For office use only	Team Control Number	For office use only
T1 _____	**84802**	F1 _____
T2 _____		F2 _____
T3 _____	Problem Chosen	F3 _____
T4 _____	**B**	F4 _____

2018
MCM/ICM
Summary Sheet

Prediction of languange distribution v6.2

Summary

This paper is about to propose a predictable model which is forecasting the number of each native speaker and total speark in the next 50 years. Also, the model would be used to commercial field, it could find a better place to open a office which can make huge benefit towards a service company. And at last, due to the changing nature of global communcation, in order to save the resources of the company, we calculate the profits that the company earn and losses. The results is to suggest the company whether open six office or not.

We first model the trend of number of native speaker based grey prediction model, forecast the change of distribution.

Secondly, we define some useful index

Thirdly, we test the model by using his torical data, we give the criterion that percentage difference should be under 5% As well as we note that the model's strength and weaknesses, which can only refer limited years and the model's creditability would decrease as the time through.

Finally, the model would be detacted by real result

Keywords: Population; Native speaker ; Grey prediction model

Prediction of languange distribution v6.2

February 10, 2018

Contents

1 Introduction

1.1 Background

Nowadays,There are 7099 languages around the world. Each of the language has its unique charm. But they are spread unequally throughout the world. That trend is clear whether were looking at whole regions,or individual countries. Under the influence of globalization,the distribution and number of each language speaker are now very different from the past. It is changing all the time. [2]

Moreover,an increasing number of people who learn another languages as second language even third languange or above. Some may know English, Chinese, Spanish and some may know Japanese, Portuguese. These kind of people who require the language job in service company. The head hunter had noticed that the phenomenon.

So we established this model to predict the distribution of the languages in the next 50 years. A further data can improve the business by decreasing the probability of mistakes to open a office. The place would be considered and selected depand on economic index from the model. It could be easy to refer which language would become popular in the corresponding place in the future. Besides, it would be offering the job opportunity directly to someone in need who satisfied the language requirement.Turning job finding to be more convenient. On the other hand, considering the people in these places who can speak more then on language, and they are the main targets to employ. The distribution of number of languages used can be review.

According to the study

The total number of speaker is mainly affected by the population growth. The following graph shows the relationship bewteen number of speaker and the population

We focus exclusively on the second definition.

- the angular velocity of the bat,
- the velocity of the ball, and
- the position of impact along the bat.

center of percussion [Brody 1986],

1.2 Assumptions

The model is going to ignore unpredictable and high-impact occured, we have to make following assumptions to guarantee the correctness of the model.

- ensure the information is absolutely right,
- the governments won't change the official language in their country,
- ignore the large-scale war, assume it won't break,
- the force over time that the hitter hands applies on the handle.

Theorem 1.1.

$$\int_{\infty}^{x} x \mathrm{d}F_l(x) \tag{1}$$

Lemma 1.2. *TEX.*

2 Analysis of the Problem

2.1 Overall analysis

2.2 Key point analysis

2.2.1 Analysis of prediction of native speaker growth

2.2.2 Analysis of prediction of native speaker growth

Proof. The proof of theorem. □

3 The models

3.1 Notations

We will use the symbols that given in the following table.

Variable	Description
L_i	Number of first(second,third or above) language (i=1 for first,etc)
Eg	Number of Emigration
Ig	Number Immigration
P	Population
P_{GDP}	Per Capita GDP
Im	Import (dollar)
Ex	Export (dollar)

3.2 The model idea

Due to the lack of data for the number of native speaker, we consider the grey prediction model to simulate the growth of speakers in the next 50 years. As we have found the factor of native speaker's growth has a strong relation with population growth of the countries which take it as official language.

After the calculation of the grey prediction model, we obtain the global distribution of all total different languages speakers. Then we established economic model to choose the place to open a office. The model cosider the business effect and the profits that the company may receive.

3.3 Growth of native speaker model

We build up this model based on grey prediction model

(2)

$$a^2 \tag{2}$$

$$\begin{pmatrix} *20ca_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} = \frac{Opposite}{Hypotenuse} \cos^{-1}\theta \arcsin\theta$$

$$p_j = \begin{cases} 0, & \text{if } j \text{ is odd} \\ r!\,(-1)^{j/2}, & \text{if } j \text{ is even} \end{cases}$$

$$\arcsin\theta = \oiiint_{\varphi} \lim_{x\to\infty} \frac{n!}{r!\,(n-r)!} \tag{1}$$

	1900		1906		1910	
Party	% of Vote	Seats Won	% of Vote	Seats Won	% of Vote	Seats Won
	Provincial Assembly					
Conservative	35.6	47	26.0	37	30.9	52
Socialist	12.4	18	27.1	44	24.8	39
Christian Democrat	49.2	85	41.2	68	39.2	59
Other	2.8	0	5.7	1	5.1	0
Total	100.0	150	100.0	150	100.0	150
	National Assembly					
Conservative	32.6	4	23.8	3	28.3	3
Socialist	13.5	1	27.3	3	24.1	2
Christian Democrat	52.0	7	42.8	6	46.4	8
Other	1.8	0	6.1	0	1.2	0
Total	100.0	12	100.0	12	100.0	13

Table 1: Elections in Götefrith province, 1900–1910. (Taken from [1], pg. 414.)

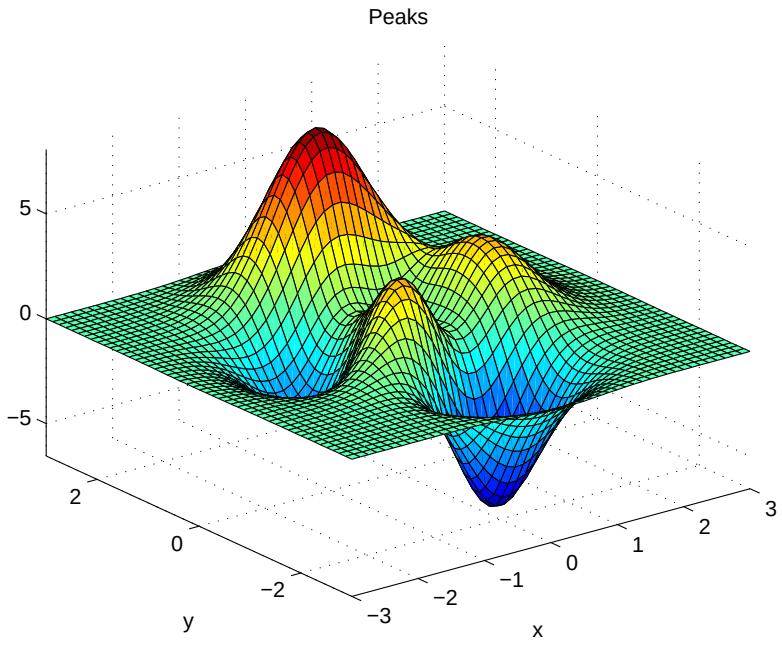

Figure 1: dadasdasdd

3.3.1 The model result

4 Calculating and Simplifying the Model

5 Validating the Model

5.0.1 The influences of the model

We use the contral variable method

6 Conclusions

7 Evaluate of the Model

8 Strengths and weaknesses

8.1 Strengths

- **Applies widely**
  This system can be used for many types of airplanes, and it also solves the interference during the procedure of the boarding airplane,as described above we can get to the optimization boarding time.We also know that all the service is automate.

- **Improve the quality of the airport service**
  Balancing the cost of the cost and the benefit, it will bring in more convenient for airport and passengers.It also saves many human resources for the airline.
-

[1]

8.2 Weaknesses

- **Policy never change**
  The model works only depand on no any outside force disturb, for instance: Policy won't change, and wherever is stable.
- **Data insufficient**

9 Memo

MEMORANDUM

To: Chief Operating Officer
From: Team #84802
Subject: The best place to open office
Date: February 13,2018

References

[1] John Grossman, editor. *The Chicago Manual of Style*. University of Chicago Press, Chicago, IL, 14th edition, 1993.

[2] Gary F. Simons and Charles D. Fennig (eds.). How many languages are there in the world? *Ethnologue*, 2017.

Appendices

Appendix A First appendix

Here are simulation programmes we used in our model as follow.

Input matlab source:

```
function [t,seat,aisle]=OI6Sim(n,target,seated)
pab=rand(1,n);
for i=1:n
    if pab(i)<0.4
       aisleTime(i)=0;
    else
        aisleTime(i)=trirnd(3.2,7.1,38.7);
    end
end
```

Appendix B Second appendix

some more text **Input C++ source:**

```
#include <iostream>
#include <cstdlib>
#include <ctime>
```

```
using namespace std;

int table[9][9];

int main() {

    for(int i = 0; i < 9; i++){
        table[0][i] = i + 1;
    }

    srand((unsigned int)time(NULL));

    shuffle((int *)&table[0], 9);

    while(!put_line(1))
    {
        shuffle((int *)&table[0], 9);
    }

    for(int x = 0; x < 9; x++){
        for(int y = 0; y < 9; y++){
            cout << table[x][y] << " ";
        }

        cout << endl;
    }

    return 0;
}
```