# *Lecture on "Forecasting epidemics based on big data"*

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At 6pm to 7:30pm on February 4, 2021, the lecture of “Forecasting epidemics based on big data” of School of Silicon Valley Artisan of USJ broadcasted live online globally. Nowadays, California and other areas hardest hit by the COVID-19 have tried to gradually open outdoor catering, reopening schools and other measures to try to get people’s lives back on track. The effect whether it will go well is still unknown; at the same time, many countries in the world have also begun Large-scale injection of vaccines, but whether there will be unpredictable consequences or whether the effectiveness of the vaccine can meet people's expectations, or whether the vaccine is still effective after the virus has mutated, and so on are still plaguing everyone. It is particularly important to use big data to predict the development trend of epidemics. For the outbreak of infectious diseases, the models currently used in forecasting and early warning at home and abroad mainly include time series models, linear regression models, gray system theory, artificial neural network models, Markov models, Yebe’s model, etc. The following are the three main points summarized by the USJ instructor Kedi.

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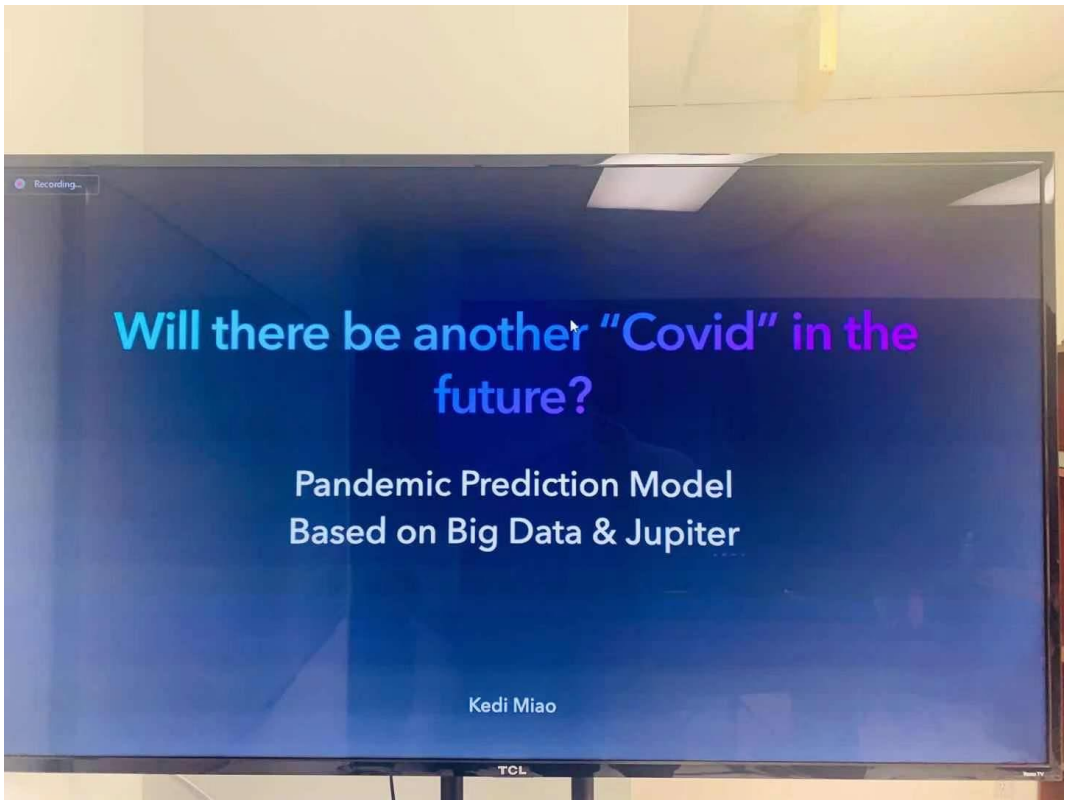
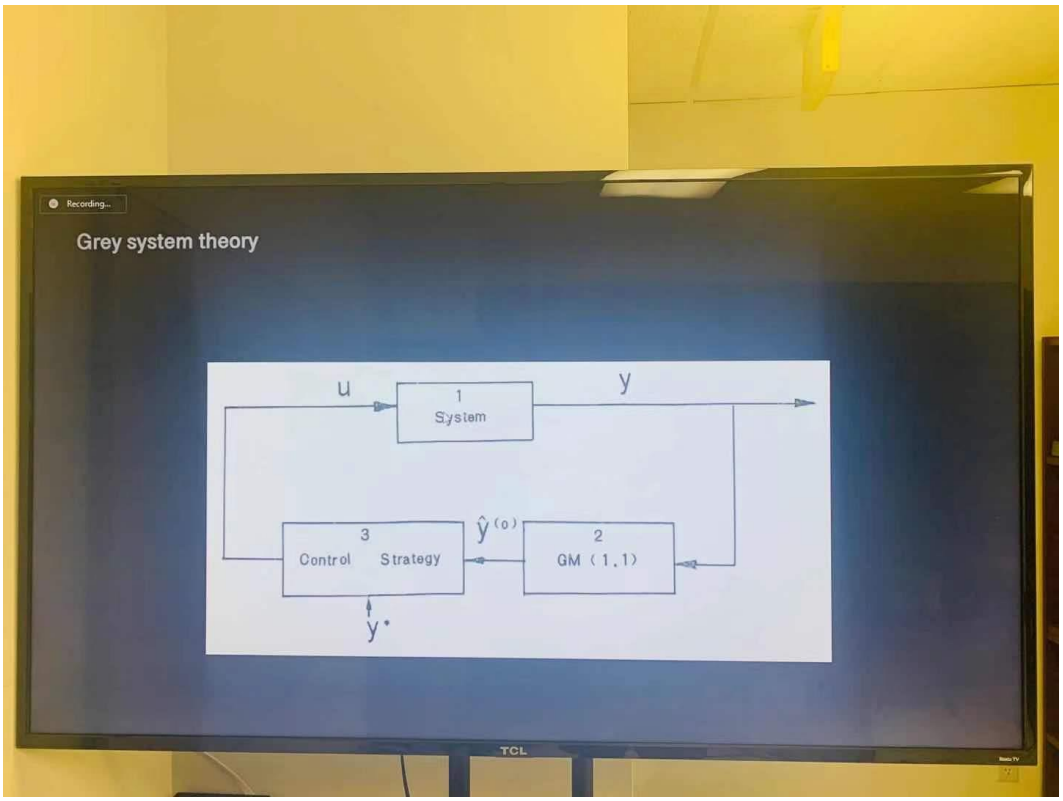

Recording...
Will there be another "Covid" in the future?
Pandemic Prediction Model
Based on Big Data & Jupiter
Kedi Miao
TCL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I. The review of lecture of “Forecasting epidemics based on big data”

1. Time series model (ARIMA model)

   As a classic model in unary time series analysis, it is one of the more mature and widely used methods in time series analysis. The model is not only suitable for stationary time data required by general time series models, but also for non-stationary time series that can be smoothed after d-order difference.

2. Linear regression model

   The regression model takes into account various influencing factors that affect the occurrence of the disease and can analyze complex data. Scholars at home and abroad have used regression models to successfully predict hemorrhagic fever, hepatitis B and other diseases.

3. Grey system theory

   The advantages of this model in disease prediction are:

   (1) Few data, as few as 4 data can be used to establish a model for prediction, and the use of data contaminated by noise can be allowed.

   (2) Good timeliness

   (3) Strong system and correlation

   (4) The modeling accuracy is high, and the characteristics of the original system can be maintained. It can be used for long-term trend forecast analysis, as well as medium and short-term forecasting.

   For example, the linear regression algorithm is trying to find the change pattern between two related variables, smoothing the data by fitting the data to a function, that is to predict the next value by establishing a mathematical model.

4. Markov model

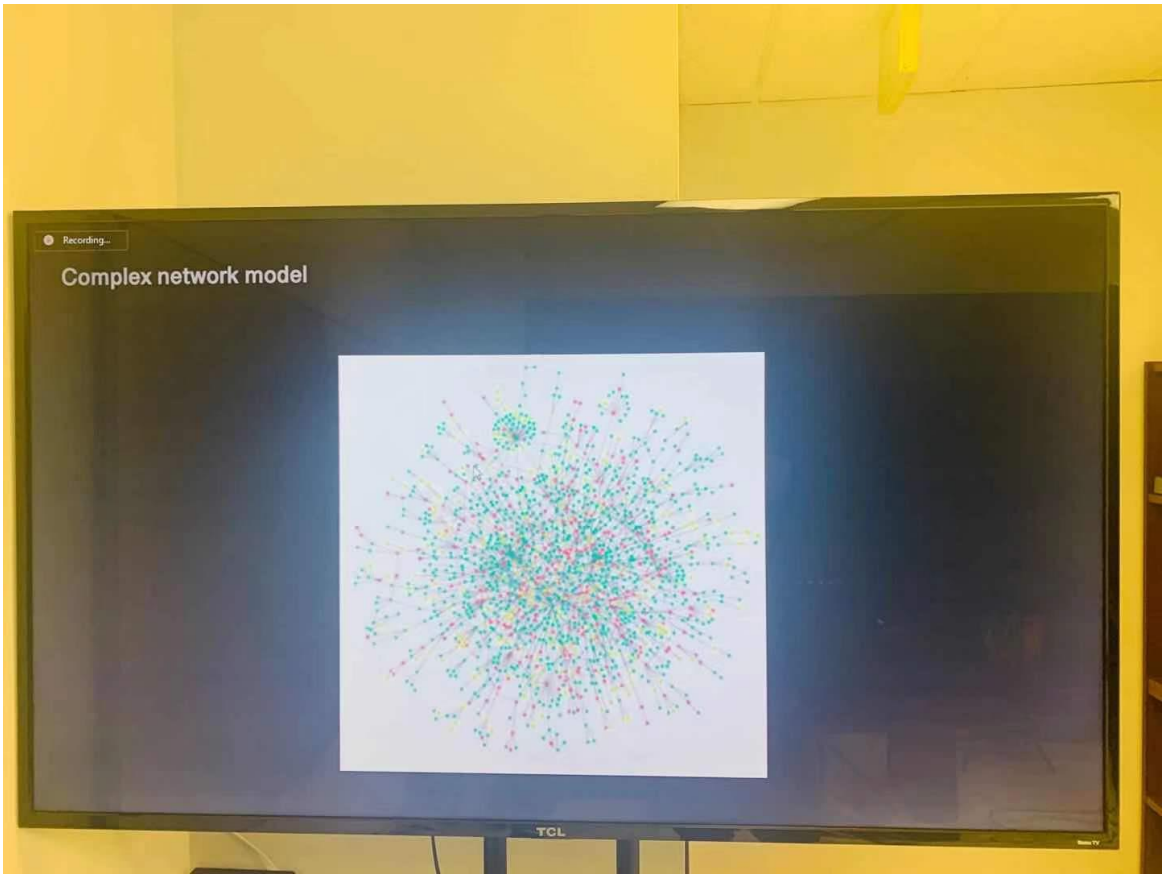
   Markov model is a non-parametric discrete time series analysis method. Markov model is an effective tool to explore the influencing factors of different stages of chronic disease.

5. Markov model

   The biggest advantage of artificial neural network is that it can adjust its structure to adapt to the characteristics of the sample. Completely overcome the inherent shortcomings of the traditional parameter model to adapt the sample to its own.

6. Markov model

   The most classic infectious disease prediction and early warning models in the complex network theory model are SIR, SIS and SIRS models. The SIR model is used to predict the diseases in which individuals can obtain permanent immunity after infection. The SIS model is used for diseases in which individuals have no immunity after being cured. The SIRS model is used to obtain a certain period of immunity after an individual is infected with a disease.



## II. Lecture Content

1. Epidemic hazards and history
2. What is big data and cloud computing?
3. Existing mathematical models in epidemic prediction
4. How to scientifically use big data to predict epidemics?

## III . Lecturer

School of Silicon Valley Artisan of USJ Instructor: Kedi Miao

(Washington University in St. Louis EE Master; familiar with JAVA, JavaScript, React, Spring and Android development; experience in developing Android App independently)

## IV. Organizer

USJ SVA

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