

Department of Statistics and Actuarial Science

BACHELOR OF SCIENCE

Major in *Statistics*

Major in *Risk Management*

Major in *Decision Analytics*

A theme underlying all 3 majors is...

STATISTICS

addresses an important human endeavour...

a desire to make “sense” of *observations*



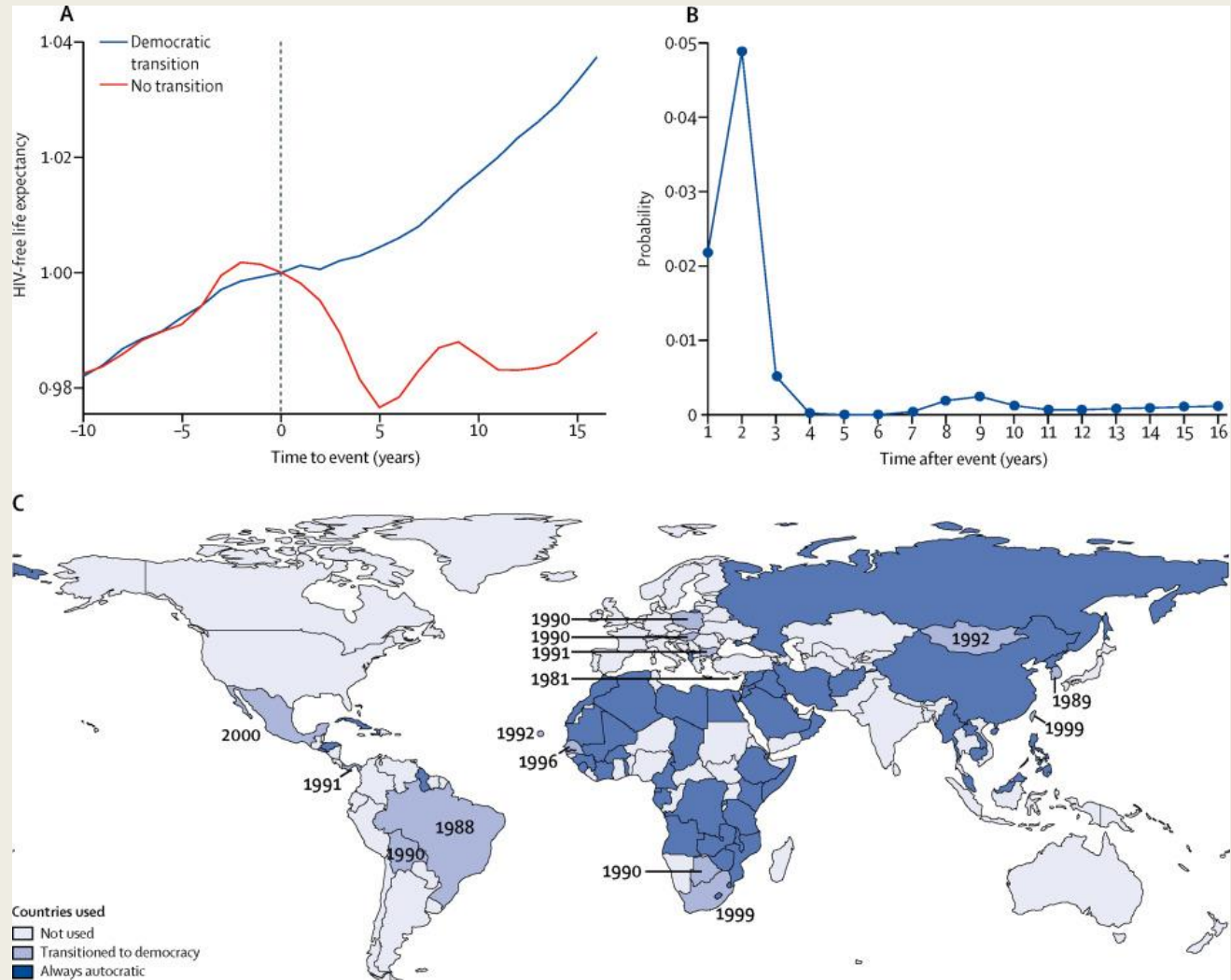
STATISTICAL
REASONING



EXAMPLES OF APPLICATIONS

THE LANCET

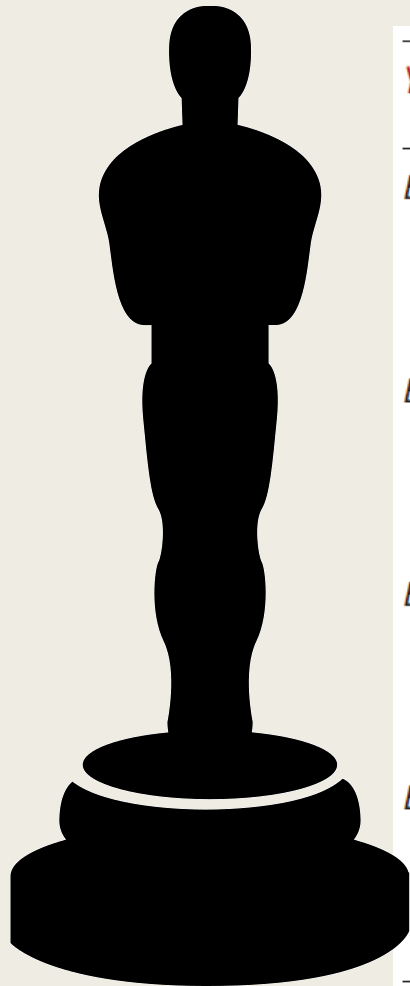
The relationships between democratic experience, adult health, and cause-specific mortality in 170 countries between 1980 and 2016: an observational analysis



Predicting Oscar winners

significance

december2007



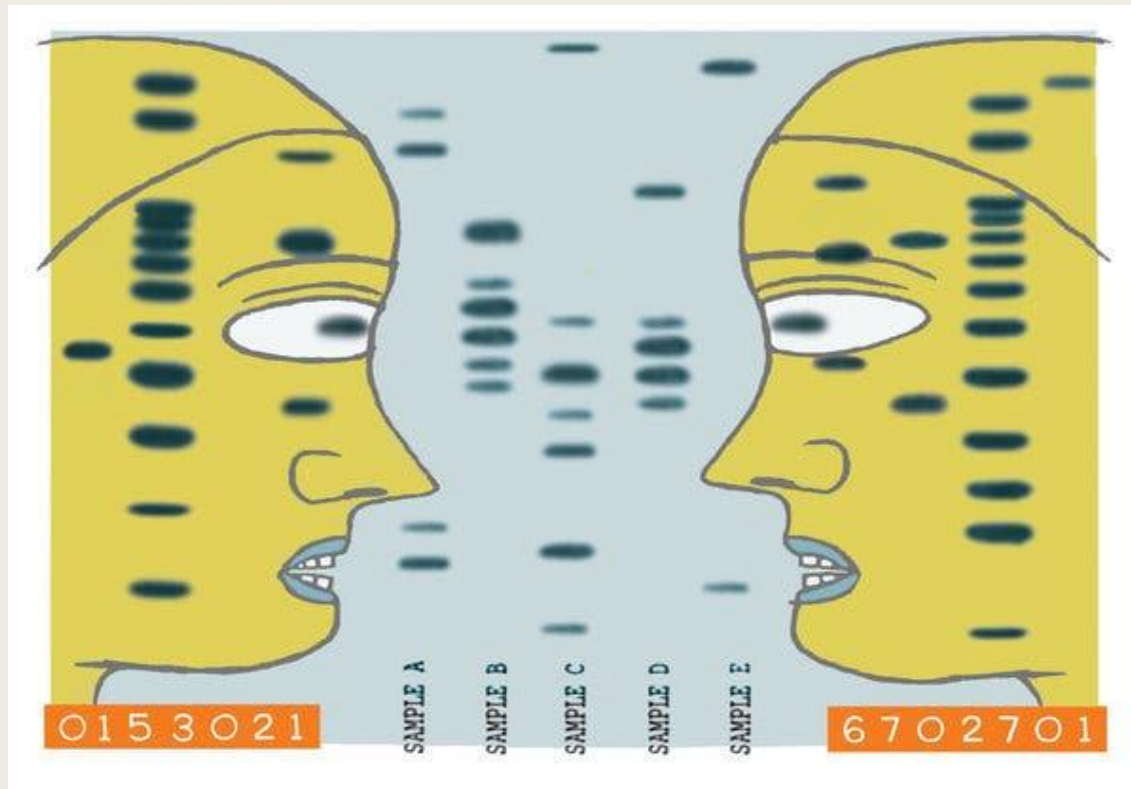
<i>Year</i>	<i>Winner</i>	<i>Probability</i>	<i>Predicted</i>	<i>Probability</i>
<i>Best Picture</i>				
1948	<i>Hamlet</i>	0.01	<i>Johnny Belinda</i>	0.97
2004	<i>Million Dollar Baby</i>	0.01	<i>The Aviator</i>	0.97
1981	<i>Chariots of Fire</i>	0.01	<i>Reds</i>	0.88
<i>Best Director</i>				
2000	Steven Soderbergh	0.01	Ang Lee	0.95
1968	Carol Reed	0.02	Anthony Harvey	0.97
1972	Bob Fosse	0.03	Francis Ford Coppola	0.96
<i>Best Actor</i>				
2001	Denzel Washington	0.00	Russell Crowe	0.99
1968	Cliff Robertson	0.00	Peter O'Toole	0.88
1974	Art Carney	0.02	Jack Nicholson	0.87
<i>Best Actress</i>				
2002	Nicole Kidman	0.07	Renée Zellweger	0.90
1985	Geraldine Page	0.07	Whoopi Goldberg	0.70
1950	Judy Holliday	0.09	Gloria Swanson	0.76

EXAMPLES OF APPLICATIONS

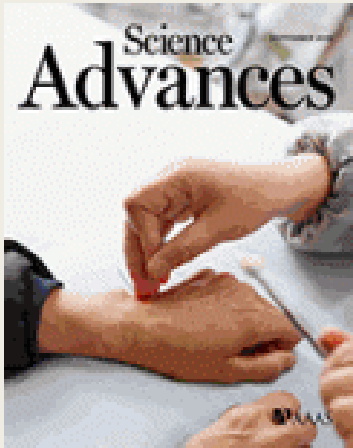
The New York Times

One Twin Committed the Crime — but Which One? A New DNA Test Can Finger the Culprit

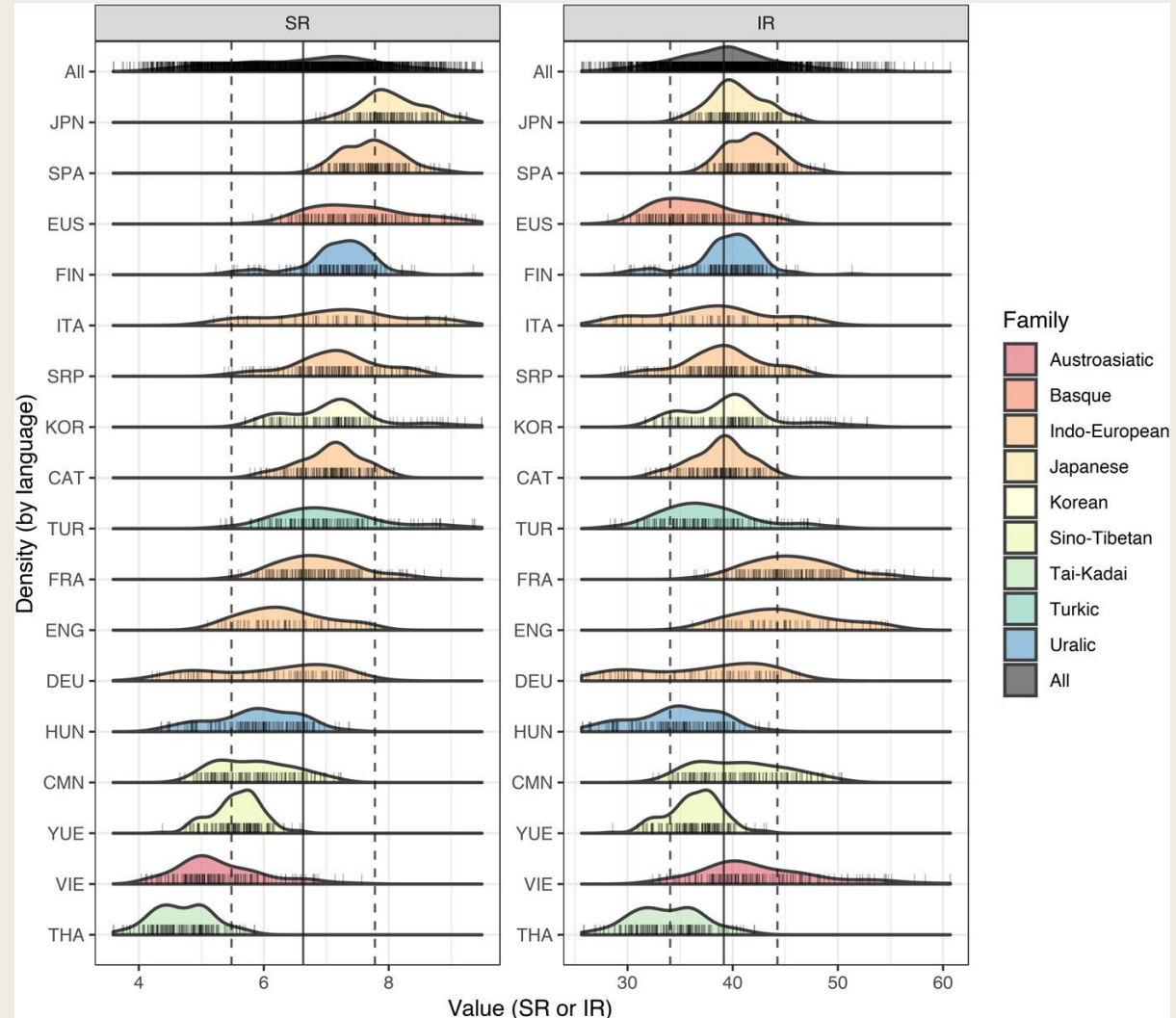
A handful of criminal prosecutions have stalled because DNA tests cannot distinguish between suspects who are twins. Then scientists decided to create one.



EXAMPLES OF APPLICATIONS



Different languages, similar encoding efficiency:
Comparable information rates across the human
communicative niche



EXAMPLES OF APPLICATIONS



Journal of Archaeological Science

Volume 49, September 2014, Pages 249-254



Focus article

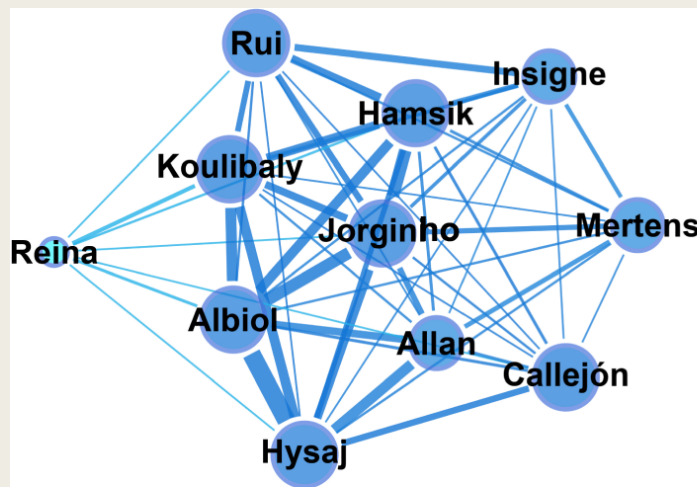
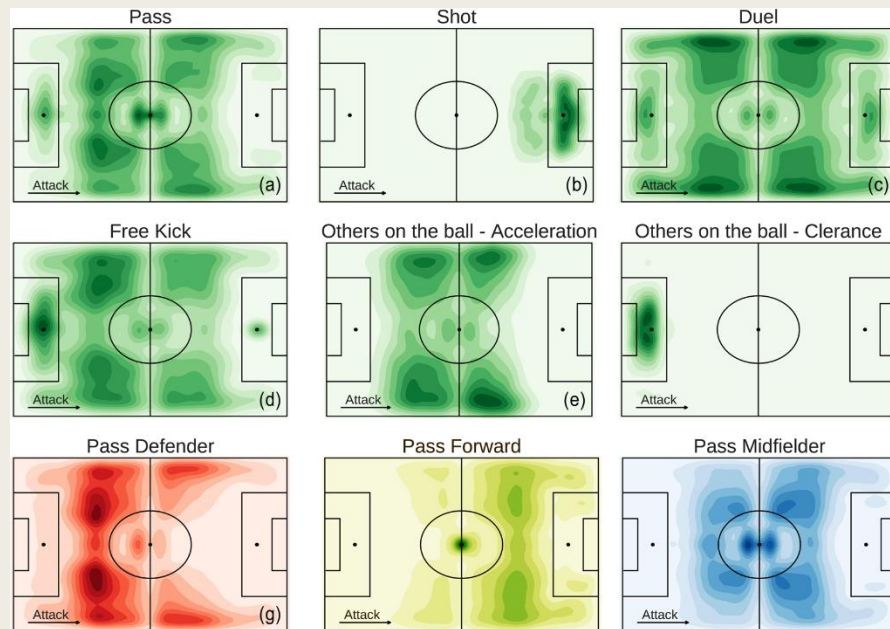
Computer vision, archaeological classification and China's terracotta warriors



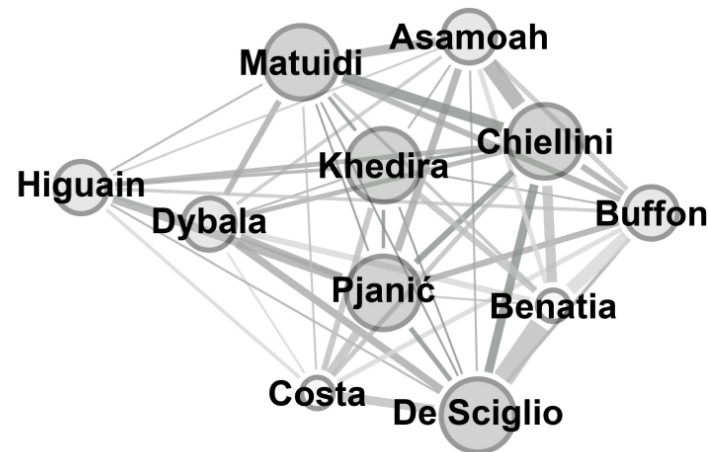
EXAMPLES OF APPLICATIONS

SCIENTIFIC DATA 110110 0111101 1101110 011101101

A public data set of spatio-temporal match events in soccer competitions



Napoli (0)
connectivity = 14.74



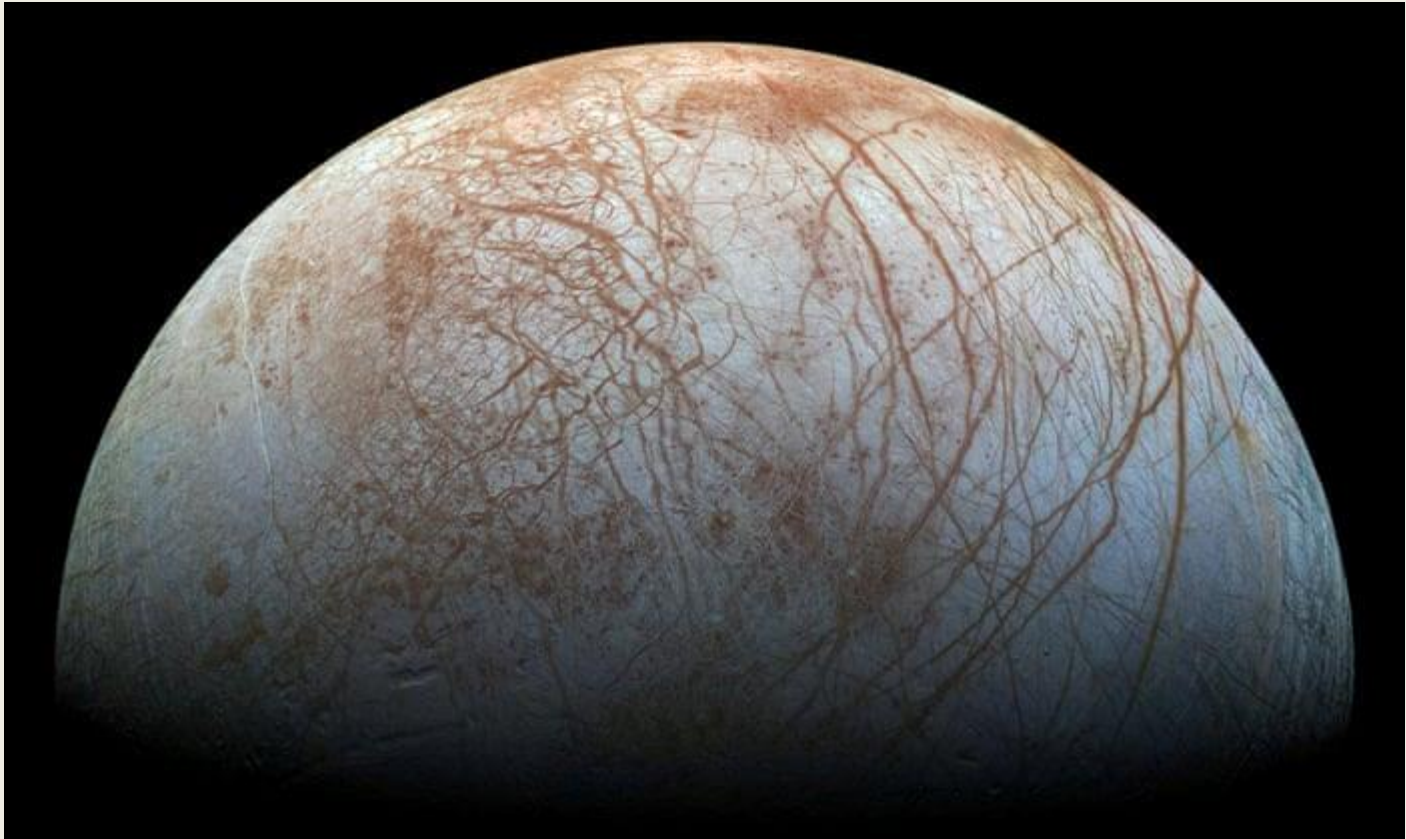
Juventus (1)
connectivity = 19.89

EXAMPLES OF APPLICATIONS

The Guardian

Aliens may not exist – but that's good news for our survival

A new study suggests that we could well be on our own in the universe. Yet loneliness might have its advantages



EXAMPLES OF APPLICATIONS



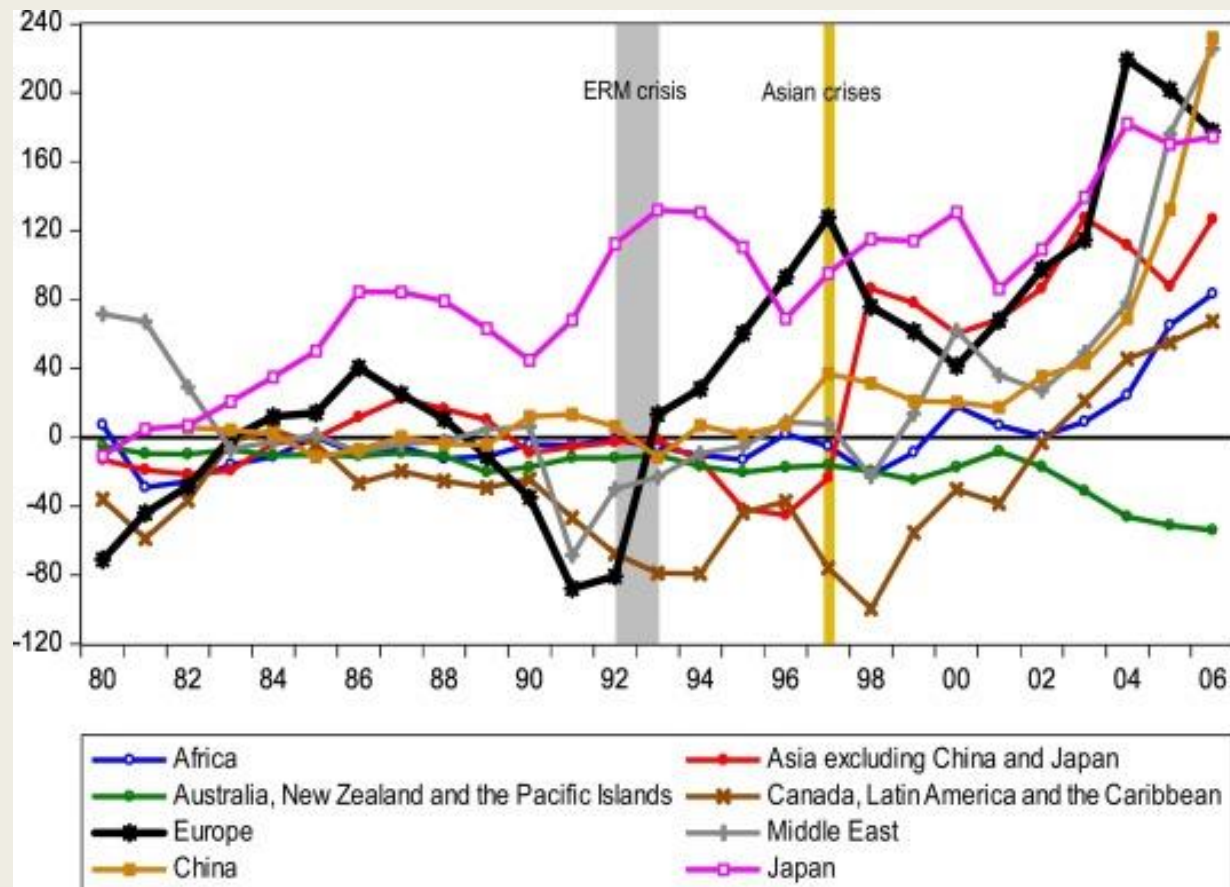
International Review of Financial Analysis

Volume 69, May 2020, 101377



The run-up to the global financial crisis:

A longer historical view of financial liberalization, capital inflows, and asset bubbles



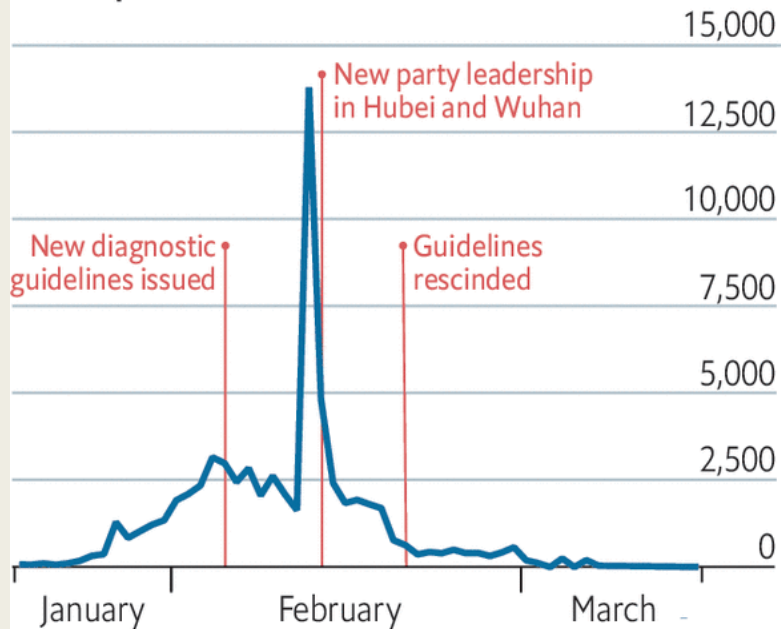
EXAMPLES OF APPLICATIONS

The Economist

Some days are more equal than others?

China, covid-19, 2020, new confirmed cases, by day

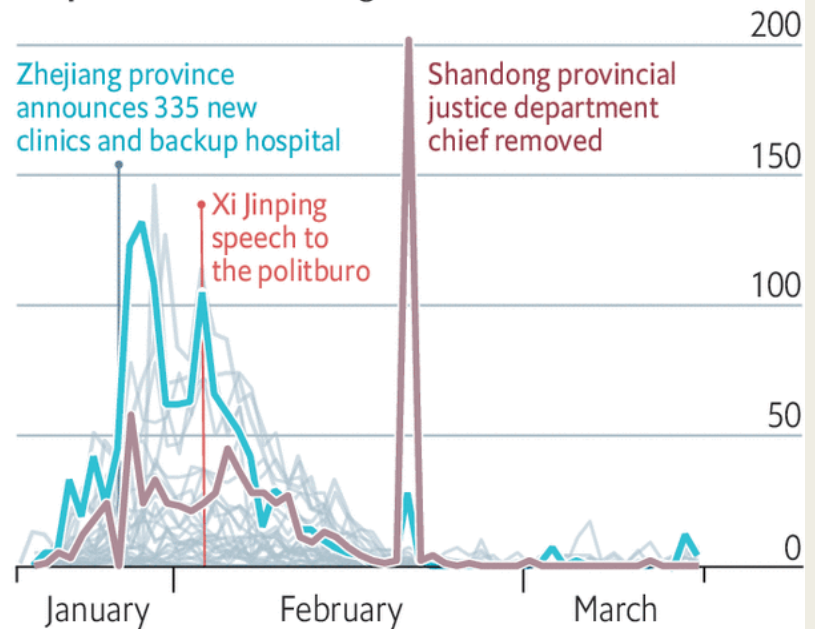
Hubei province



Source: China's National Health Commission

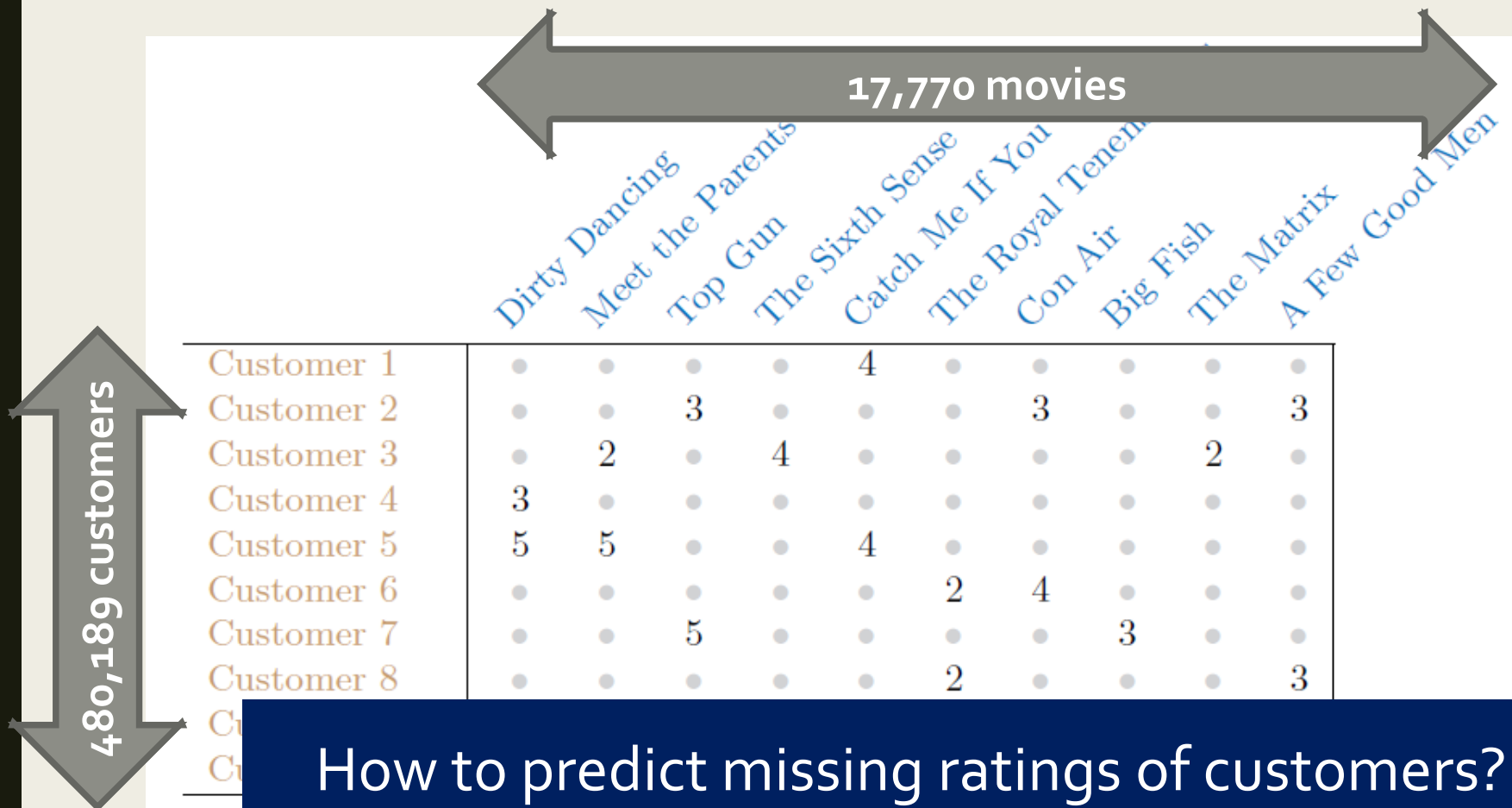
The Economist

All provinces, excluding Hubei



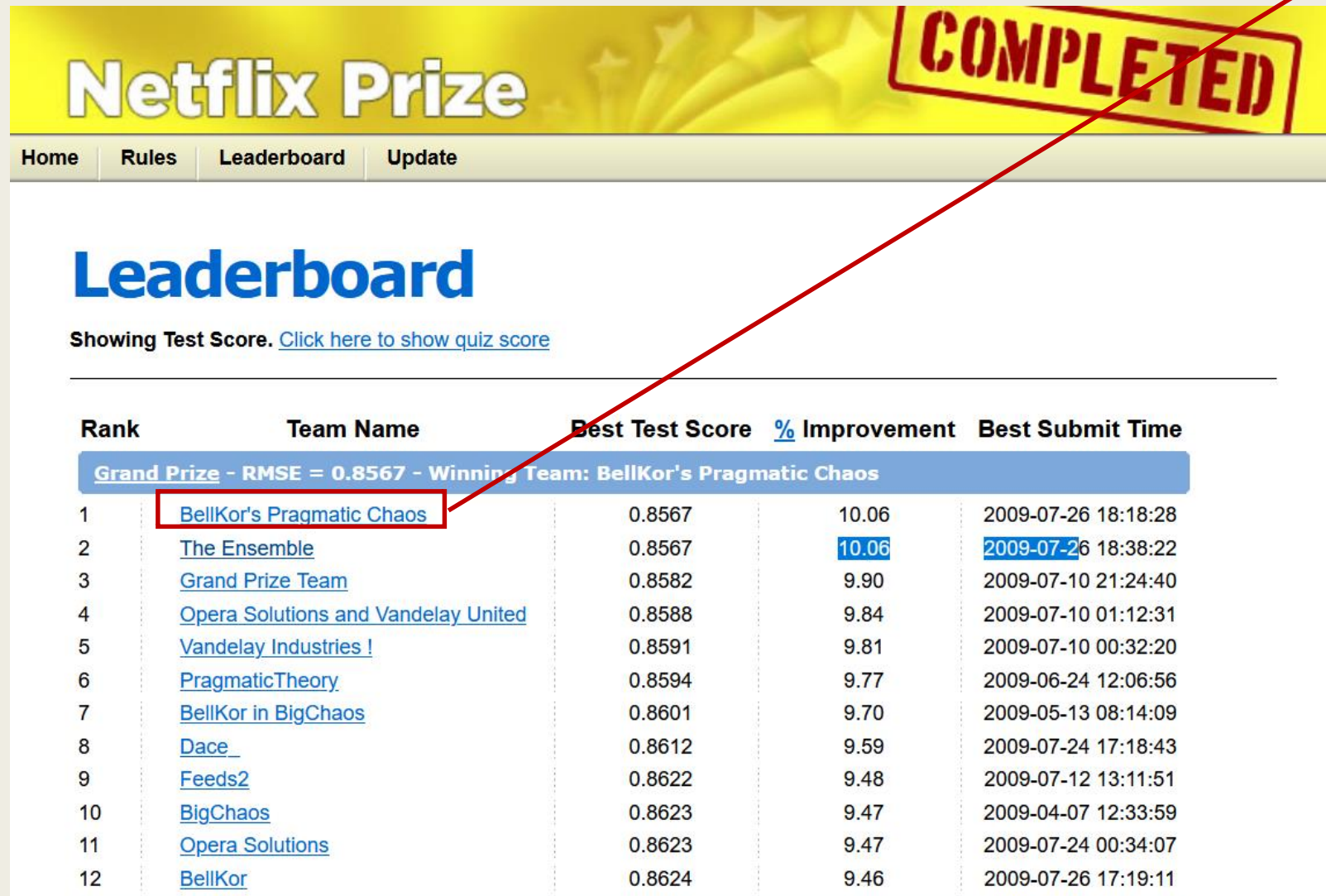
EXAMPLES OF APPLICATIONS

Netflix movie-rating challenge



EXAMPLES OF APPLICATIONS

... involved many statistical techniques, of which most important is SVD (Singular Value Decomposition)



Netflix Prize

Home Rules Leaderboard Update

Leaderboard

Showing Test Score. [Click here to show quiz score](#)

Rank	Team Name	Best Test Score	% Improvement	Best Submit Time
Grand Prize - RMSE = 0.8567 - Winning Team: BellKor's Pragmatic Chaos				
1	BellKor's Pragmatic Chaos	0.8567	10.06	2009-07-26 18:18:28
2	The Ensemble	0.8567	10.06	2009-07-26 18:38:22
3	Grand Prize Team	0.8582	9.90	2009-07-10 21:24:40
4	Opera Solutions and Vandelay United	0.8588	9.84	2009-07-10 01:12:31
5	Vandelay Industries !	0.8591	9.81	2009-07-10 00:32:20
6	PragmaticTheory	0.8594	9.77	2009-06-24 12:06:56
7	BellKor in BigChaos	0.8601	9.70	2009-05-13 08:14:09
8	Dace_	0.8612	9.59	2009-07-24 17:18:43
9	Feeds2	0.8622	9.48	2009-07-12 13:11:51
10	BigChaos	0.8623	9.47	2009-04-07 12:33:59
11	Opera Solutions	0.8623	9.47	2009-07-24 00:34:07
12	BellKor	0.8624	9.46	2009-07-26 17:19:11

the Oxford Scientist

ChatGPT: A milestone in natural language processing

[The Oxford Scientist January 9, 2023](#)



ChatGPT is a language model that can be accessed by anyone online. We asked it to tell us about itself and why it's so significant in the field of AI.

EXAMPLES OF APPLICATIONS

Step 1

Collect demonstration data, and train a supervised policy.

A prompt is sampled from our prompt dataset.

A labeler demonstrates the desired output behavior.

This data is used to fine-tune GPT-3 with supervised learning.

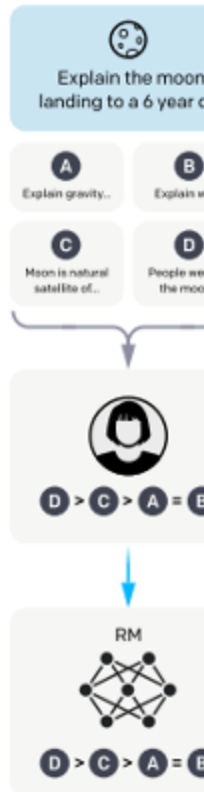
Step 2

Collect comparison data, and train a reward model.

A prompt and several model outputs are sampled.

A labeler ranks the outputs from best to worst.

This data is used to train our reward model.



Step 3

Optimize a policy against the reward model using reinforcement learning.

A new prompt is sampled from the dataset.

The policy generates an output.

The reward model calculates a reward for the output.

The reward is used to update the policy using PPO.



Leverages Proximal Policy Optimization (PPO)

A policy is, a strategy that an agent uses in pursuit of goals

Kullback-Leibler penalty for SFT model to avoid overfitting

Major in **RISK MANAGEMENT**

RISK MANAGEMENT

a desire to make sense of, & manage, “risk”

- **Risk Management** is a logical and systematic methodology of studying the risks involved in any activity or process.



Identifying risk

Analyzing risk

Treating risk

Monitoring risk

- **Major Objectives of Risk Management:**

- To *avoid* or *minimize* potential losses
- To *help managers* make best use of their available resources

Professional Qualification

■ Financial Risk Manager (FRM) Certificate Exam

- awarded by Global Association of Risk Professionals (GARP) <http://www.garp.com> (founded in 1996)

■ Professional Risk Managers (PRM) Exam

- awarded by Professional Risk Managers' International Association (PRMIA) <http://www.prmia.org>

■ Chartered Enterprise Risk Actuary (CERA)

- awarded by CERA Global Association <https://ceraglobal.org>



U.S. News Best Jobs Rankings 2022

<https://money.usnews.com/careers/best-jobs/rankings>

Statistician

- #3 in Best Business Jobs
- #7 in Best STEM Jobs
- #8 in 100 Best Jobs

Data Scientist

- #3 in Best Technology Jobs
- #6 in 100 Best Jobs
- #6 in Best STEM Jobs

Actuary

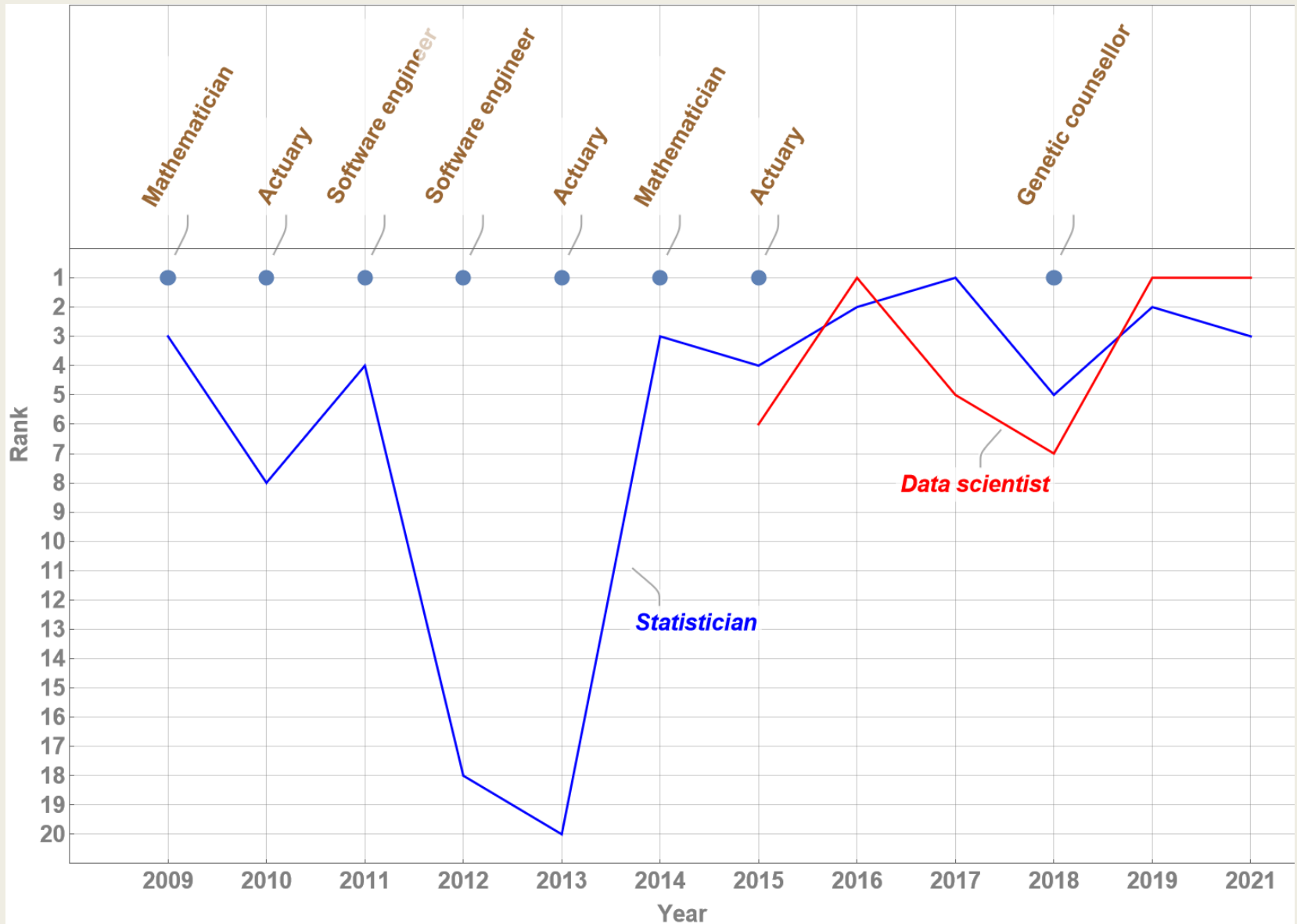
- #7 in Best Business Jobs
- #11 in Best STEM Jobs
- #20 in 100 Best Jobs
- #24 in Best Paying Jobs

Management Analyst

- #6 in Best Business Jobs
- #17 in 100 Best Jobs

Market Research Analyst

- #4 in Best Business Jobs
- #14 in 100 Best Jobs



Top Low Stress Jobs That Pay Well in 2021 (*GoBankingRates*)

<https://www.gobankingrates.com/money/jobs/high-paying-careers-wont-kill/#6>

1. University Professor

Median Salary: \$80,790

Post-secondary teachers tend to enjoy flexible schedules. While some teach classes at night or on weekends, these professionals generally find their jobs rewarding and appreciate the opportunity to share their expertise with students, according to the BLS. CareerCast ranked university professor as one of the careers with the lowest stress level in 2019, the most recent year the job website compiled its list.

In addition to teaching, university professors advise students and conduct research in their fields. While most positions require you to hold a Ph.D., a [graduate degree](#) might be sufficient for community colleges, according to the BLS.

5. Statistician

Median Salary: \$92,270

If you're good with numbers, you might want to consider a career as a statistician. These individuals collect data to help solve problems in a variety of industries and generally work full time. They could need to work overtime to meet a deadline or fill a last-minute request for information.

Job growth for this profession is currently high, as an increasing number of businesses are using statistical analysis to make decisions, according to the BLS. Most opportunities require candidates to hold master's degrees in statistics, mathematics or similar fields.

9. Mathematician

Median Salary: \$110,860

Mathematicians utilize techniques to solve problems in business, engineering and other fields. U.S. News ranked mathematician as the sixth-best job in business in 2021 and noted that mathematicians enjoy a variety of professional opportunities.

To qualify for a mathematics position, you'll need at least a bachelor's degree in math. Some positions require further education.

10. Actuary

Median Salary: \$111,030

An actuary analyzes the financial costs of risks taken by businesses and clients. However, pursuing a career as an actuary involves little risk and plenty of rewards. South Dakota State University touts the profession for its "high pay, low stress, good job security" and contribution in solving important problems.

Actuaries commonly hold bachelor's degrees in math or related analytical fields. Additional certification is needed to achieve full professional status.

Top 10 Well Paid Jobs With Low Stress

Posted by [Glassdoor Team](#) *Career Advice Experts* Last Updated 20 August 2021

<https://www.glassdoor.co.uk/blog/well-paid-jobs-low-stress/>

10 well paid jobs that are relatively low stress:

- 1.Statistician
- 2.Dental Hygienist
- 3.Librarian

1. Statistician

Glassdoor Average Salary: £39,473

Statisticians use mathematical techniques to interpret data to draw parallels or to come to conclusions. Statisticians can work across various sectors, including public, private and academic. Freelance statisticians - those who are self-employed and work on a project basis, are in high demand.

Using logical thinking, combined with mathematical techniques to draw facts from raw data, statisticians can work solo or in a collaborative team. Having this option means, being a statistician is a relatively low-stress job.

An interest in mathematics and the ability to understand complex mathematical functions is important. When hiring, employers look for candidates who have a degree in maths or a related subject.

Difference in focus between the 3 majors

- **Decision Analytics** –

*heavy emphasis on both **STATISTICS** and **COMPUTER SCIENCE***

- **Risk Management** –

courses focus primarily on business-related topics: e.g.

investment, insurance, finance, banking, etc.

- **Statistics** –

courses cover wide range of topics with emphasis on

“METHODS”, their applications, and underlying theory.

A few practical reasons for majoring in

Statistics / Risk Management / Decision Analytics

- Flexibility of the programme enables you to tailor-make your course of study.
- Develop your interest at your own pace.
- Pre-mature commitment not required.

Mathematical background adequate?

Students must have level 2 or above in

- HKDSE Extended Module 1 or 2 of Mathematics or equivalent

Otherwise, strongly advised to take

MATH1011 University Mathematics I

in Semester 1.

What do we need from your Mathematics?

- Set notation and theory
- Functions (*incl.* limits, continuity)
- Sequences, series
- Basic calculus (*incl.* partial differentiation, double integration)
- Vectors, matrices (basic operations)

New Changes to Major in Decision Analytics from 2024-25

STAT3612	Statistical machine learning (6)	
STAT4609	Big data analytics (6)	
Disciplinary Electives (12 credits)		
<i>At least 12 credits selected from the following courses:</i>		
COMP3250	Design and analysis of algorithms (6)	
COMP3251	Algorithm design (6 credits)	To add COMP3251 as an advanced level elective course from 2019 (all cohorts)
COMP3252	Algorithm design and analysis (6 credits)	To add COMP3252 as an advanced level elective course from 2019 (all cohorts)
COMP3270	Artificial intelligence (6)	
COMP3323	Advanced database systems (6)	
COMP3407	Scientific computing (6)	
STAT3010	Image processing and computer vision (6)	To add STAT3010 as an advanced level elective course from 2019 (all cohorts)
STAT3620	Modern nonparametric statistics (6)	
STAT3621	Statistical data analysis (6)	
STAT3622	Data visualization (6)	
STAT3655	Survival analysis (6)	
STAT4011	Natural language processing (6)	

- Biology, Chemistry, and Physics qualification in Gao Kao will be considered on a case-by-case basis

9. It is recommended that students opt for COMP3251 Algorithm design instead of COMP3252 Algorithm design and analysis when selecting elective courses between COMP3251 and COMP3252.

Remarks:

New Changes to Major in Risk Management from 2024-25

Disciplinary Electives (30 credits)		
<i>At least 30 credits selected from the following courses:</i>		
STAT3603	Stochastic processes (6)	
STAT3610	Risk management and insurance (6)	
STAT3612	Statistical machine learning (6)	
STAT3618	Derivatives and risk management (6)	
STAT3655	Survival analysis (6)	
STAT3911	Financial economics II (6)	
STAT4601	Time-series analysis (6)	
STAT4603	Current topics in risk management (6)	
STAT4606	Risk management and Basel Accords in banking and finance (6)	
STAT4607	Credit risk analysis (6)	
STAT4608	Market risk analysis (6)	
STAT4610	Bayesian learning (6)	To add STAT4610 in Advanced level course Disciplinary Electives in from 2019-20 to 2024-25 and thereafter
3. Capstone requirement (6 credits)		
<i>At least 6 credits selected from the following courses:</i>		

New Changes to Minor in Risk Management from 2024-25

	data analysis (6)	
2. Advanced level courses (30 credits)		
Disciplinary Electives (30 credits)		
<i>At least 30 credits selected from the following courses:</i>		
STAT3609	The statistics of investment risk (6)	
STAT3610	Risk management and insurance (6)	
STAT3612	Statistical machine learning (6)	
STAT3615	Practical mathematics for investment (6)	
STAT3618	Derivatives and risk management (6)	
STAT4601	Time-series analysis (6)	
STAT4603	Current topics in risk management (6)	
STAT4606	Risk management and Basel Accords in banking and finance (6)	
STAT4607	Credit risk analysis (6)	
STAT4608	Market risk analysis (6)	
STAT4610	Bayesian learning (6)	To add STAT4610 in Advanced level course Disciplinary Electives in from 2019-20 to 2024-25 and thereafter

New Changes to Minor in Statistics from 2024-25

	data analysis (6)	
2. Advanced level courses (30 credits)		
Disciplinary Electives (30 credits)		
<i>At least 30 credits selected from the following courses:</i>		
STAT3021	Modern biostatistics (6)	to add STAT3021 in Advanced level courses Disciplinary Electives from 2019 to 2024-25 and thereafter
STAT3600	Linear statistical analysis (6)	
STAT3602	Statistical inference (6)	
STAT3603	Stochastic processes (6)	
STAT3604	Design and analysis of experiments (6)	
STAT3606	Business logistics (6)	
STAT3607	Statistics in clinical medicine and bio-medical research (6)	
STAT3608	Statistical genetics (6)	
STAT3612	Statistical machine learning (6)	
STAT3613	Marketing analytics (6)	
STAT3617	Sample survey methods (6)	
STAT3620	Modern nonparametric statistics (6)	
STAT3621	Statistical data analysis (6)	
STAT3655	Survival analysis (6)	
STAT4601	Time-series analysis (6)	
STAT4602	Multivariate data analysis (6)	
STAT4610	Bayesian learning (6)	

A useful introductory-level course

■ STAT2604

Introduction to R programming and elementary data analysis

- *introduction to statistical programming language R*
- *basic programming skills in R with examples and applications in elementary statistical analysis*
- *management of different data types: input/output, manipulation, transformation*
- *random sampling, descriptive data analysis*
- *production of professional summary reports with high-quality graphs*

Accreditation with the Royal Statistical Society

For more information: <https://saasweb.hku.hk/current/stat.php>

**THE UNIVERSITY OF HONG KONG
DEPARTMENT OF STATISTICS AND ACTUARIAL SCIENCE**

Accreditation with the Royal Statistical Society (RSS) for BSc Students Admitted in 2023

Accredited Major (*conditions)	Applicants must have completed and passed these specific courses
Major in Statistics*	STAT3602 or STAT4610
Major in Decision Analytics*	STAT3602 (not Disciplinary Elective) or STAT4610, and at least 2 Quality Marked (QM) Disciplinary Electives, and at least one QM Capstone course.
Major in Risk Management*	STAT3602 or STAT4610 (both are not Disciplinary Electives), and at least one of STAT3603, STAT3612, STAT3655 or STAT4601, and at least one QM Capstone course.

Reminder

- plan ahead
 - major/minor, overseas exchange, internship, research project
 - career vs further study
- watch out for pre-requisites of individual courses
- courses **CANNOT** be double-counted to fulfill different majors/minors
 - (exception for double major in Science: SCNC1111 & SCNC1112 & up to 12 credits of compulsory courses **REQUIRED** by both Science majors can be double-counted)
- consult course selection advisors if necessary

Support from University and Department

- **HKU** : Centre of Development and Resources for Students
 - *NETmatch, NETjobs, JIIS (Joint Institutions Job Info. System)*
- **Department** : Internship / Job Online Application System

The screenshot shows a web browser window with the URL <https://apps.saas.hku.hk/internship/index.php>. The page header features the Department of Statistics & Actuarial Science logo and a banner image of students. Below the header, the user's profile information is displayed in a grid format:

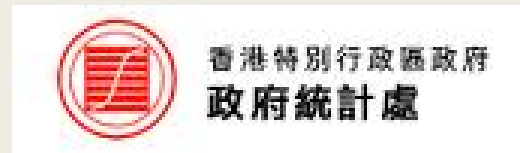
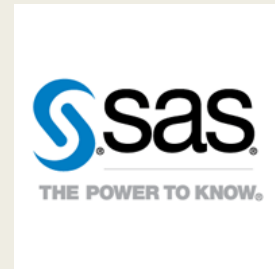
UID :	2008000001	Major :	Statistics
Name :	Ugrad Test_Student1	E-mail :	@hku.hk
Last Status :	Available working period: From: 2019-04-10 To: 2019-11-30	Contact Phone :	+852 12345678
CAP Profile: (Cover letter & CV)	<input type="button" value="Upload Profile"/>	PPP Score :	Letter & CV Submitted : 0.0 Case Analysis & Presentation : 0.0 Mock Interview : 0.0

Below the profile information, there are three tabs: **Current Job List**, **Application History**, and **Past Internship/Jobs**. The **Current Job List** tab is active, showing a table of job listings:

Jobtype	Company Name	Job Title / Job Description / Form	Closing date	Action
Full-time_ST&AS	EFA	Portfolio Investment Analyst(ASAP) (GRAD/Internship) IR 1452	2019-08-11	Submit completed application via email at careers@efadrin.com
Internship_AS&ST	AIA Group	Actuarial Internship Programme (Jan-Jun 2020) AW 1426	2019-08-31	Submit completed application via email at Rachel-yh.chan@aia.com
Internship_AS&ST	Blue, trade name of Aviva Life Insurance Co Ltd	Actuarial Intern (Jan-Jun 2020) MY 1529	2019-08-31	Submit completed application via email at careers@blue.com.hk
Full-time_AS&ST	CIGNA	Contract Associate - Valuation (IFRS) (ASAP) JC 1629	2019-08-25	Submit completed application via email at sandy.lau@cigna.com
Full-time_AS&ST	YF Life Insurance International Ltd	Actuarial Analyst (GRAD)ASAP\ VL 1643	2019-08-18	Submit completed application via email at recruit@yflife.com

Career Development Training

- Summer IT course:
 - *Essential IT skills (certificate course)*
- Career Advising Programme (CAP) to prepare students for:
 - *internships and job opportunities*
 - *advancing resume and interview skills*



Besides career...

- Opportunity for further studies
 - Recently our graduates had pursued Masters and PhD studies in universities including Harvard, UC Berkeley, Yale, Stanford, Cambridge
- Scholarships/Awards
- Other learning opportunities
 - (e.g. overseas exchange, mentorship, internship, research projects)*

Contact Persons

- Co-ordinators & Course Selection Advisors
 - *Ke Zhu (Statistics)*
 - *Yuan Cao (Decision Analytics)*
 - *K P Wat (Risk Management)*
- Credit transfer
 - *Chen Wang*
- Internship
 - *Eric Li*
- Tel: 3917 2466
- Email: ugenq@hku.hk



QUESTION AND ANSWER

Our Homepage: www.hku.hk/statistics

