Booming Blooming: When Can You Enjoy Flowering Season?

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Abstract—The blooming season is a crucial aspect of tourism in Taiwan, but it is subject to annual variations caused by weather factors such as rainfall and temperature. While many AI models are on the market for predicting flowering, they often need more applicability to specific regions due to climate variations. Moreover, Taiwan's climate is known for being changeable, which can further complicate flower prediction. Using Taiwan's climate and flowering date as training parameters, our model can achieve significantly higher accuracy than models that do not incorporate Taiwan's climate information. This paper presents an App called "Booming Blooming," which integrates a flower prediction model with real-time weather information. The App utilizes weather data from Taiwan's Central Weather Bureau to predict the optimal time for flower viewing and provides users with up-to-date weather forecasts. With this App, users can plan their flower-viewing trips more effectively. Moreover, the App includes a built-in Google map to assist users in locating nearby stores, traffic conditions, and other people at popular flower-viewing locations. Additionally, Booming Blooming offers a flower-sharing platform where users can share the latest information on flower blooming conditions. Overall, the proposed flower blooming prediction model and App provide a convenient and efficient way for Taiwanese to enjoy flower-viewing activities.

I. INTRODUCTION

Taiwan's favorable climate makes it an ideal environment for a diverse range of flowers to thrive, resulting in year-round blooms throughout the country. Many towns celebrate this abundance of floral beauty by hosting flower festivals that attract domestic and international tourists. These festivals are crucial in Taiwan's tourism industry, drawing visitors to appreciate the magnificent blossoms.

Existing platforms that offer information on flowering in Taiwan can be broadly categorized into two types. The first category provides detailed information on the blooming period of individual flower species, like the Hakka Affairs Committee's Tung flower forecast platform. The second category covers the flowering seasons of various flower species in Taiwan but provides less detailed information on each species, such as the "Shǎng huā qù" platform.

Existing platforms typically only provide general information about flowering seasons and cannot make blooming predictions for specific flowers. This leads to disappointment for tourists who miss the blooms. To solve this, we develop a model for accurate flowering time predictions, ensuring reliable information for visitors.

Several factors, such as temperature and humidity, can influence flower growth and blooming conditions. Taiwan's weather is unpredictable, with warm winters, cold snaps, and intense northeast monsoons bringing heavy rain, which can impact flower blooming times. This can result in a significant loss of tourism revenue and economic activity. Hence, precise prediction of flowering time is vital.

Various methods for predicting the flowering date, such as using daily temperature and regional climate in Japan [1] or observing carbohydrate metabolism in deciduous trees [2]. However, since the local climate affects the flowering time, even within the same climate zone, it is essential to train the prediction model based on the local climate of each region to improve its accuracy.

This paper presents an App called "Booming Blooming", which integrates a flower prediction model with real-time weather information. By Booming Blooming, users can access detailed information on popular seasonal flowers with just a few taps, eliminating the need for online searches. The model in Booming Blooming can predict current blooming conditions based on saved data, increasing the chance of seeing flowers fully bloom. It also integrates local weather and travel info, providing a one-stop shop for planning a memorable flower-viewing trip.

II. RESEARCH METHODS

Our team developed a model that accurately uses the collected data to predict the current flowering season. To make this information accessible to users, we created an App that integrates the model with real-time weather conditions and travel information. This App not only predicts the particular flowering period but also offers tour-related information to users.

The following is the process of training and predicting the flowering season model in this project.

A. Data Collection

To train our model, we collect data using Python Selenium to crawl information from multiple sources, including real-time weather forecasts from Taiwan's Central Weather Bureau, long-term meteorological observation data, and Facebook groups that appreciate flowers. To maintain the order of the Facebook group, each group formulate post templates about flower data. This also makes it easier for us to obtain the flower information we need.

B. Data Pre-processing

We carefully select the relevant columns from the collected data for model training purposes, such as humidity, temperature, and rainfall quantity, which served as labels for the model.

C. Model Training

Booming Blooming adopts XGBoost to predict flowering periods based on historical flower condition data and blooming dates. Different models are trained for various flower species using specific meteorological data. For instance, a model for hydrangeas is trained using humidity, temperature, rainfall, and light intensity. We also add the maximum wind speed column to train the model for lotus since they prefer a climate without strong wind. XGBoost's built-in missing value handling allows us to handle missing values in climate features such as daily wind direction, rainfall, wind speed, etc. The computed dates are stored in a database for future predictions. It is estimated that after five years of training, the accuracy will reach 90% by comparing predicted and actual flowering dates.

III. EXPERIMENTAL RESULT AND DISCUSSION

In Booming Blooming, users can easily find the flower species and blooming locations that match the current season, as shown in Fig. 1(a). The App provides predicted flowering season periods and current flowering status for each species, along with a real-time weather forecast, as shown in Fig. 1(b). Additionally, the App includes a Google map that allows users to navigate to the flower-viewing locations without having to search manually. The map also displays parking lot information, location, and nearby attractions, as shown in Fig. 1(c). Finally, users can comment on other people's posts about the flowers and use the App's predicted blooming time and user feedback to assess the current status of the flowers. Fig. 1(d).

Booming Blooming is an all-in-one App that simplifies flower viewing for enthusiasts. It integrates flowering season information, real-time weather data, travel details, and user feedback, making it a comprehensive resource for planning flower-viewing trips in Taiwan. With Booming Blooming, users can effortlessly plan their trips and never miss the opportunity to see stunning blooms.

IV. CONCLUSION

We developed the "Booming Blooming" App to address the scattered information and uncertainty surrounding flower blooming timing. Our App utilized humidity, temperature, the quantity of rainfall, and historical blooming dates to construct a flower blooming prediction model for different flower species. We also integrated the best-predicted viewing period with platforms like Google Maps and the real-time weather forecast system of the Central Weather Bureau of Taiwan. We also provided a user-sharing system to promote flowering season tourism in Taiwan. With this App, tourists can arrange their travel schedule in advance and access information about nearby attractions, thereby driving business
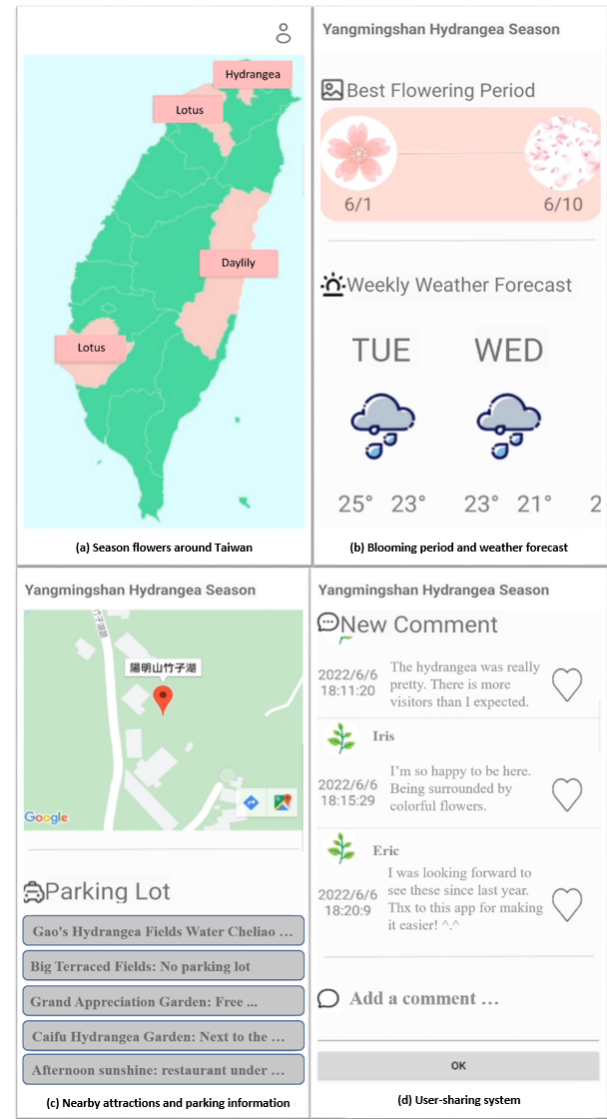

Fig. 1. Flowering Season Prediction App.

opportunities for local attractions. Booming Blooming is a must-have for anyone looking to experience the beauty of Taiwan's flowers.

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