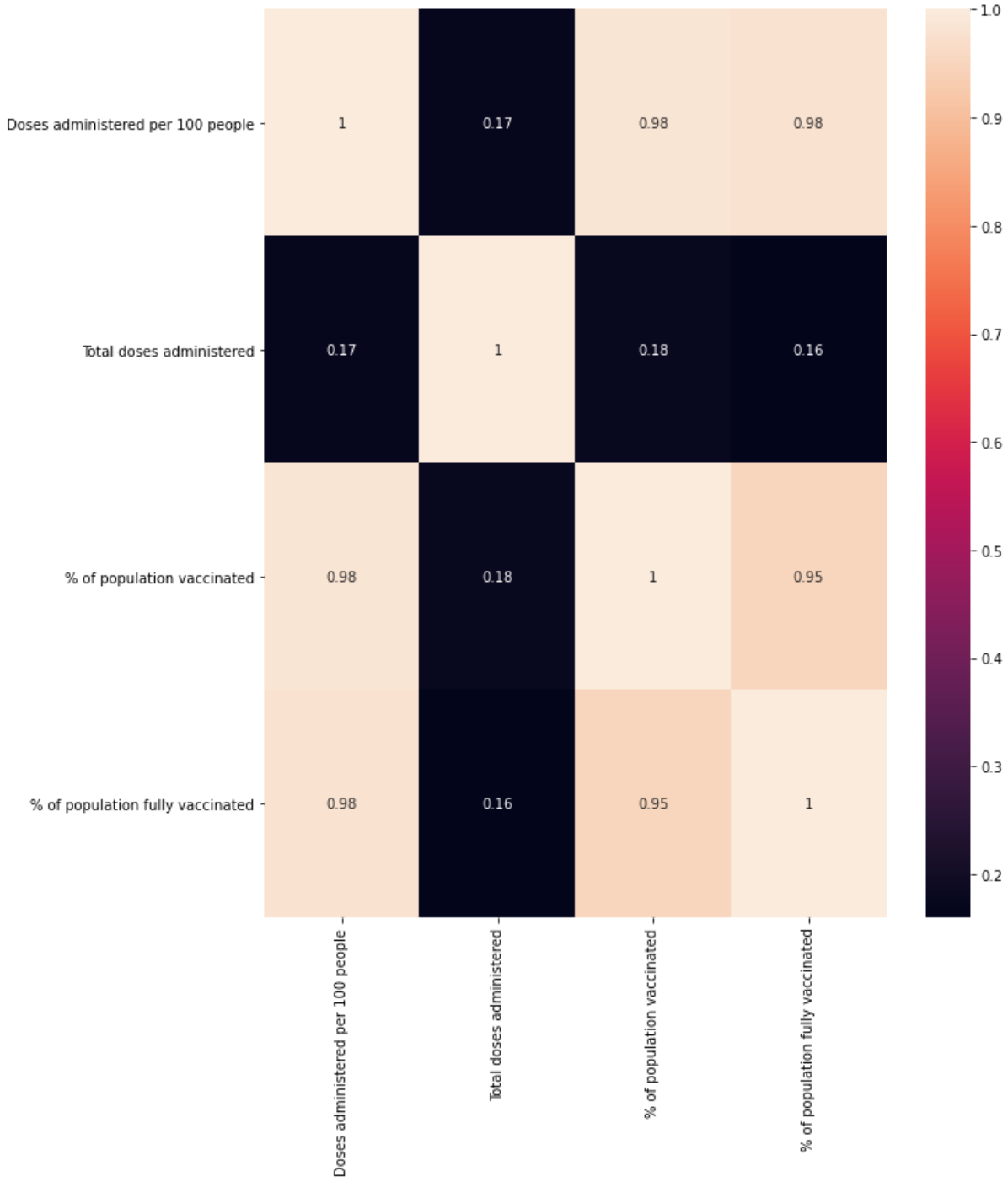


Fig-10 Area divided according to population and Administration

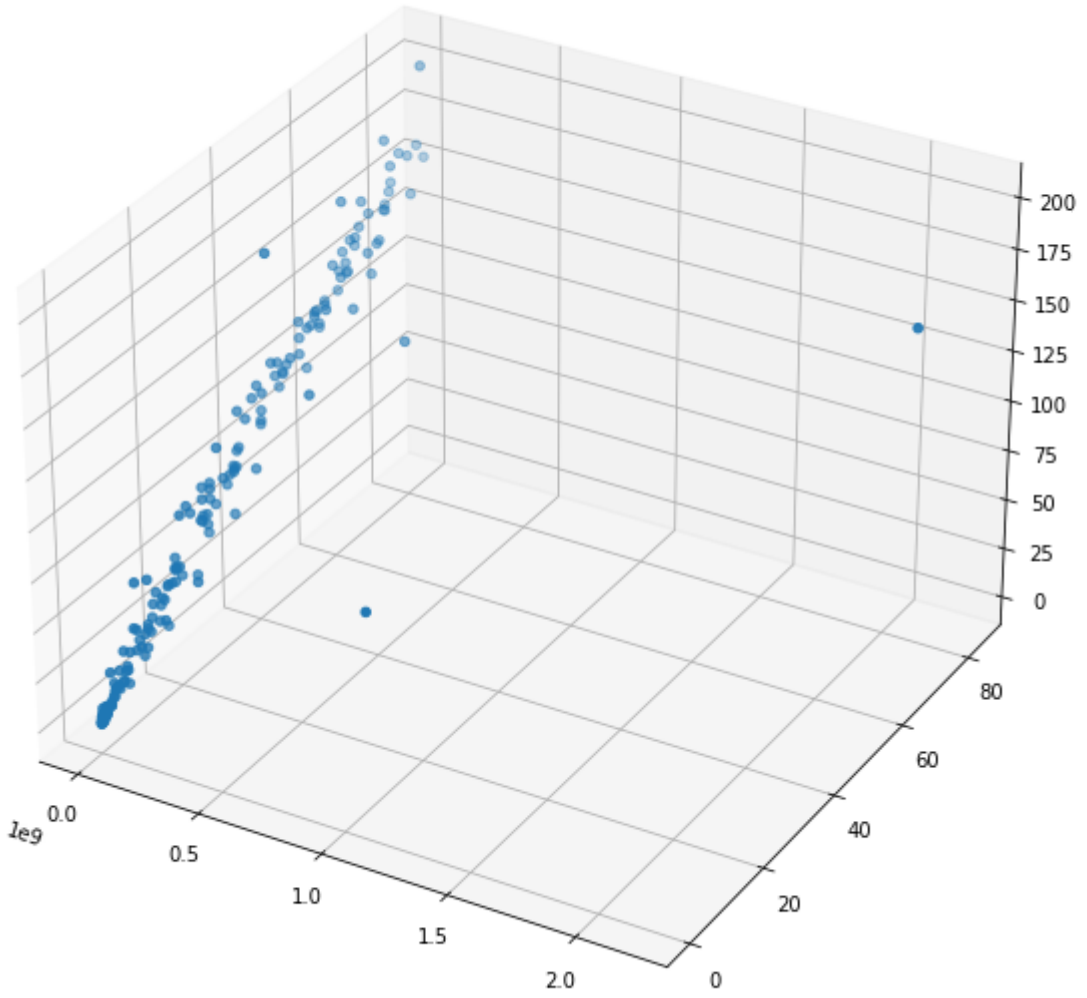


Fig-11 *3d graph of % of the population fully vaccinated and total dose of administration*

The Mutation of Covid-19 and Vaccination relation

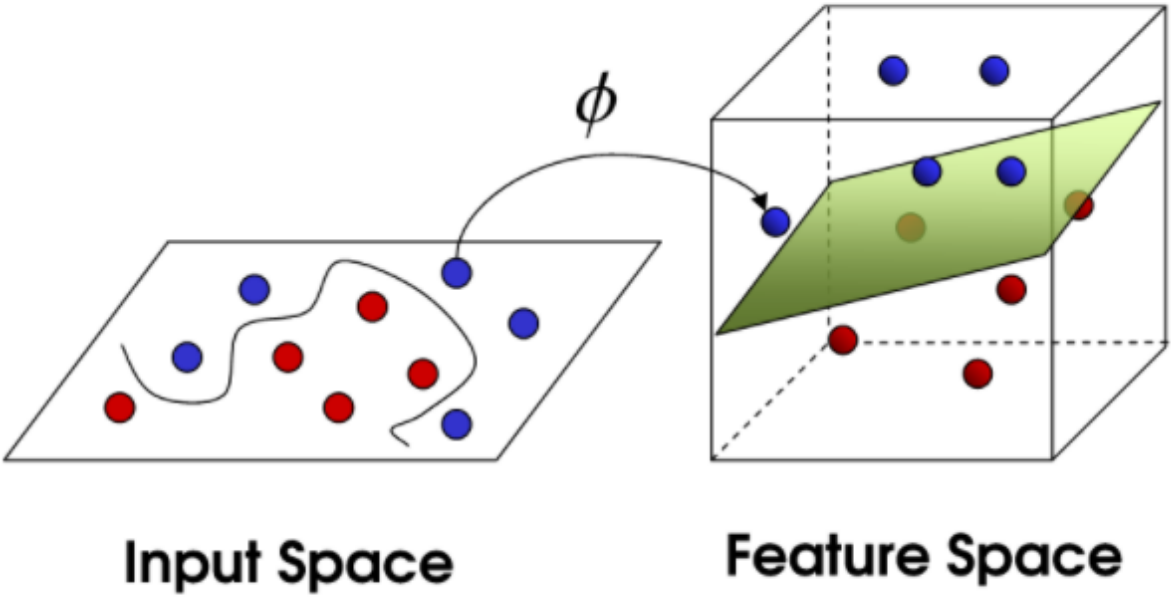


fig-12[6]-How prediction system work between vaccination and mutation in covid-19

```
df = df.select_dtypes(exclude=['object'])
df=df.fillna(df.mean())
X = df.drop('Long',axis=1)
y = df['Lat']
```

```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0)
```

```
from sklearn.svm import SVR
```

```
svr = SVR(kernel = 'linear',C = 1000)
```

```
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
X_fit = sc.fit(X_test)
X_std = X_fit.transform(X_test)
```

```
X_std
```

```
array([[-0.43517467, -0.2024578 , -0.24620888, ..., -0.43534702,
        -0.43534221, -0.43535844],
       [-0.43409457, -0.2024578 , -0.24620888, ..., -0.43427332,
        -0.43427124, -0.43428982],
       [-0.42766704, -0.2024578 , -0.24620888, ..., -0.42786284,
        -0.42787493, -0.42790755],
       ...,
       [-0.40736657, -0.2024578 , -0.24620888, ..., -0.40614056,
        -0.40557852, -0.40504161],
       [-0.43486349,  0.31288932,  0.72475573, ..., -0.43505746,
```

```
X_std.sum()
```

```
-2.7533531010703882e-14
```

```
type(y_test)
pd.core.frame.DataFrame
y_test.shape
(3, 1)
```

```
(3, 1)
```

```
type(X_test)
pd.core.frame.DataFrame
X_test.shape
(3, 1)
```

```
(3, 1)
```

```
X_train_std = sc.transform(X_train)
X_test_std = sc.transform(X_test)
X_test_std
sc= StandardScaler().fit(X_train)
```

Fig-13 how we implement the SVM

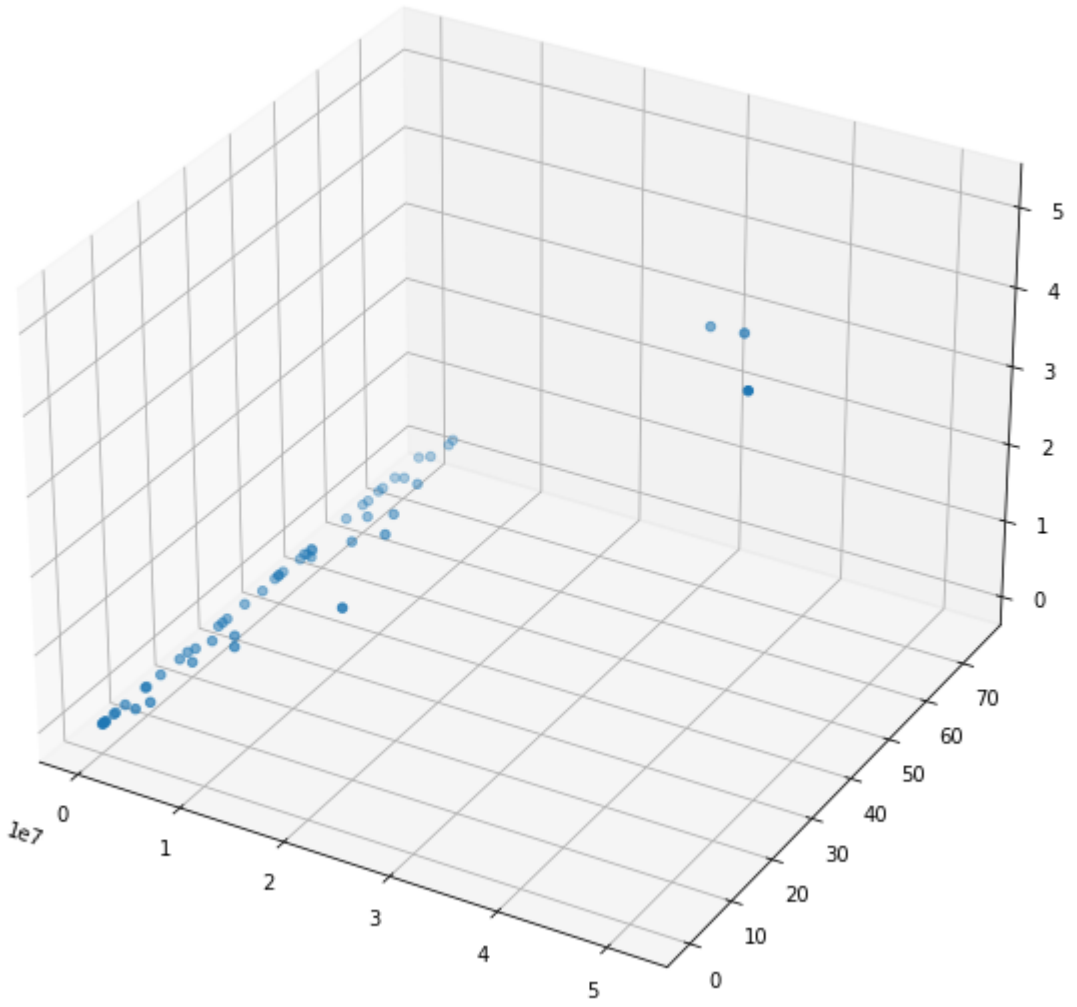


Fig-14 3-d graph the mutation and vaccination of covid-19

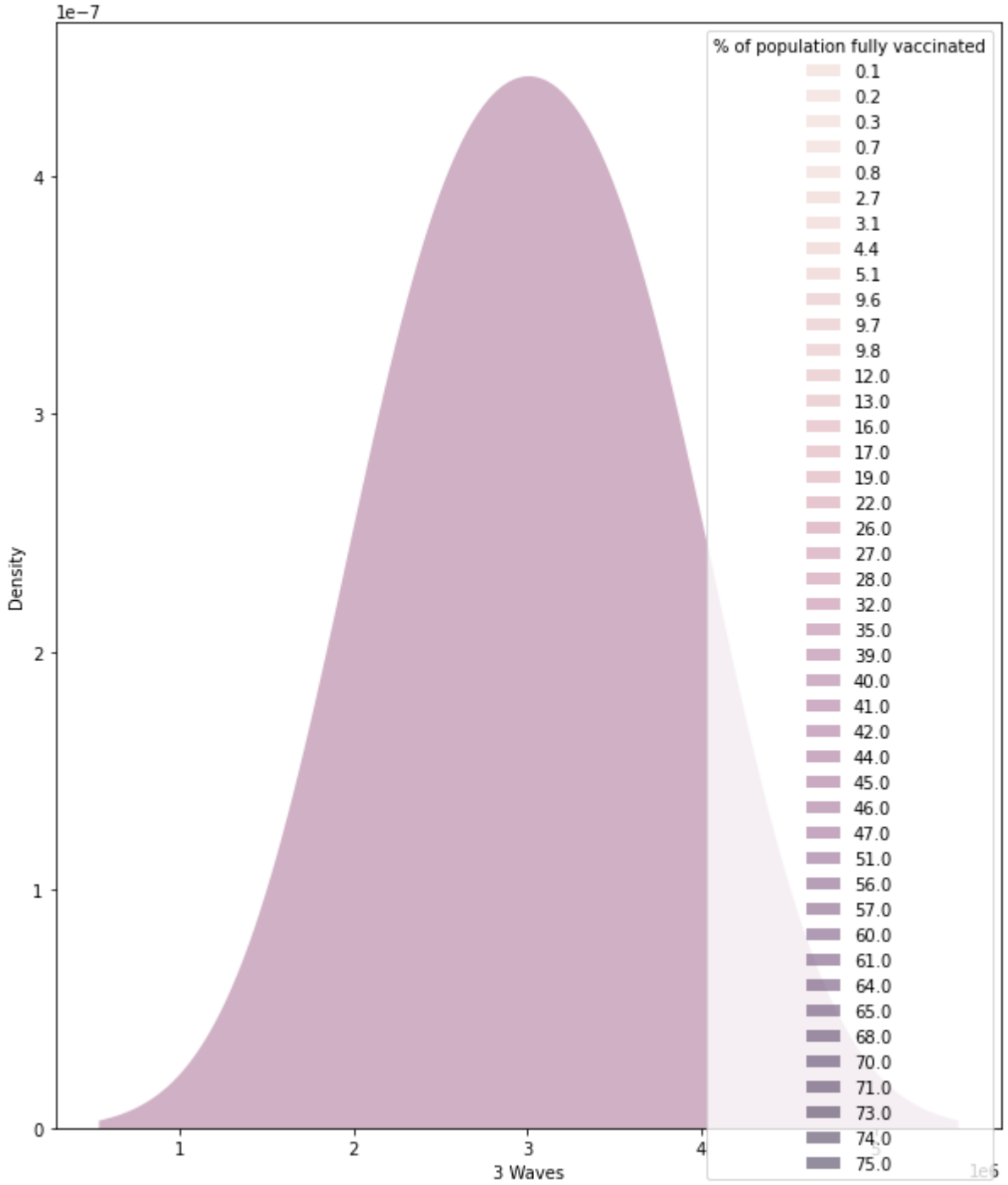


Fig-15 graph the mutation and vaccination of covid-19