SOLUCIONS ALS PROBLEMES PROPOSATS
AL VOLUM 21 N. 3

PROBLEMA N. 66

1. $a = \beta P b$ y $b = \beta Q a$ implican

$$a = \beta^2 PQ a$$

que demuestra que $a$ es un vector propio de $PQ$ de valor propio $\lambda = 1/\beta^2$.

2. Si $1_p$, $1_q$ son vectores columnas de unos, entonces

$$Q 1_p = 1_q \quad P 1_q = 1_p$$

como consecuencia de que las filas de $P$ y $Q$ son vectores de probabilidad (suman 1). Por tanto

$$PQ 1_p = P 1_q = 1_p$$

y las filas de $PQ$ son también vectores de probabilidad.

Luego $1_p = (1, \ldots, 1)'$ es vector propio de $PQ$ de valor propio $\lambda = 1$.

3. Indiquemos $C = PQ = (c_{ij})$, $C^n = (c_{ij}(n))$. Si $V = (v_1, \ldots, v_p)'$ es vector propio de $C$ de valor propio $\lambda$, entonces

$$CV = \lambda V \quad \Rightarrow \quad C^n V = \lambda^n V$$

Indiquemos $C^n V = (w_1, \ldots, w_p)'$. Entonces $w_i = \lambda^n v_i$ y

$$w_i = \sum_{j=1}^{p} c_{ij}(n) v_j$$

$C^n$ es una matriz cuyas filas son también vectores de probabilidad. Luego

$$|w_i| \leq \sum_{j=1}^{p} c_{ij}(n) |v_j| = \sum_{j=1}^{p} |v_j|$$

Así $|w_i|$ está acotado. Pero $|w_i| = \lambda^n |v_i|$. Si $\lambda > 1$, tendríamos que $|w_i| \xrightarrow{n \to \infty} \infty$, contradiciendo la acotación de $|w_i|$. Esto prueba que $0 \leq \lambda \leq 1$.

C.M. Cuadrás
Universitat de Barcelona
PROBLEMA N. 67

Consideremos la función paramétrica $\Psi(x, \theta)$

$$\Psi(x, \theta) = P(X \leq x) = F_0(x)$$

Un estimador inesgado de $\Psi(x, \theta)$ a partir de una muestra $x_1$ es la variable Bernouilli

$$\bar{\Psi}(x, \theta) = \begin{cases} 1 & \text{si } x_1 \leq x, \\ 0 & \text{si } x_1 > x, \end{cases}$$

cuya varianza es $F_0(x)(1 - F_0(x))$.

Aplicando la desigualdad de Cramer-Rao

$$F_0(x)(1 - F_0(x)) \geq \frac{\left( \frac{\partial}{\partial \theta} F_0(x) \right)^2}{I(\theta)}$$

Pero para todo $x$

$$\frac{1}{4} \geq F_0(x)(1 - F_0(x))$$

así que

$$\frac{1}{4} \geq \frac{\left( \frac{\partial}{\partial \theta} F_0(x) \right)^2}{I(\theta)}$$

que es equivalente a $I(\theta) \geq 4 \left( \frac{\partial}{\partial \theta} F_0(x) \right)^2$ y esta desigualdad se cumple uniformemente en $x$.

C.M. Cuadras  
Universitat de Barcelona
PROBLEMES PROPOSATS

PROBLEMA N. 68

Un comerciant viaja diàriament a Barcelona (B), Girona (G) i Tarragona (T). Si un dia està a B, la probabilitat de que l'endemà viatgi a G és 0.3 i a T és 0.2. Si està a G, la probabilitat de que l'endemà segueix a G és 0.5 i la de que viatgi a B és també 0.5. Si un dia està a T la probabilitat de que l'endemà continui a T és 0.5 i de que viatgi a B és 0.5.

1) Si un dilluns està a B, calculeu la probabilitat de que el dimecres estigui a G.

2) L'empresa destina anualment 1 milió de tires al viatjar per a despeses d'estada a B, G i T, però li demana que faci un pressupost. Calculeu aquest pressupost repartint el milió en despeses previstes a B, G i T.

C.M. Cuadras
Universitat de Barcelona

PROBLEMA N. 69

Sigui, a cada punt geogràfic del mar, X i T la nebulositat del cel i la temperatura del mar. Suposem que X és una variable aleatòria uniforme amb densitat \( f(x) = 1, 0 < x < 1 \). La funció de densitat de probabilitat de T és g(t) i les variables X i T són estocàsticament independents. La temperatura Y que un satèl·lit artificial mesura sobre cada punt del mar és Y = T(1 − X). Cal notar que només són observables les variables X i Y.

1) Calcule la mitjana \( \mu(T) \) en funció de \( \mu(Y) \).

2) Si la distribució de T és exponencial negativa amb paràmetre \( \alpha = 1 \), troba la densitat bivariant de (X, Y).

C.M. Cuadras
Universitat de Barcelona
Cursos i congressos d’estadística
TES OR THE ENHANCEMENT OF STATISTICS

The TES Institute is a non-profit association created in November 1996 by the Directors General of the National Statistical Institutes of ten Member States of the European Union and of the four Member States of the European Free Trade Association.

As an international post-graduate vocational training institute for statisticians, the mission of the TES Institute is to create truly European vocational training and staff development opportunities at post-graduate level. The annual training programmes are designed for target groups ranging from young statisticians to executives of National Statistical Institutes.

Over the last five years, the objectives of the TES Institute were (a) to provide training courses and seminars of short duration at post-graduate level, thus offering statisticians opportunities to perfect their skills, (b) to provide a forum for mutual consultation on vocational training for statisticians, (c) to give assistance in the training for new European statistical projects, thus disseminating standards, European methods and classifications, and to help future members to prepare for their integration into the European Statistical System, and (d) to promote exchanges of skills and experiences.

TYPES OF TRAINING

The TES Institute offers two types of training: the Core Programme and the Special Courses Programme. Both of them are covering the following specialisation areas:
(1) Data Collection and Survey Methodology, (2) Economic Statistics, (3) Social Statistics and (4) Publication, Dissemination and Use of Statistics, complemented by the Common Courses (general «statistical» culture) and the Support Courses (statistical analysis, computing techniques and statistical management).

The Core Programme

The annual training programmes are designed for public sector statisticians in the Member States of the EU and EFTA. However, the programmes are also open to the National Statistical Institutes of countries in Central and Eastern Europe, the Mediterranean Basin, some other selected countries and private sector statisticians.

The leading principle for the definition of the annual programmes and the detailed content of each of the courses is that choices are made on the basis of the training needs in the Member States of the EU and the EFTA. The Core Programme is subsidised by the Statistical Office of European Commission (Eurostat).

The Special Courses Programme

The Special Courses Programme is designed for public sector statisticians from countries outside the EU and the EFTA. At this moment its main clients are statisticians from the Central European countries and the countries of the Mediterranean Basin. The Special Courses Programme is not subsidised.

The Special Courses Programme consists of courses which are either repeats of existing courses in the Core Programme or tailor-made courses at the request of a country or a group of countries. Whenever a course from the Core Programme is repeated, the content is reviewed and adapted to the specific needs of the participants.

TRAINING ORGANISATION

Obviously, vocational training programmes of this kind imply the involvement of different groups of people.

- The training staff of the TES courses consists of an international pool of trainers (highly qualified practitioners and university professors). This pool is responsible for the design and the execution of the courses and the development of the course material, which are annually reassessed and updated where necessary. Each year the organisation of the programme requires the intervention of about hundred trainers.
• The National Statistical Institutes of the European Union (EU), the European Free Trade Association (EFTA), the Central and Eastern European Countries (ECO) and the Mediterranean Basin countries have nominated TES Correspondents for the TES programme. This network of TES Correspondents is responsible for the communication between their Institute and the TES Institute, for the co-ordination of the registration of candidates and for the dissemination of information about TES courses.

• The main task of the staff of the TES Institute is to assist in the design, to organise and to give logistic support to the international vocational training programme and to provide information about existing training possibilities in the various countries in Europe. To carry out these activities, the TES Institute comprises a permanent team of eleven people.

CURRENT ACTIVITIES

Training Core and Special Courses Programmes

Over the last five year, the TES Institute organised some 110 courses in the framework of the Core Programme open to EU, EFTA and ECO statisticians. Besides, Special Courses have also been organised especially for statisticians from ECO countries.

On the whole, about 600 participants have been trained every year through these two kind of training programme.

Moreover, since 21st May 1997, when the first Eurostat Task Force on Training for MEDSTAT countries was organised, the TES Institute officially extended its training activities to the Mediterranean Basin countries.

Ad hoc projects

Recently, a seminar on «Education Statistics» has been organised at the request of Eurostat (Vienna, January 1998).

Moreover, two ad hoc courses (5 days) for the statistical service of Malta: the course «Enterprise Statistics» and the course «National Accounts Statistics in Practice». Both courses were executed end 1997.

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1 Albania, Bulgaria, Czech Republic, Estonia, Hungary, FYROM (Former Yugoslav Republic of Macedonia), Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.
2 Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Palestine, Syria, Tunisia, Turkey.
In a near future, the TES Institute will carry out:

- Two seminars on «Statistics and Policy Making» at the request of the Palestinian Statistical Training Centre (Gaza, Westbank). These seminars will be financed through UN funds and are carried out in cooperation with UNITAR, the UN Institute for Training and Research, Geneva. Again this seminar may be introduced, in a modified form, in the future regular programme.
- The first part of a «Summer School on Social Statistics» in July 1998 (5½ days) in Siena. The other two parts are planned for summer 1999 and 2000.
- Specific training will be provided to statisticians from the Ukrainian Statistical Office. The training will cover Business Registers, Enterprise Statistics and National Accounts.

Consulting

Apart from the well-known training activities, the TES Institute has recently set up a procedure for consulting activities.

In this context, the TES Institute is requested to provide support to the set-up of a training centre for statisticians in a specific country in Ukraine. This support will consist of (a) training of future trainers, as above mentioned and (b) consulting for curriculum development for their future training programmes.

Publication

Articles The TES Institute is regularly publishing articles on its current activities in periodic Newsletter of several Statistical Institutes and some statistical journals (as «Quaderns d’Estadística i Investigació Operativa» (Questió), edited by the Institut d’Estadística de Catalunya).

Manuals

The TES Institute decided to set up a TES Manual series for the manuals to be developed in the specialisation areas covered by the vocational training programme (i.e. Data Collection and Survey Methodology, Economic Statistics, Social Statistics and Publication, Dissemination and Use of Statistics).

By the end of this year, the following publications will be available at the TES Institute:
- «Introduction to Demographic Data Analysis» by Mr Otto Andersen from Statistics Denmark. This manual will cover subjects like: data in demography, lexis diagram, fertility, mortality, etc. As the manual will be available at the TES Institute.
• «Index Number Theory and Practice» by Prof. Marco Martini from the University of Milano.

Please inform the TES Institute if you are interested in the above mentioned publications (articles and/or manuals) and detailed information will be forwarded to you.

GENERAL INFORMATION

For further information about courses, new brochure, publications, specific projects and so on, please contact Ms Valérie Vandewalle:

<table>
<thead>
<tr>
<th>by phone:</th>
<th>+352/29 85 85 34</th>
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<tr>
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<tr>
<td>e-mail:</td>
<td><a href="mailto:vvandewalle@tes-institute.lu">vvandewalle@tes-institute.lu</a></td>
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<tr>
<td>for mail:</td>
<td>5. rue Guillaume Kroll</td>
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<tr>
<td></td>
<td>L - 1882 Luxembourg</td>
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ANNEX

The courses to be organised between April and June 1998 in the framework of the Core Programme are listed below:

• From 6 to 8 April, Mr Stelluto (Bureau of Census - USA) will present the Construction and Use of the Employment Cost Index. The course will be provided in English in Barcelona.

• From 20 to 23 April, the TES Institute will host the course of Mr Barnabé (Statistics Canada) on Planning and Management of Statistical Programmes.

• The course on Notions of Sampling and Survey for Managers will be given in French by Prof. Droesbeke in the premises of the Belgian National Statistical Institute from 27 to 29 April. (Not included in the overview published in Qüestió, vol. 21, num. 3.)

• The Variance Estimation and Discrete Data Analysis for Complex Surveys will be presented by Mr Lehtonen (Statistics Finland) from 4 to 6 May. It will take place within the Finnish Statistical Office.

• The course on Nomenclatures, Classifications and their Harmonisation will be given in English by Mr Langkjær (Eurostat) in the premises of the TES Institute from 4 to 8 May.
• Mr Glätzel (Eurostat) will present the Revised European System of Accounts (ESA 95) - Financial Accounts from 11 to 13 May in the premises of the TES Institute in Luxembourg. (Not included in the overview published in Qüestió, vol. 21, num. 3.)

• From 25 to 29 May, Prof. von der Lippe (University of Essen) will present the main concepts of Price Index Theory and Price Statistics. The course will be organised in Düsseldorf and presented in English.

• Prof. Smith (University of Southampton) will give a course on Sampling Techniques and Practice in Southampton from 1st to 12 June.

• Mr Lyberg (Statistics Sweden) will present in English how to Deal with Non Response. The course will be organised in Stockholm from 8 to 12 June.

• Mr Domergue (INSEE) will present in French the main concepts of National Accounts Statistics in Practice from 15 June to 26 June in Paris.

• Mr Carlsen will present in English The Set-up and Operation of Data-Shop and Marketing of Statistical Services in the premises of Statistics Denmark from 15 to 19 June.

• From 15 to 19 June, Mr Bergström (Statistics Norway) will present the Set-up, Use and Maintenance of Business Registers. The course will be provided in English in Oslo. (Not included in the overview published in Qüestió, vol. 21, num. 3.)

• From 16 to 19 June, the TES Institute will host the course of Mr Müller on The European Labour Force Survey.

• Statistical Presentation with Graphic Software will be treated by Mr Wallgren (Statistics Sweden) from 22 to 24 June. It will take place within the Swedish Statistical Office.

• The course on the Application of the Blaise System will be organised at the end of the academic year (details about this course will be provided later).
INTRODUCTION

Statistical computing provides the link between statistical theory and applied statistics. COMPSSTAT'98 will range over all aspects of this link, from development and implementation of new computer-based statistical methodology to innovative applications and software evaluation. The conference will appeal to anyone using computers in statistics, whether in universities, industrial companies, research institutes or as software developers.

The conference is organised by IACR-Rothamsted, IACR-Long Ashton, the University of Bristol Department of Mathematics and the University of Bath Department of Mathematical Sciences. We have a strong involvement in statistical computing and a long association with COMPSSTAT, and look forward to welcoming you to a stimulating and enjoyable conference.
Compstat '98

**SCIENTIFIC PROGRAMME**

The conference will present an extensive programme of invited and contributed papers, covering the following topics.

**C1: Statistical Research – development of statistical methodology, especially topics that rely on computers and computing environments.**

**C2: Computing – contributions of computer algorithms, tools and environments to the practice of statistics.**

**C3: Applied Statistics – innovative applications of statistical computing in any area of current interest.**

The conference proceedings will be published in two volumes, ready for each (full) participant to be given a copy at the start of the conference. Volume 1, published by Springer Verlag, contains the refereed Full Contributions and the Invited Papers. Volume 2, published by IACR–Rothamsted and University of Bristol, contains the Short Communications and Posters.

The current content of the invited programme is listed below.

**INVITED SPEAKERS**

**Brian Cullis (Australia)**  
*Analysis of spatially correlated data*

**Krystof Eben (Czech Republic)**  
*Mortality pattern prediction in worker cohorts*

**John Eccleston (Australia)**  
*Computational issues in the design of experiments for correlated data*

**Heikki Mannila (Finland)**  
*Data mining and hierarchical models*

**Jacqueline Meulman (Netherlands)**  
*Optimal scoring methods for graphical multivariate data analysis*

**Geert Molenberghs (Belgium)**  
*The analysis of multivariate clustered binary data from developmental toxicity experiments*

**Marlene Müller (Germany)**  
*Interactive teaching of statistics*

**Florence Muri (France)**  
*Modelling bacterial genomes using hidden Markov models*

**Christian Robert (France)**  
*Bayesian and likelihood inferences for latent variable models*

**Roberta Siciliano (Italy)**  
*Exploratory versus decision trees*

**Bernard Silverman (United Kingdom)**  
*Wavelets in statistics: some recent developments*

**Dag Tjøstheim (Norway)**  
*Exploring time series using semi- and nonparametric methods*

**Mariano Valderrama (Spain)**  
*Time series forecasting by functional principal component methods*
LOCAL INFORMATION
Bristol is an attractive city in the South-West of England. It is set in pleasant surroundings and contains a wide range of sites of historic interest ranging from St Mary Redcliffe Church ("the fairest, the goodliest and most famous parish church in the Kingdom" according to Queen Elizabeth 1 in 1574) and Bristol Cathedral, to the SS Great Britain (one of the original iron ships) and the Clifton suspension bridge. The Arts are well represented with the Theatre Royal (the oldest theatre in England), a fine City Museum and Art Gallery, concert halls and the Arnolfini Complex for contemporary visual arts, music, dance and cinema. The conference is based at the University of Bristol's academic and administrative campus situated within easy walking distance of the city centre and attractive historical areas such as Clifton, with their shops, cafés and night clubs!

TRAVEL ADVICE
Bristol has excellent connections by train and road to the rest of the United Kingdom or, via Eurotunnel, to Europe as a whole. The most convenient railway station is Bristol Temple Meads, in the centre of Bristol, which is about 2 km from the University campus and about 5 km from the Stoke Bishop accommodation. There are usually plenty of taxis, but we will also provide car transport from the station to Stoke Bishop for those arriving on Sunday afternoon. There is an hourly train service taking about 1 hr 45 minutes between Bristol and London (Paddington Station). The trains stop at Reading, for coach connections to London Heathrow Airport. There are also trains from London Gatwick to Reading. Bristol has its own airport situated about 12 km to the south west of the city, with flights to and from many leading European cities.
ACCOMMODATION

The official conference accommodation will be in single study bedrooms in the University of Bristol Halls of Residence, situated in a park and woodland setting in the area of Stoke Bishop, about 5 km to the north of the city centre and 3 km from the academic campus. There are 280 rooms with ensuite facilities available at the cost of £37 per night (bed and breakfast). There are also a number of standard rooms with washbasin, but shared bath and toilet facilities, at a lower cost of £22 per night (bed & breakfast). There will be a courtesy coach service to transport participants between Stoke Bishop and the academic campus at the beginning and end of the scientific programme each day, and to and from all the social events. Alternatively, a hotel list is available by post or on the World Wide Web if you wish to make your own arrangements. We regret that disabled participants will need accompanying helpers, as access to the academic campus and to the Halls involves climbing flights of steps.

MEALS

Buffet lunches will be available at the University, with a vegetarian option, for all five days of the conference at an inclusive price of £44 (a packed lunch will be available for those taking lunches and wishing to join the walking tour to the Brecon Beacons on Wednesday). The Conference Dinner, on Thursday 27 August in the Victoria Rooms, Clifton will cost £30. A self-service dinner can be booked at the Halls of Residence on 23 August at a cost of £10.
COMPSTAT '98

SOCIAL PROGRAMME

There will be a full programme of social events to allow participants to meet friends, exchange ideas and see many of the local attractions.

Sunday 23 August
Informal get-together at the Halls of Residence

Monday 24 August
Reception by Bristol City Council at The Council House

Tuesday 25 August
Organ recital and self-guided tour at St Mary Redcliffe Church

Wednesday 26 August
A choice of excursions:
1. Tour to Avebury, Stonehenge and Salisbury
2. Tour to Cheddar, Glastonbury and Wells
3. Visit to the City of Bath and Roman Baths
4. Tour of the Bristol Docks area, including boat trip and visit to the SS Great Britain
5. Strenuous walk in the Brecon Beacon hills

Thursday 27 August
Conference dinner in the Victoria Rooms, Clifton
REGISTRATION FEES

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<td>ISI/IAASC member</td>
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<td>£190</td>
<td>£220</td>
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<tr>
<td>Others</td>
<td>£190</td>
<td>£220</td>
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<tr>
<td>Accompanying person</td>
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There is also a student rate, available on application supported by a letter from your Head of Department. The fee includes:

- the proceedings
- attendance at all scientific sessions, poster, book and software exhibitions,
- participation in the social programme (excluding excursions and conference dinner)
- refreshments during morning and afternoon breaks

Meals, conference dinner and accommodation will be charged for separately, and a charge of £10 will be made for excursions. Cancellation will incur a charge of £30 up to 26 April, £60 up to 24 June; no refund can be made after 24 June.

FURTHER INFORMATION

Up-to-date information about the conference, and the Bristol locality, will be maintained on our Web site:
http://www.stats.bris.ac.uk/COMPSTAT/
Compstat '98

SCIENTIFIC PROGRAMME COMMITTEE

Roger Payne (United Kingdom), Chair
Jaromir Antoch (Czech Republic)
Gianfranco Galmacci (Italy)
Peter Green (United Kingdom)
Wolfgang Härdle (Germany)
Peter van der Heijden (Netherlands)
Albert Prat (Spain)
Jean Pierre Raoult (France)
Mats Rudemo (Sweden)

CONSULTATIVE MEMBERS:
ASC – Andrew Westlake (United Kingdom)
ERS IASC – Antoine de Falguerolles (France)
EARS IASC – Chooichiro Asano (Japan)
EUROSTAT – Christian Guittet (Luxembourg)
IASC – Malcolm Hudson (Australia)
INTERFACE – Carey Priebe (USA)

LOCAL ORGANISING COMMITTEE

Roger Payne (IACR-Rothamsted) Chair
Peter Lane (IACR-Rothamsted)
Peter Green (University of Bristol)
Steve Brooks (University of Bristol)
Gillian Arnold (IACR-Long Ashton)
Phil Brain (IACR-Long Ashton)
Stuart Barber (University of Bath)
Andrew Wood (University of Bath)

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Information is also available
on the World Wide Web:
http://www.stats.bris.ac.uk/COMPSTAT/