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A study on the trend of Global language Development

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Abstract: Inpart paper, by considering the data of population, economy, national policy from 2000 to 2015, we adapt Principal component analysis to quantify the data to find out the influence factors. We establish the Virus Infection model to predict the language users within 50 years. We get that Chinese, Spanish, English, India language and other languages will become the top ten languages in the next 50 years.

Key word: Population projections Virus Infection ModelExpert score.

1.Introduction

There are currently about 6,900 languages spoken on Earth. The following 10 languages are listed as the top 10 languages(in order of most native speakers): Mandarin (incl. Standard Chinese), Spanish, English, Hindi, Arabic, Bengali, Portuguese, Russian, Punjabi, and Japanese. Considering the world's population of seconds(third) language speakers, the languages and their order change from the native language list above.

The total number of speakers of a language may change over time due to variety of influences of economy, education, technology and government immigration and emigration policy reasons. In addition, increased global tourism, the use of electronic communication and social media may cause the change of amount of any language speakers.

In this paper, we predict the amount of speaker of top ten languages in the next 50 years. We establish the virus infection model to simulate the change of population migration. We get that Chinese, Spanish, English, India language and other languages will become the top ten languages in the next 50 years.

2 Main results

We establish a virus infection model to solve the problem:

The virus is: languages;

The infected population is: native speakers;

The infected population is: non-native population

Set: the total number N the same has been the proportion of infected people i(t), The proportion of healthy population is $s(t)$;

Infection rate is λ, and contact with healthy people will cause disease;

Extablish a mathematical model:

$$N[i(t+\Delta t)-i(t)]=[\lambda s(t)]Ni(t)\Delta t \tag{1}$$

$$\left.\begin{aligned}\frac{di}{dt}&=\lambda\\ s(t)+i(t)&=1\end{aligned}\right\}\rightarrow\begin{cases}\dfrac{di}{dt}=\lambda i(1-i)\\ i(0)=i_0\end{cases} \tag{2}$$

In this paper, the number of speakers in each language in 2015 is obtained by finding the data, and the growth rates of the following tables 1-3 are calculated:

Language	Annual growth rate λ
Chinese	0.028
Spanish	0.046
English	0.053
Hindi	0.132
Portuguese	0.140
Arabic	0.214
Bengali	0.036
Russian	0.050
Punssian	0.425
Japanese	0.028

Table 1-3

Bring (1) to Table 1-4:

Language	50 years later (millions)
Chinese	33240
Spanish	19780
English	17277
Hindi	16820
Portuguese	11583
Arabic	16014
Bengali	11591
Russian	7649.9
Punssian	10059
Japanese	6319

Table 1-4

Here we find that the results obtained do not match the actual situation: the total number of top ten language users in top ten ranks alone has reached to 148.3 billion. According to the existing studies, the current global average annual population growth rate Andassuming a downward trend, assuming thatits growth rate does not decrease, that is, the ideal state: there will be no global scale natural disasters,N=75Billion is the current world's total population after 50 years. N'Satisfies the following relationship:

$$N^{'} = N(1+\phi)^{50} \tag{3}$$

Brought into the corresponding parameters are:

$$N^{'} = 174.225 \tag{4}$$

$$N^{'} < 1483 \tag{5}$$

From the assumption that the premise, N' The ideal value, but the real value N* Should meet:

$$N^{*} \le N^{'} \tag{6}$$

After careful thought we made the following optimization of the model:

Taking into account the learning of a new language takes some time, so this article introduced here the incubation period of the virus: language learning stage, with Said. The model needs to be modified as:

$$N[i(t+\Delta t)-i(t)]=[\lambda s(t)]Ni(t)(\Delta t\mu) \quad (7)$$

In the meantime, give that language is life skills, our team believes that unless an individual dies, he can not cure the disease (language) and therefore introduces a mortality rate. The resultingmodel is as follows:

$$N[i(t+\Delta t)-i(t)]=[\lambda s(t)]Ni(t)(\Delta t\mu)-\varphi Ni(i)\Delta t \quad (8)$$

$$\left.\begin{array}{l}\dfrac{di}{dt}=\lambda \\ s(t)+i(t)=1\end{array}\right\}\rightarrow\begin{cases}\dfrac{di}{dt}=\lambda i(1-i)\\ i(0)=i_0\end{cases} \quad (9)$$

Suppose you have a complete grasp of a language need α Years are $\mu=\dfrac{1}{\alpha}$; Find out from the information that human mortality is 0.681% (Annual) the mortality rate $\varphi=0.681\%$ (Per year).

Language	50 years later (millions)
Chinese	3674
Spanish	1980
English	1717
Hindi	1672
Portuguese	1610
Arabic	1258
Bengali	1015
Russian	731
Punssian	708
Japanese	599

Table 1-5

According to Table 1-5, there are 14,968 million people who have been counted in the top 10 languages after 50 years

The virus infection model has some advantages: relatively simple, the virus infection model uses simulated virus infection, vividly simulates the dynamic image of population migration, and can accurately predict the rule of language assimilation. It also has some disadvantages: lack of a large number of accurate data support, model is the prediction, estimation model, can only predict and estimate the data, lack accurate data validation.

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