A Moblie App collects and displays Daily COVID-19 and Flu Cases

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*Abstract*— Machine learning is widely used to do prediction and give suggestion. When enough data is available, supervised learning is a good way to build accuracy models. Covid-19 is one of the hottest topics in this year and flu is also a problem confused people for many years. This project is to develop an android app to predict the trend of flu and covid-19, also can give people suggestion whether they need inject flu vaccine or not. All trend prediction and flu vaccine suggestion based on their assemble model. In this project, KNN, decision tree and Multi-layer perceptron are mainly used to train models.

Keywords— Covid-19, Flu, Android, Machine Learning, Deep learning

# Problem Introduction, Challenges and Related Work

## Problem Introduction

From Dec.2019, the covid-19 spread from Wuhan to the world. Millions of people suffered from this new virus. At the same time, the economy of many regions stopped growing.

Machine learning and deep learning tech are widely used to help people to fight against this kind of new virus. For example, L. Mertz and his team developed AI-driven tools to quantify Lung Images.[1] At the same time, in people's daily life, many apps are developed for keeping people away from the Covid-19 virus. J. Berglund and his team developed software to track the virus.[2]

The epidemic has not been controlled so far, and winter has come. Therefore, anticipation and early warning of Covid-19 are necessary. Use an app to help people away from Covid-19 seems necessary to work. If we can predict the possible outbreak of the epidemic, then forecast it to the public. Then we can reduce the number of people infected. This will help the epidemic to be extinguished more quickly, and make the economy recover faster. Currently, people use machine learning methods to predict the trend in the price of goods. Based on the history price, it is feasible to predict future prices. A. Yousefi and his team have used this tech to predict long-term electricity prices.[3] Therefore, it is also feasible to use machine learning to predict the future trend of covid-19.

This technology can be also used to forecast flu. At the same time, machine learning models can be used to predict whether a person needs a flu vaccine shot or not. This suggestion system can be ported to suggest a person should take the covid-19 vaccine as well.

## Challenges

### Data Collection and Procession

In the past, research project assignments are with datasets given by professor. These datasets are all well designed for my projects, and no need to reprocess these datasets. This time one of the biggest problems is to get good datasets

### Machine learning

Unsupervised learning has many kinds of algorithms, such as linear regression, support vector machines. however, different algorithms have different performance on different task. Therefore, it’s necessary to pick some good algorithm for project.

### Android App Development

As brief description of my project, this app should be a user-friendly manner. When this app is being designed, ease of use must be considered. So there are many restrictions and requirement when designing apps.

## Related Work

### COVID-19 Future Forecasting Using Supervised Machine Learning Models[4]

Furqan Rustam and his team use the dataset provided by the Center for Systems Science and Engineering, Johns Hopkins University. This dataset include features like latitude, longitude and the number of new inflect people.

They use 4 algorithms, Linear Regression, LASSO, Support Vector Machine and Exponential Smoothing to do future covid-19 forecasting. They set 85% of data as training data and 15% as test data.

ES and LASSO method perform good in forecast new cases with higher score and lower MSE. LR perform not bad and SVM cannot make a good prediction.

### Prediction of Influenza and the Associated Pneumonia in Taiwan Using Machine Learning[5]

Sing-Ling Jhuo and his team use a different kind of dataset and algorithm to study the trend prediction of Influenza. In their dataset, there are a lot more kinds of features such as temperature, relative humidity, PM2.5 and CO. Then their study dataset has more features.

Then they use a deep learning method, Multilayer Perceptron (MLP), to make model. Their study achieves 77.54% accuracy for the trend of influenza. The accuracy of elder population is especially good. The accuracy gets 81.16%.

# Formal Definition of the Problem

## Overall Framework

An android can collect data input by user, then machine learning model can calculate the predict of this data.

Then this app can display the prediction trend of covid-19 and flu or give app user suggestion whether he or she should take flu vaccine shot or not.

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1. Structure of Server Part and Client Side

## Data Procession Part

After collect dataset from internet, make them become a suitable dataset for supervised learning. Make sure that they have suitable labels and their features.

For example, the raw data of flu trend prediction records flu cases happened in Australia. The focus labels are the numbers of new cases. Therefore, we need to process data, like adding cases happens at same time and same place to one row.

## Machine Learning Part

Try different kinds of supervised machine learning algorithm to solve 3 problems, flu trend prediction, covid-19 trend prediction and flu shoot suggestion.

Then, compare their accuracy, MSE and other scores to choose suitable model. Pick about 2~3 models as final decision.

## Andriod APP Development Part

Client part is an android app which collects the data input by user and sends them to server; finally display the solution given by Server.

The main part of server part is assemble models based on ml model picked at machine learning part. Server part receive the data from client side and calculate them by machine learning models.

# Description of the Solutions (3 Page)

## Data Procession

## Machine Learning Part

## Andriod APP Development Part

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# Numerical Results and Analysis (1 Page)

## Machine Learning Part

# System Demonstration (1 Page)

## Server Part

## Client Part (Andriod APP)

# Conclusion (0.5 Page)

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*a**b* 

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* The subscript for the permeability of vacuum **0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter “o”.
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