# The 538 Models

The data reporting website 538 has compiled and maintained a list of predictions models throughout the pandemic. While their reporting focuses on the US, many of the models take into account world data. Below, I have summarized some information about the models so as to hopefully help anyone who wants to take a look. The models primarily use extensions of the SIR model one some sort of discretization of the united state (city, county, state, lat vs long) or some continuous moving estimate. Each model has a different methodology for estimating the parameters, here is a pretty good description of why that’s the big challenge here:

<https://fivethirtyeight.com/features/why-its-so-freaking-hard-to-make-a-good-covid-19-model/>

**Data:**

Johns Hopkins is compiling most of the data, take a look at their dashboard:

<https://coronavirus.jhu.edu/map.html>

Some models use their own data sources but the JHU data is by far the most commonly used. The raw data can be viewed on their github, but it’s very complicated since it comes from individual reports, some by hospital, some by county, some by state; some every day, some every month, some sporadic.

**Models:**

538 has the best model summary I’m aware of:

<https://projects.fivethirtyeight.com/covid-forecasts/?cid=rrpromo>

**Acronyms:**

Many of the models below are varaitions of the SIR model to include the following populations:

* S – Susceptible
* I – Infected
* R – Recovered
* E – Exposed
* H – Hospitalized
* D – Dead

For a full list of typical epidemiological models, see here:

<https://en.wikipedia.org/wiki/Compartmental_models_in_epidemiology>

# Differential Equations Models:

## UCLA

<https://projects.fivethirtyeight.com/covid-forecasts/?cid=rrpromo>

Modified SIR Model:

<https://covid19.uclaml.org/model.html>

## Yuyang Gu

<https://covid19-projections.com/>

Use Machine Learning to fit SEIR Model (<https://en.wikipedia.org/wiki/Compartmental_models_in_epidemiology#The_SEIR_model>)

## COVID-19 Simulator

<https://www.covid19sim.org/methodology>

Uses modified SIER model that includes hospitalized, under critical care, dead.

## University of Arizona

<https://www.sciencedirect.com/science/article/pii/S1755436516300329>

Pretty straight SIR model, they talk a lot about fitting it to data. It looks pretty straightforward but someone’s got to do it, and do it carefully.

## MIT

<https://www.covidanalytics.io/projections>

*You can think of our model as a standard* [*SEIR model*](https://en.wikipedia.org/wiki/Compartmental_models_in_epidemiology#The_SEIR_model) *with additional features specific*

## University of Massachusetts

<https://github.com/dsheldon/covid>

Bayesian inference on SEIRD model + Hospitalization.

# Curve Fit Models

## University of Texas

<https://covid-19.tacc.utexas.edu/mortality-projection-faq/>

Ensemble of statistical curve fit model and SEIRD model.

## IHME

<https://covid19.healthdata.org/united-states-of-america>

Ensemble model of SEIR, Dynamic Growth, and Curve Fit models.

# Discrete Models

## Los Alamos

<https://covid-19.bsvgateway.org/>

It looks like they’re using a discretize version of the SIR Model at the state level with validation on the data.

## Columbia University

<https://github.com/shaman-lab/COVID-19Projection>

Discrete Markov Model (Probability 1, if you haven’t seen them before).

## Iowa State

<http://www.covid19dashboard.us/>

Homebrewed version of discrete SIR that includes New Cases, Total Cases Thus Far, Active Infections, Dead, Recovered, Populations Size and Susceptible Population. They then run this as a weighted average over a discretized US infection map.

# Other

## Georgia Tech

<https://www.cc.gatech.edu/~badityap/covid.html>

A lot of stuff around using modeling to look at different intervention mechanisms. Very interesting, but I can’t find any easy summary of their modeling methodology.

*to the COVID-19 pandemic, like under-detection and differentiated government intervention.*

<https://github.com/dsheldon/covid/blob/master/docs/Bayesian%20SEIRD%20Model.pdf>

## Johns Hopkins

SEIR model, but they’ve got a lot of bells and whistles. Very computational model, but you can clone their git repo/docker instance and play around with their whole framework.

## Northeastern University

<https://covid19.gleamproject.org/>

Network based model that simulates mobility flows between different areas, each with an SLIR like model on them. Interesting by very complicated model that tries the realistically simulate human mobility. (<https://uploads-ssl.webflow.com/58e6558acc00ee8e4536c1f5/5e8bab44f5baae4c1c2a75d2_GLEAM_web.pdf>)

## US Army

Massive ensemble of other models.