The Statistical Education in China

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Outline

1, Chinese Degree System
2, Statistical Education & Degree
3, Instructors
4, Employment
5, Challenges
6, A new degree program & a platform
7, Societies and Resources

1, Chinese Degree System

- **Chinese Academic Degree System started from 1981 by the Academic Committee of State Council.**

- **Two kinds of degrees: Academic and Professional**

- **Among academic degree, there are 12 degrees with Bachelor, Master and Ph.D., they are: Philosophy, Economics, Law, Education, Literature , History, Science, Engineering, Agriculture, Medicine, Management, Arts**

Bachelor

Professional Degree, 3,888

Academic Degree, 3,572,310

Mater

Profession Degree, 234,754
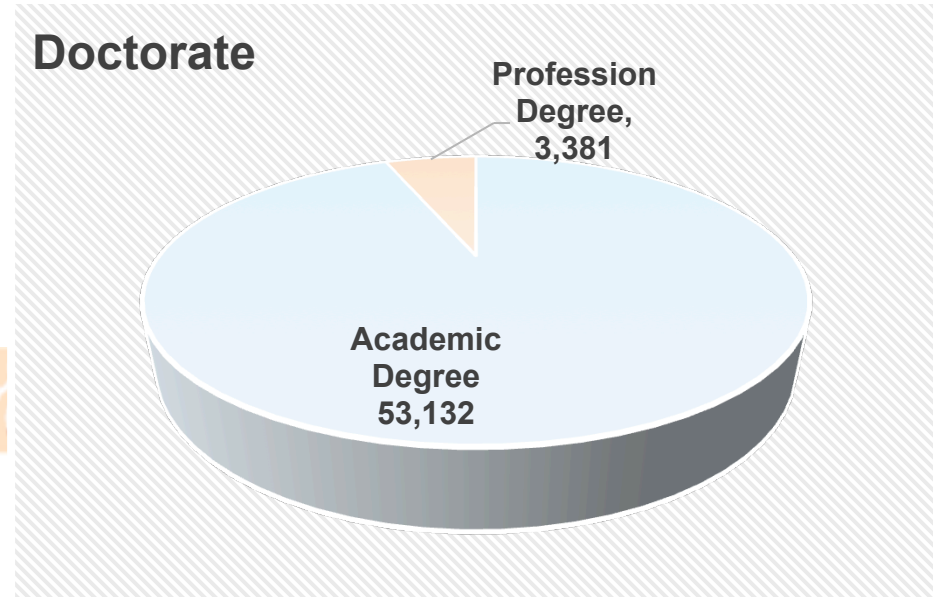
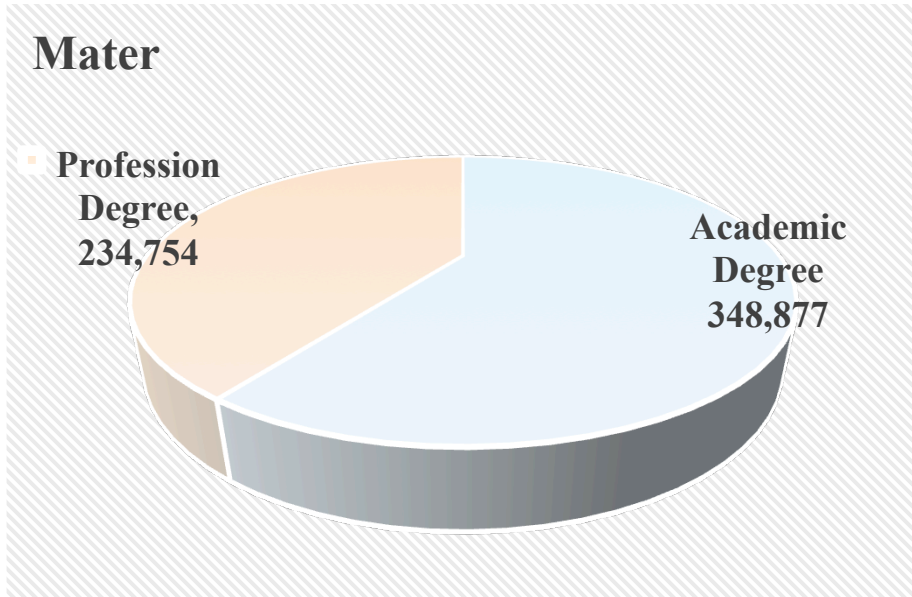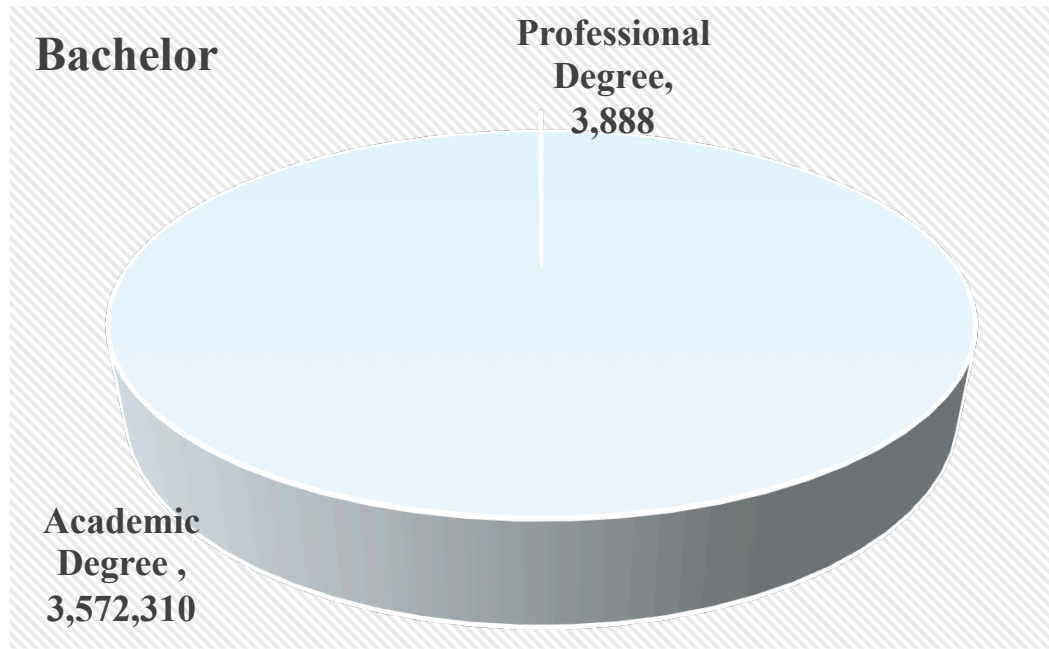Academic Degree 348,877

Doctorate

Profession Degree, 3,381

Academic Degree 53,132

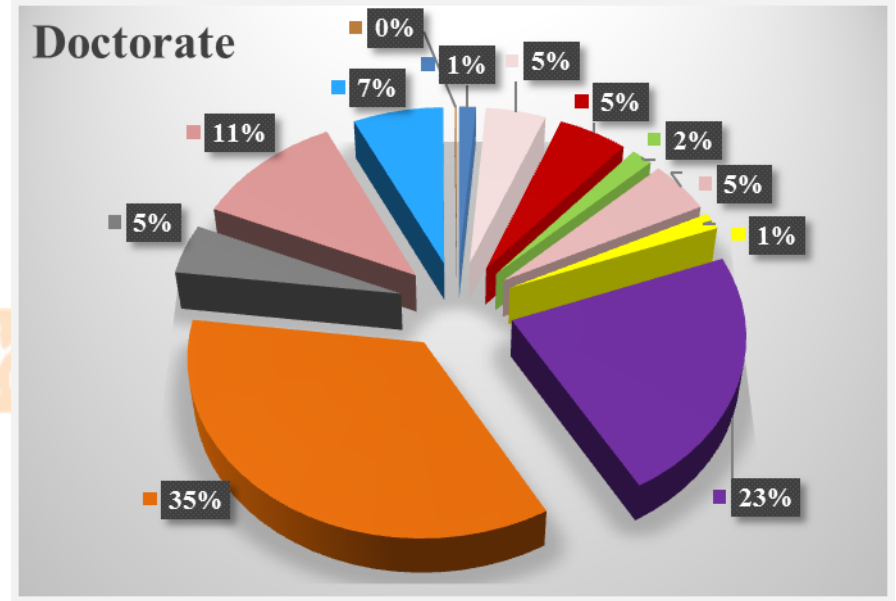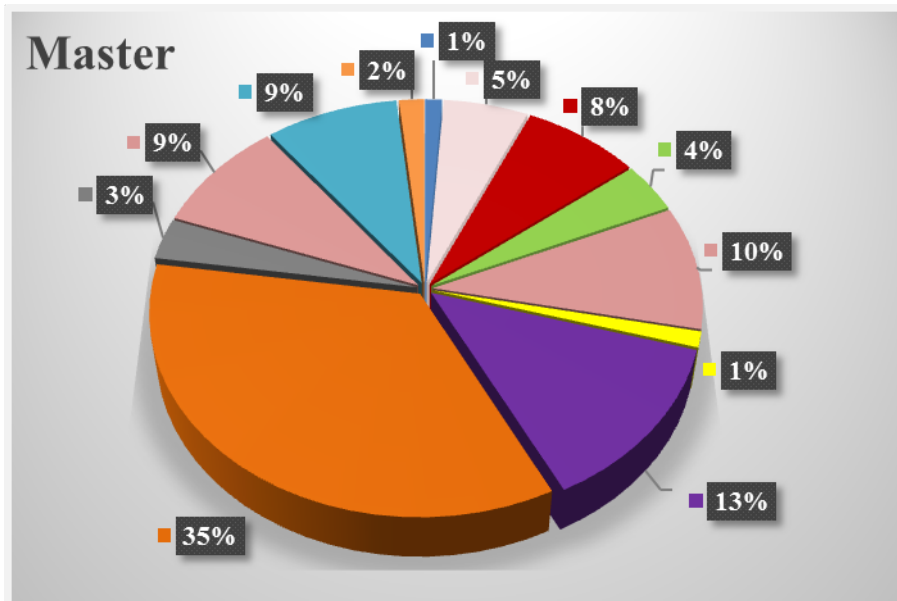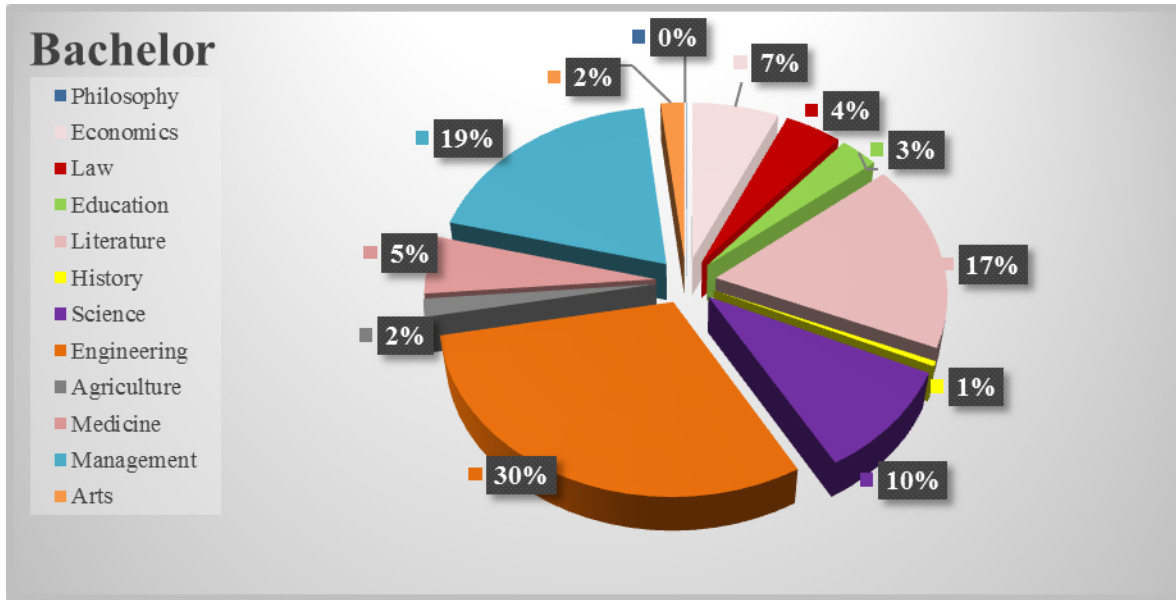Fig. 1, All Degrees Awarding in 2013

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Fig. 2, Statistical Academic Degrees Awarding in 2013

2, Statistical Education & Degree

- **From primary school, middle school, college to university, statistical teaching is in all levels of education.**

- **People's Education Press: from 2nd grade in primary school to high school (12th grade), Statistics is in each year's math class .**
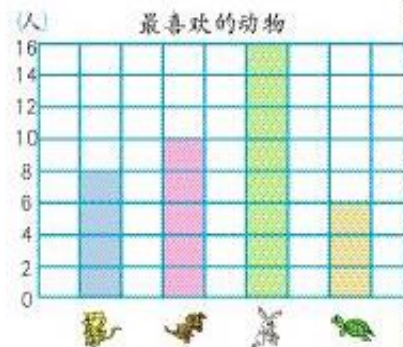
义务教育课程标准实验教科书

数学
SHUXUE

二年级上册

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7 统 计

每人找一张
自己最喜欢
的动物卡片

狗

兔

乌龟

喜欢的 动物	人数

最喜欢的动物

(1) 每格代表（ ）人。
(2) 喜欢（ ）的人数最多。
(3) 喜欢 的比喜欢 的多（ ）人。

- **In high school:**

  Statistics(16 hours) covers topics including:

  （1）**Random Sampling**

  　　Ideas of Simple Random Sampling, Stratified

  　　Sampling and Systematic Sampling

  （2）**Sample, Population and Estimating**

  　　Mean and Standard Deviation

  （3）**Correlation and Simple Linear Regression**

  Probability(8 hours)

- **In higher education:**

- **Almost all students in Economics, Education, Science, Engineering, Agriculture, Medicine, and Management take at least one statistical course.**

- **Students in other programs as their selection**

- **In total, over 40% students at least study one statistics course in their school life. Each year in China, more than 2 millions students take Statistics courses.**
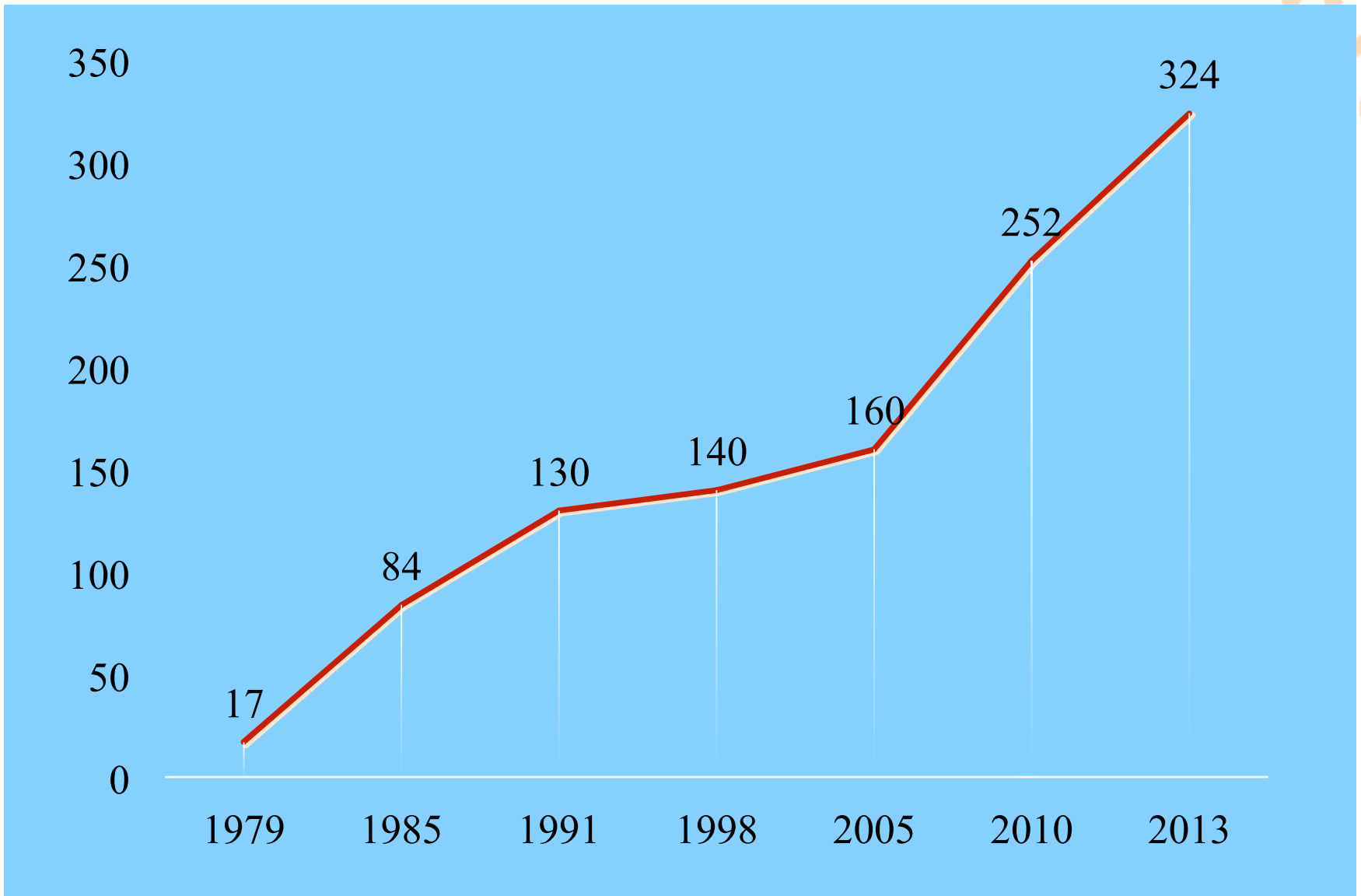
Fig. 3, Institutions offering statistics Bachelor degree

Degrees in Statistics

- **Before 2012, there were 3 statistical fields in higher education: Economic Statistics (all degrees in Economics); Mathematical Statistics(all degrees in Science); Epidemiology and Health Statistics(graduate degrees in Medicine).**

- **In 2012, The State Council Degree Committee made the decision to combine Economic Statistics and Mathematical Statistics together as the First-tier- discipline, which is parallel with Mathematics, Physics, Chemistry, etc...**
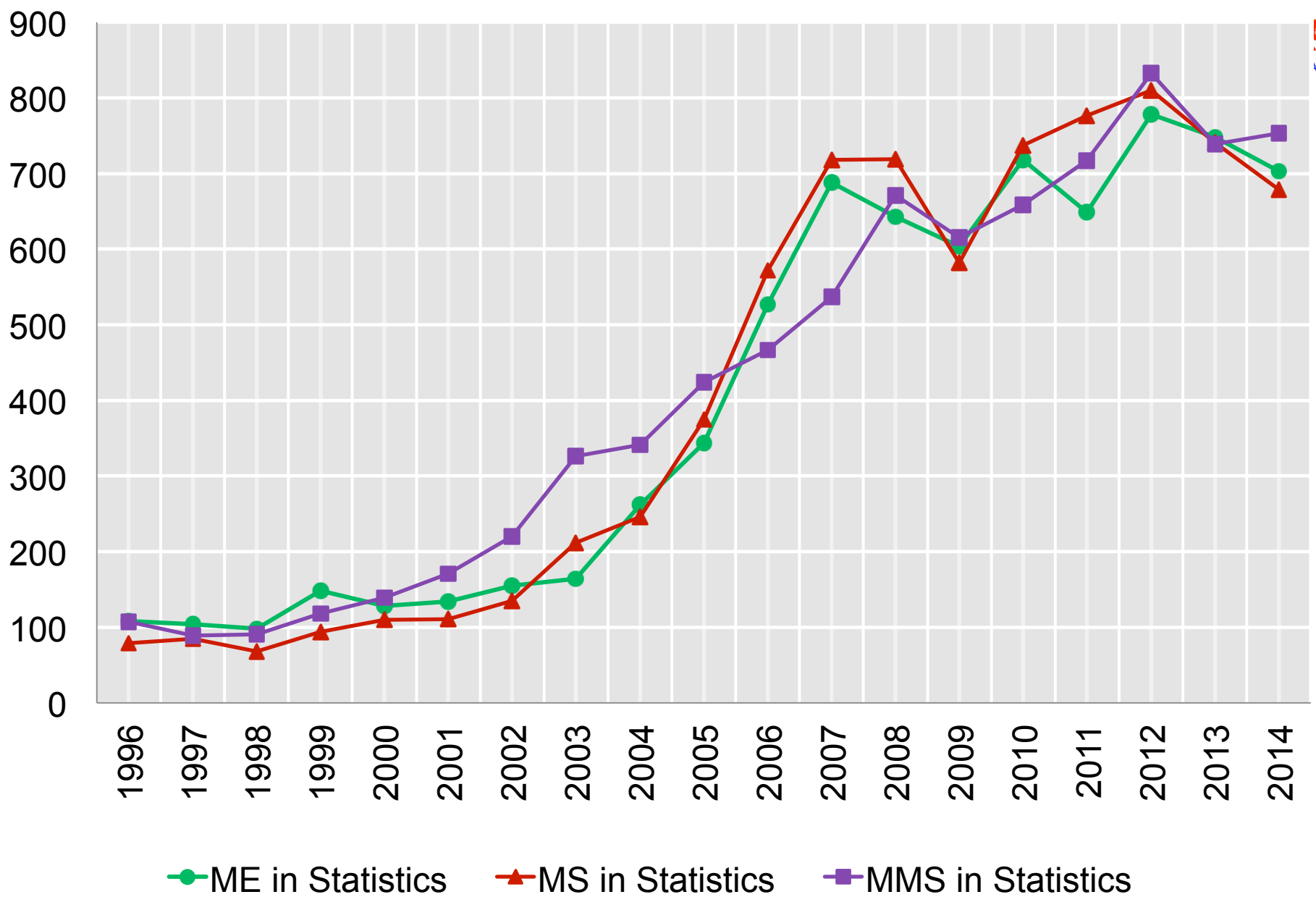
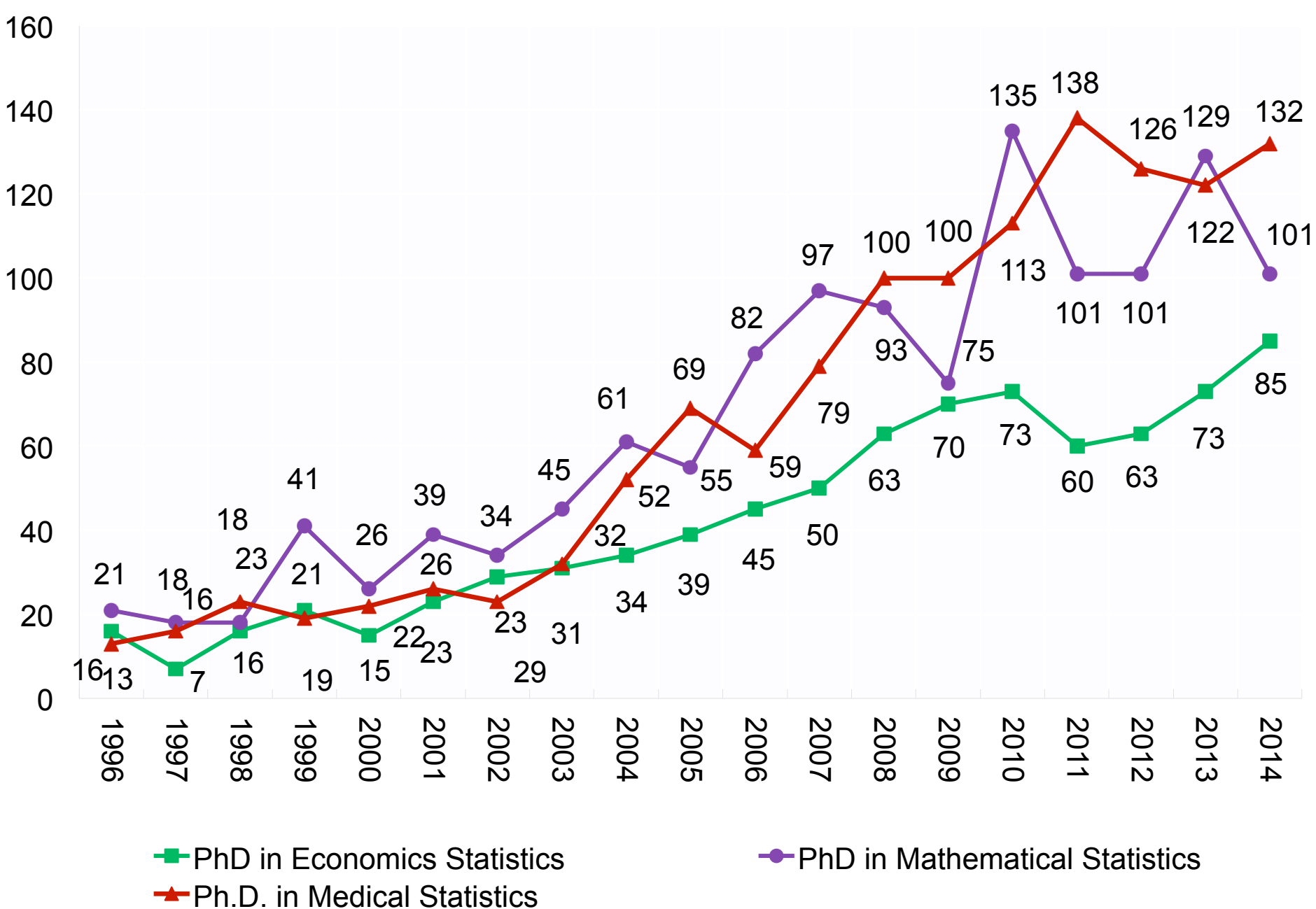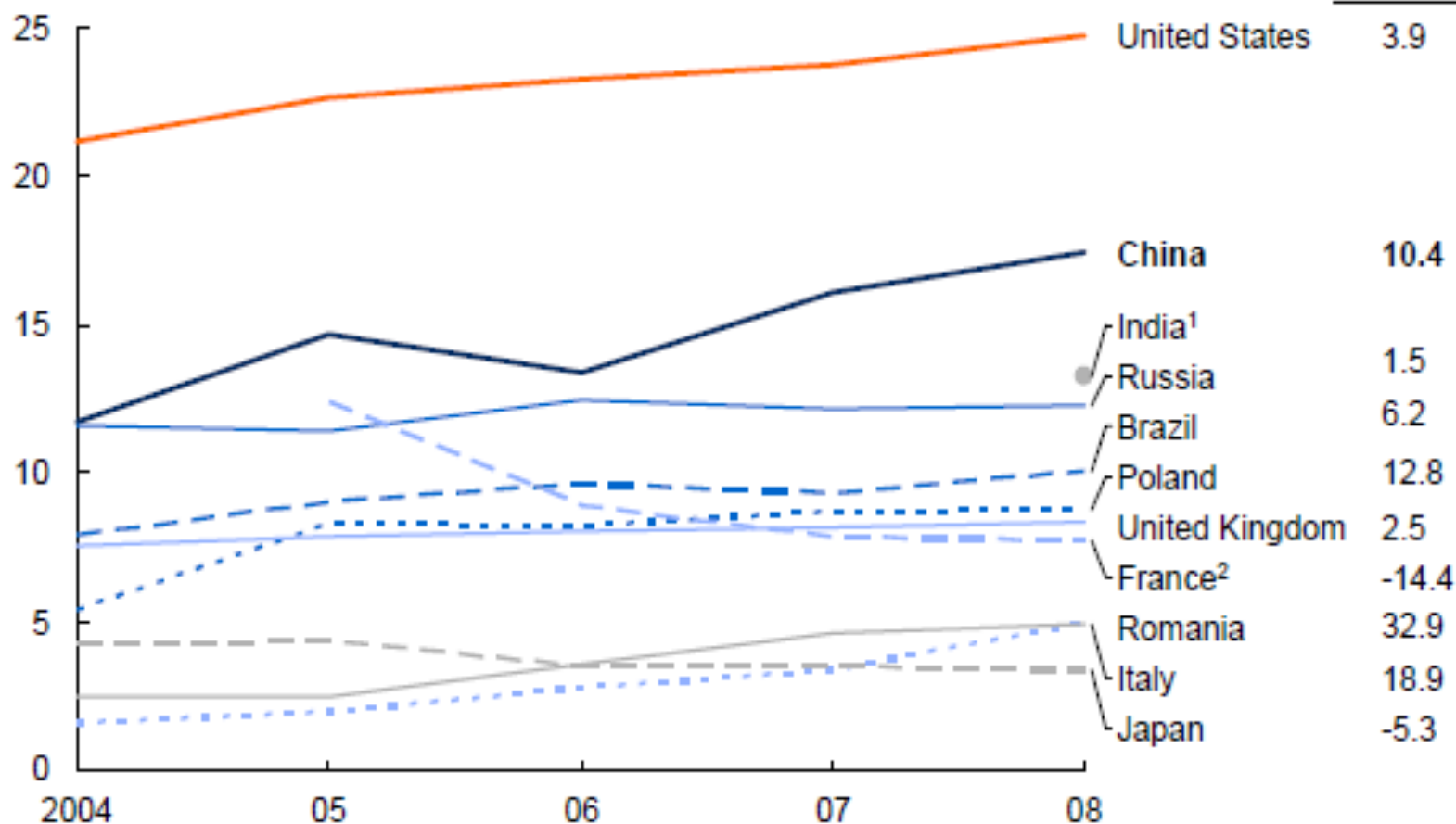**Fig. 4, Statistical master degree awarding numbers from 1996-2014** 12

Fig. 5, The statistical doctorate degree awarding numbers from 1996-2014[13]

China could narrow the gap with the United States, today's leading supplier of deep analytical talent

Top ten in the supply of deep analytical talent
Thousand people

Compound annual growth rate, 2004–08, %

	Compound annual growth rate, 2004–08, %
United States	3.9
China	10.4
India[1]	
Russia	1.5
Brazil	6.2
Poland	12.8
United Kingdom	2.5
France[2]	-14.4
Romania	32.9
Italy	18.9
Japan	-5.3

1 India ranked third in 2008 with 13,270 people with deep analytical skills but India does not have a time series for these data.

2 For France, the compound annual growth rate is for 2005 and 2008 because of data availability.

SOURCE: Eurostat; national statistical agencies; Japan Ministry of Education; India Sat; NASSCOM; China Statistical Yearbook; China *Education News*, April 2005; IMF *World Economic Outlook*; McKinsey Global Institute analysis
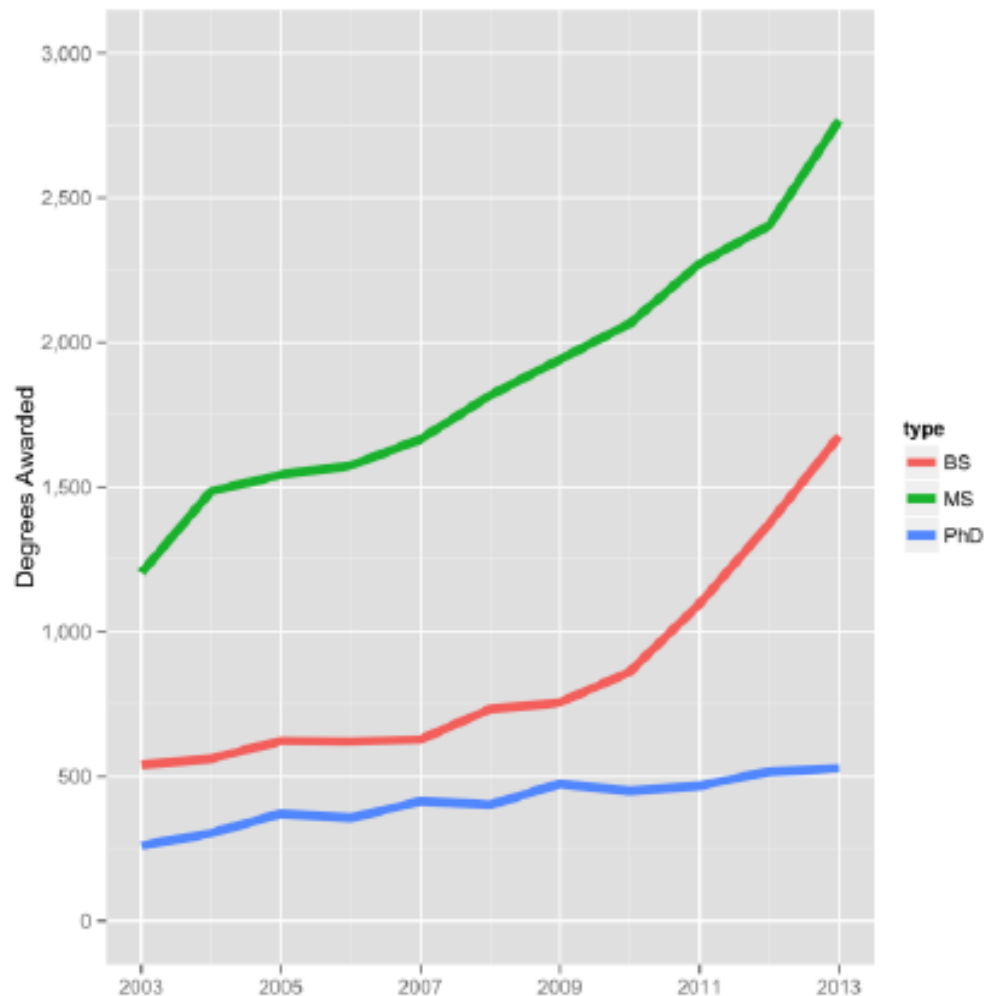
Figure 1: Statistics degrees at all levels in the United States. These data include the following categories: biostatistics; statistics; mathematical statistics and probability; statistics, other; and mathematics and statistics, other. Source: The Integrated Post-Secondary Education Data System Completions Survey, National Center for Education Statistics, ncsesdata.nsf.gov/webcaspar.

The key curriculum updates recommended in the ASA Guidelines for Undergraduate Programs in Statistical Science are the following:
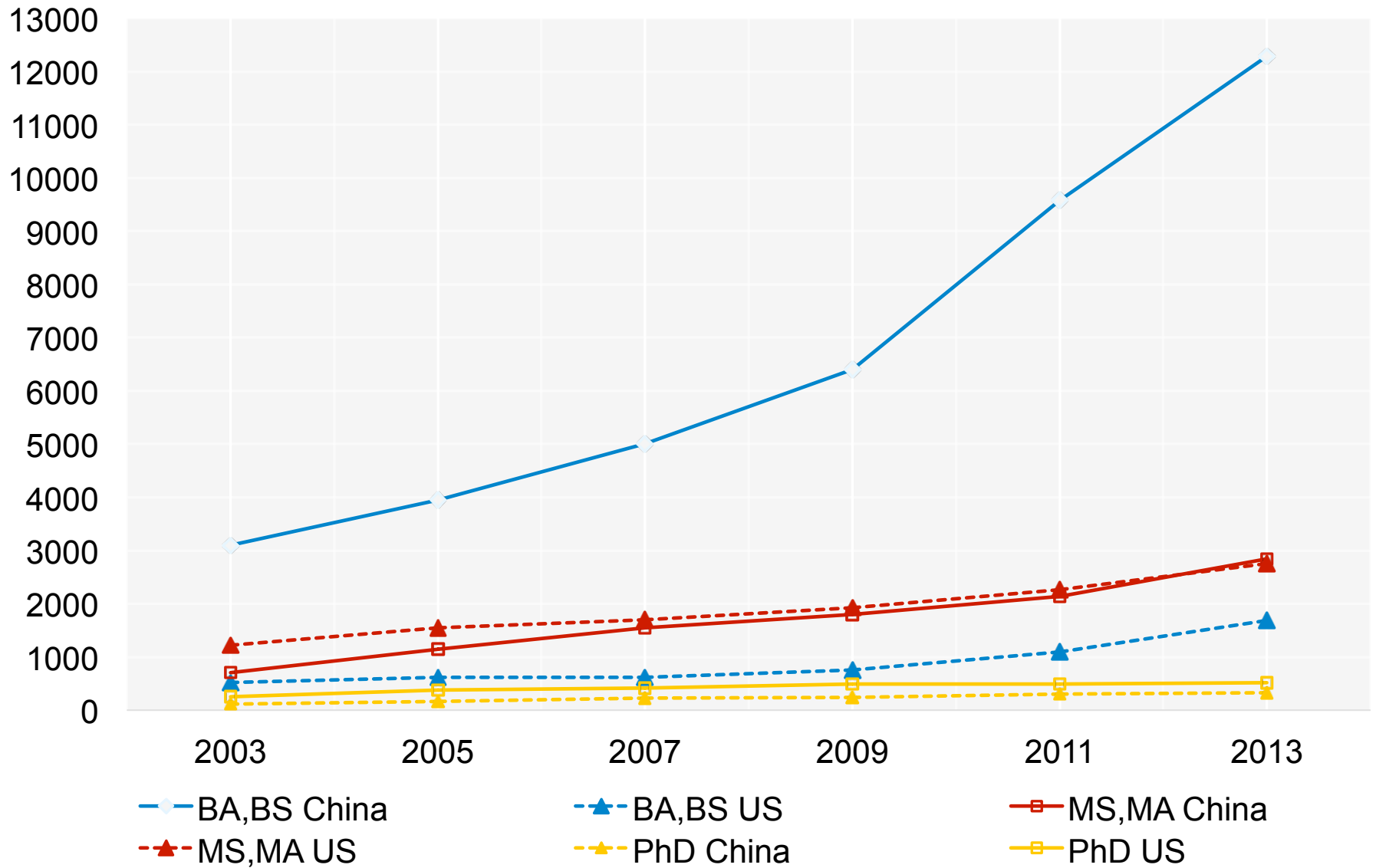
Fig. 6, Comparisons of statistical degree awarding numbers between China & US(2003-2013)

3, Instructors

- **The statistical instructors now are not enough for huge course teaching demand. For 324 statistical major institutions as well as more than 2 million students, more than 12,000 instructors are needed.**

- **From 1981 to 2014, total number of Ph.D. in Statistics, including Economics Statistics, Mathematical Statistics and Medical Statistics, is only 4,000. Among them, only 1/2 went on to be teachers.**

- **A huge gap to meet the demand of statistical teachers either in quantity or in quality.**

- **In western China , the statistical teachers usually take more than 12 hour' courses per week, and it is difficult for those institutions to enroll the statistical teacher with PhD degree.** 18

- **After Statistics became the first-tier discipline in 2012, 75 institutions now have the program to enroll the Ph.D. in Statistics.**

- **Among the 75, about half are the new programs, and after 4 to 5 years, the PhDs in Statistics will be doubled.**

	First-tier- discipline	No. of PhD Awarded Institutions	PhD Awarded in 2014
1	Management Science & Engineering	87	1306
2	Material Science	80	2103
3	Biology	80	3745
4	Mechanical Engineering	74	1548
5	Mathematics	69	1071
6	Chemistry	64	2461
7	Computer Science & Technology	59	1539
8	Physics	58	1634
9	Statistics	57(+18)	326
10	Business Administration	55	1211
11	Information & Communication Engineering	53	1232
12	Applied Economics	51	1524

Table 1, Discipline ranking of PhD program number and degree awarding numbers

Ranking	Institutions	Total Score	Faculty	Research	Education	Reputation
1	Renmin Uni. of China	90	4	1	2	2
2	Peking University	88	1	4	4	1
3	Xiamen University	85	6	3	1	9
4	Nankai University	83	7	5	5	3
4	Northeast Normal University	83	5	7	3	10
4	East China Normal University	83	3	10	8	4
4	Shanghai Finance & Economic University	83	2	12	7	6
8	Zhejiang Gongshang University	78	9	2	16	30
8	China Science & Technology University	78	30	14	6	7
8	Shandong University	78	14	9	11	13

Table 2, Statistical program ranking by Degree Center of Education Ministry 2012

哥大统计学硕士被中国学霸垄断 中国学生占8成

保存到相册
2

5月20日，出现在哥伦比亚大学毕业典礼上的"中国面孔" 供图/新华

M.A. in STATISTICS

Morgane Austern
Narisu Bai
Miguel Biron
Batel Blechter
Evan Blumgart
Junrui Cao
Wenjia Cao
Danni Chen
Donghuang Chen
Heng Chen
Jiong Chen
Meng Chen
Renjie Chen
Yanran Chen
Yingxin Chen
Yongyi Chen
Yuying Chen
Kai Cheng
Leyang Cheng
Mengqi Cheng
Yu-Hua Cheng
Jinyoung Chun
Bin Deng
Haiyan Deng
Peter Deng
Virginia Devi-Chou
Dawei Ding
Xiaotong Ding
Michael Discenza
Linyi Dong
Qing Dong

Qiumeng Duan
Zijun Fan
Ran Fu
Takahiro Fushimi
Hang Gao
Wenyu Gao
Yuemeng Geng
Jonathan Goetz
Mingyun Guan
Fang Guo
Minqian Guo
Yifan Guo
Lu Han
Yucen Han
Jiaqi Hao
Jundong He
Linglin He
Fan Heng
Wei-Chieh Ho
Margaret Hock
Andrew Howland
Zhao Hu
Huei-Chung Huang
Wonik Jang
Jia Jia
Biying Jiang
Nan Jiang
Yanning Jiang
Yi Jiang
Yingfei Jiang
Zixiang Jiang

Yang Kang
Jiun Kim
Zhiyuan Lai
Seungho Lee
Chunyang Li
Jialin Li
Jingnan Li
Ke Li
Kejin Li
Ruibo Li
Tianran Li
Xiaohuan Li
Xinyu Li
Xinyue Li
Yanan Li
Yingyi Li
Yitong Li
Yixuan Li
Yuanqi Li
Zheng Li
Weicong Liang
Wenxin Liang
Junchi Lin
Xi Lin
Zifan Lin
Yuan Ling
Jingdan Liu
Junyu Liu
Qin Liu
Wenyuan Liu
Xiaojing Liu

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- **MS in Statistics in Columbia University is the largest statistical master program in US, from 2003 to 2013, enrolling 1943 students.**
- **The second largest program for that period enrolled 579 students.**
- **In the top statistical Ph.D. programs of North American, nearly 1/3 students are Chinese.**
- **More and more statistics Ph.D. have returned to China in recent years, and among them, more than half join university faculties.**
- **After 5 years, the statistics instructor 's shortage will be improved.**

4, Employment

- **The graduates of statistics major are in high demand, and they can easily to find the satisfied jobs in all levels. Therefore, the enrolment have been increased rapidly in recent years.**

- **The Financial Companies, are the main selection for the statistics graduates.**
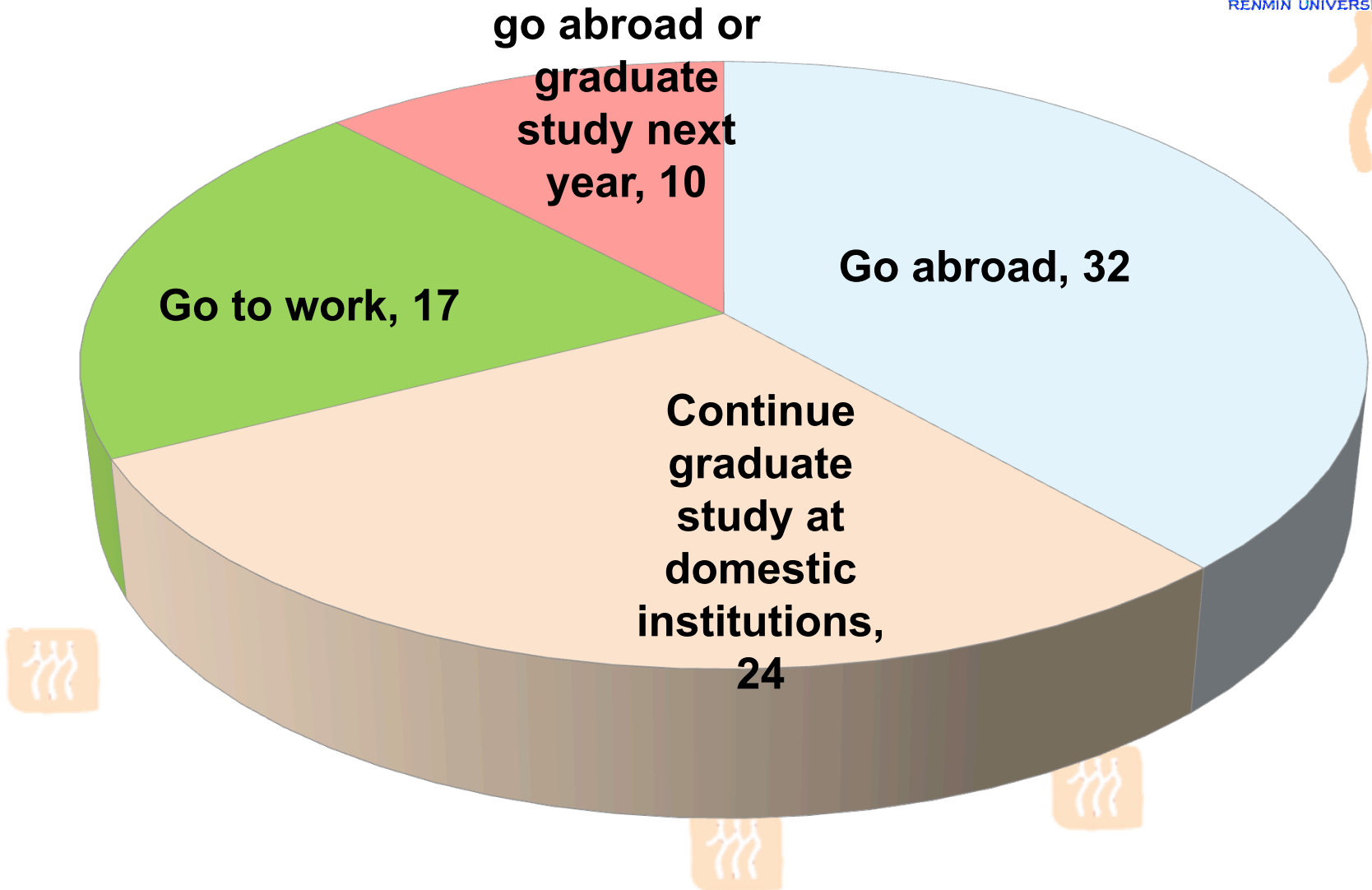
- **Take my university as an example:**

go abroad or graduate study next year, 10

Go to work, 17

Go abroad, 32

Continue graduate study at domestic institutions, 24

Fig. 7, Employment of Statistical Graduates in Renmin Univ., 2015

2015 Graduation Ceremony of Statistics graduates in Renmin Univ.[27]

5, Challenge

- **In big data age, how we statisticians find our position in the changing world, how we train our students as the deep analytical talents.**

- **We must keep our students enhancing the math and statistical foundation in one hand, and emphasizing the capability of data manipulation and computation in the other.**

Google Chief Economist Hal Varian:

"The ability to take data---to be able to understand it, to process it, to extract value from it, to visualize it, to communicate it---that's going to be a hugely important skills in the next decades."

"I think statisticians are part of it, but it's just a part. You also want to be able to visualize the data, communicate the data, and utilize it effectively."

Institute of Mathematical Statistics

The purpose of the Institute is to foster the development and dissemination of the theory and applications of statistics and probability

IMS Presidential Address
at the ASC-IMS meeting in Sydney, July, 2014
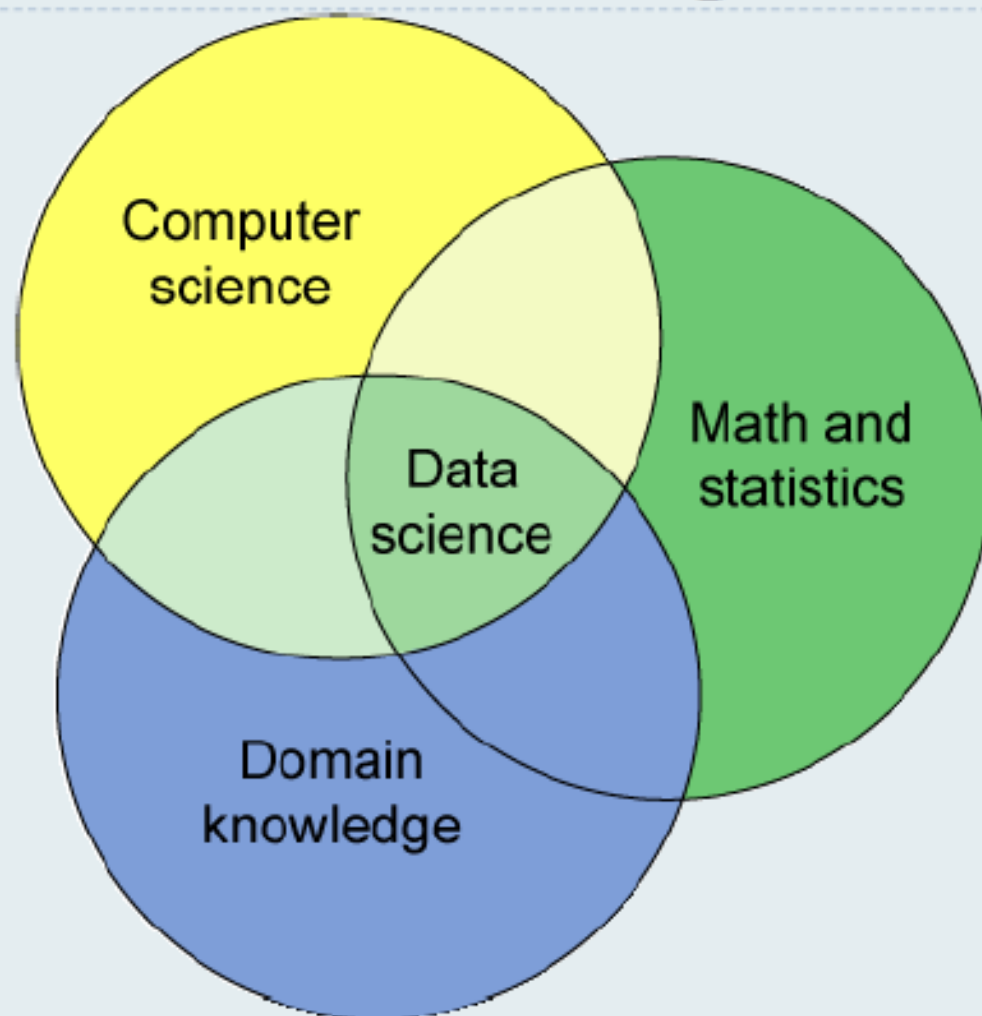
Let Us Own Data Science*

Bin Yu, IMS President (Statistician and Data Scientist)

statistics.berkeley.edu/~binyu

Statistics and EECS, University of California-Berkeley

▸ *"Own" here does not exclude other owners of data science.
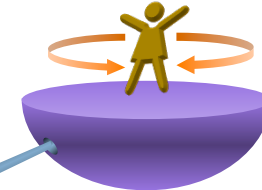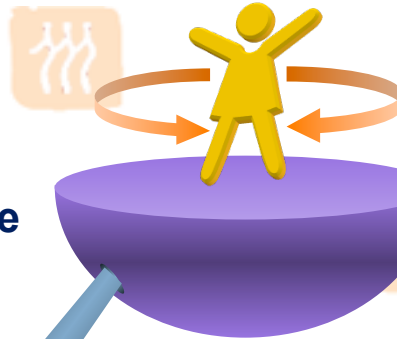
Data science is all the rage

http://www.ibm.com/developerworks/jp/opensource/library/os-datascience/figure1.png

Data Mining Engineer

• **Core link, from Data to Value**

Data Analyst

Key link, from Data to Value

Algorithm Engineer

Basic link, from Data to Value

6, A New Program & a platform

- **In 2010, Master of Applied Statistics(MAS) was proved by State Academic Degree Committee.**

- **78 higher Education Institutions have this new professional master program.**

- **Interdisciplinary--- Statistics, Computer Science, Math and Management departments work together to train the students to be skillful in data analysis and data management.**

- **The 5 statistical departments at: Renmin University, Peking University, Chinese Academy of Sciences University, Central University of Finance and Economics, Capital University of Finance and Economics, collaborated with their computer science faculties to establish a cross-university big data analytics program.**

Signing the collaborative agreement, May 2014

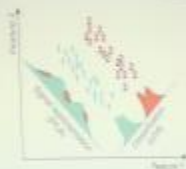# Table 3, Master of Applied Statistics（Big Data Analytics）

Main Required Courses	Main Contents	Credits
Basic computer skills on Big Data analysis	Introduction of operating system, distributed system, SQL, distributed databases(NoSQL, HBase, Hive, Pig, etc.), data integration	3
Distributed Computing	Hadoop、MapReduce、Storm	3
Basic statistics on Big Data analysis	descriptive statistic, multivariate statistics, time series statistics, spatial statistics, visualization analysis, etc.	3
Big Data mining and machine learning	Sampling, classification, prediction, clustering, associating, dimension reduction, integration algorithms	3
Unstructured Big Data analysis	Text mining, social network analysis and mining, data stream analysis, etc.	3
Big Data Analytics Case Studies		3
Summary of Required Courses		18

The first class

- **The first class started from September 2014 with 50 students (each school selects 10 students).**

- **Undergraduate major: 26 Statistics, 15 Math., 6 CS, 3 Physics and Finance.**

- **Students gender: 24 female and 26 male**

- **2 years program, 1st year attending classes(36 credits). 18 required(6 courses)**

- **2nd year, first half intern, and second half finish big data analysis report.**

One year intern

- **From next September, students will go to Alibaba Group, Baidu, JD, qihu360, iResearch, etc. for their internship.**

- **They are working in the data management or analysis department.**

- **Each student is asked to select a real big data analysis problem, and has two mentors, one from institution and the other from company.**

7, Societies and Resources

- **Statistical Education Society of China**

    ----Higher Education Committee

    ----Vocational Education Committee

    ----Primary & Secondary Education Committee

    ----Continuing Education Committee

- **The National Statistical Society of China**

- **Chinese Society of Probability and Statistics**

- **Chinese Association for Applied Statistics**

- **Forum: Capital of Statistics,**
    http://cos.name/

Summary

- Demand is huge, supply is in shortage.
- Challenges are in both quantity and quality
- Now is a good chance to develop Statistics education, we are speeding up the training and education.
Thank you!