

1. Introduction

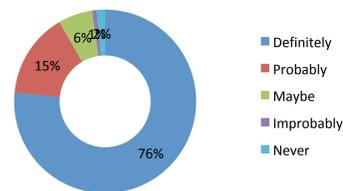
Clouds are a common and important weather phenomenon. The shape, quantity and variety of different clouds are significant in weather forecasting, especially in short-term predictions. Identifying different types of clouds is of great value not only for scientific research, but also for ordinary users.

The data set of this project comes from the real-time images of Moji weather app after which is classified by meteorologists, the AI experts use the multiple model to do several comparative training for them, and obtain the final “recognizing cloud” algorithm. In combination with the user survey, we have made it a product to popularize “recognition of clouds” capabilities to ordinary users.

2. User Survey

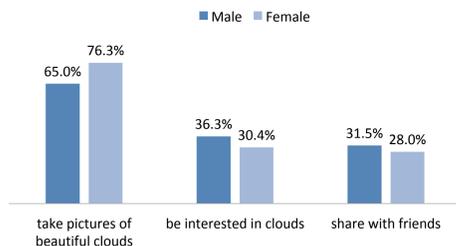
By using Moji weather platform, we have made a small survey which 4787 valid questionnaires are collected . The results have been shown as follows:

1、 Users' willingness to shoot clouds



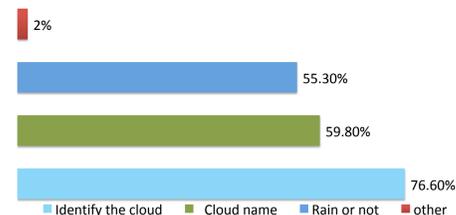
Users have a strong desire to shoot a cloud with a camera, and over 90% users are willing to record beautiful clouds.

2、 Motivation to shoot clouds



In priority, most users shoot clouds for their appreciation of good things and precious natural scenery. Their secondary purpose is the desire of cloud knowledge. And the third is “social demand”.

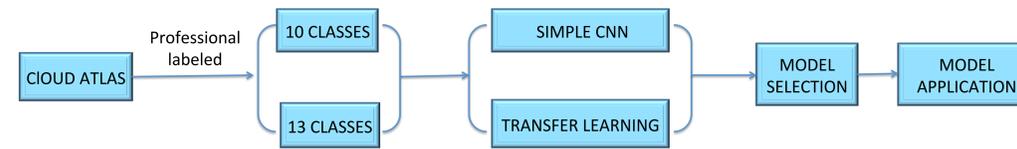
3、 What cloud information do the users want?



In the survey, users eager to know the information of the aspects of clouds, 76.6% of the users select “how to identify the different cloud”, followed by “the name of the cloud” (59.8%), and the third is “Whether clouds will rain or not”.

3. Method

FLOW



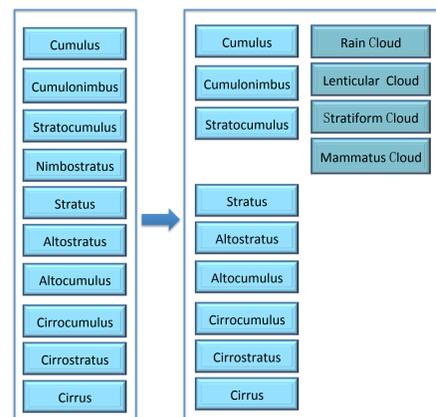
Scheme

Step1: Prepare the training set

10, 000 high-quality cloud atlas were selected from 30, 000 images containing clouds as training samples.

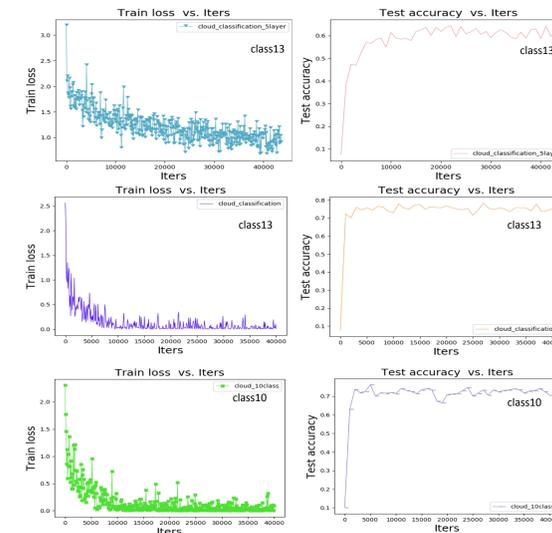
Step2: Manual classification and labeling

The general clouds has ten main groups, called genera which is our first classification. In addition, we merge some of the same features with different genera, and the category increases to 13.



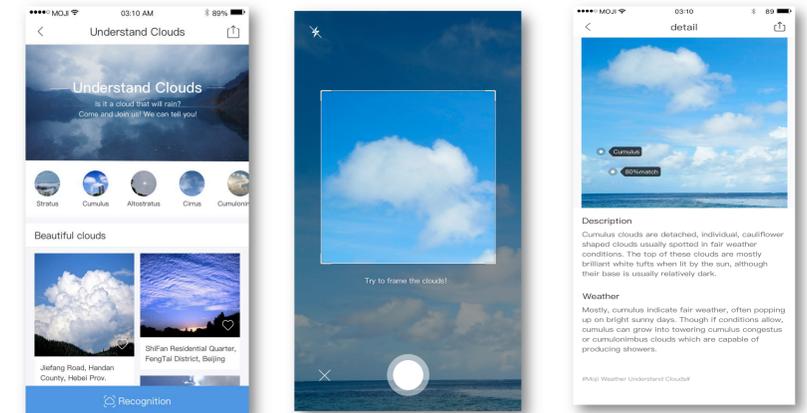
Step3: Comparison of different classification results

Simple CNN was used for rapid training and testing in the early stage, but the accuracy rate was low because of the small sample size. After that, we used the transfer learning to train two different classification data sets respectively.



The results show that, both the 10 and 13 categories of the cloud, the transfer learning has achieved better results, and the effect of 13 categories of the cloud is better than that of 10. Therefore, we choose the model of 13 categories of the cloud training as the application model of the product.

4. Product Design



In combination with the user survey, we have made a product experience of the algorithm of the cloud, and now it has become one of the functions of the APP . Click the “Recognition” button to identify the cloud.

Addition to smartly identifying clouds, the interface also presents a selection of “classified clouds” and the “most beautiful clouds” uploaded by users in real time. Users can appreciate all kinds of clouds and help them to deepen their understanding of the clouds. At the same time, a large number of user’s feedback results and picture information, which can be with other weather data, will become an important auxiliary data source for weather identification, especially in the lack of observational data, it will also have a greater value.

5. Conclusion & Future Work

In conclusion, it is really feasible to identify the cloud by artificial intelligence. However, we will progress our research in this area in the future. Further plans is as follows:

1. Try to allow users mark the correct kind of cloud when the machine’s recognition is obviously wrong.
2. In order to improve the classification credibility, we will make a secondary mark of the initial classification of cloud images by professionals in the united meteorological industry.
3. The classification of cloud will be gradually refined, and the current 13 classes will gradually add more detailed classification.
4. We will continuously optimize our product form and try to make the product more interesting which may attract more users to participate in our interaction.