To make a science poster

Elisabeth Långström

Biology Education Centre

Information & communication

What is a poster?

- An enlarged book page/article page or something completely different?
  - Simplify and focus – should not tell the full story
- Why do we make posters?
  - Inform about and create an interest for your subject
  - Show who you are and market you research/ subject
  - Make contacts – network

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See your poster as an ad

- An ad for your project! A teaser with just the essence of your project.

- What is done?
- Who did it?
- Conclusion

} Should be understood in a few seconds by the reader

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IN CASE OF FIRE
EXIT BUILDING
BEFORE TWEETING
ABOUT IT


PAY
ATTENTION
WHILE
WALKING
YOUR FACEBOOK
STATUS UPDATE
CAN WAIT.
Metropolitan
Etiquette Authority


Academics
Art
Books
Computer
Crafts
Dictionaries
Earth
Encyclopedia
Home & Garden
Green
Games
Health
History
Homeschool
Languages
Literature
Math
Music

General about posters

- If you are not seen, you do not exist.
- Do not hide your message in too much text
- Use illustrations
  - A picture says more than a thousand words

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General about posters

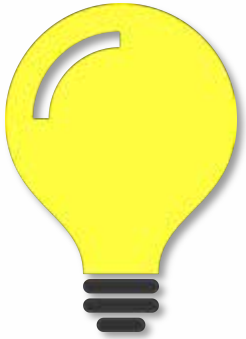
General about posters

- If you are not seen, you do not exist.
- Do not hide your message in too much text
- Use illustrations
  - A picture says more than a thousand words
- Focus on your main header, aim and conclusion
  - These should show what was done and what the findings were

- For how long time does one look at the poster before deciding to read it?

- How long time does one then spend reading the poster?

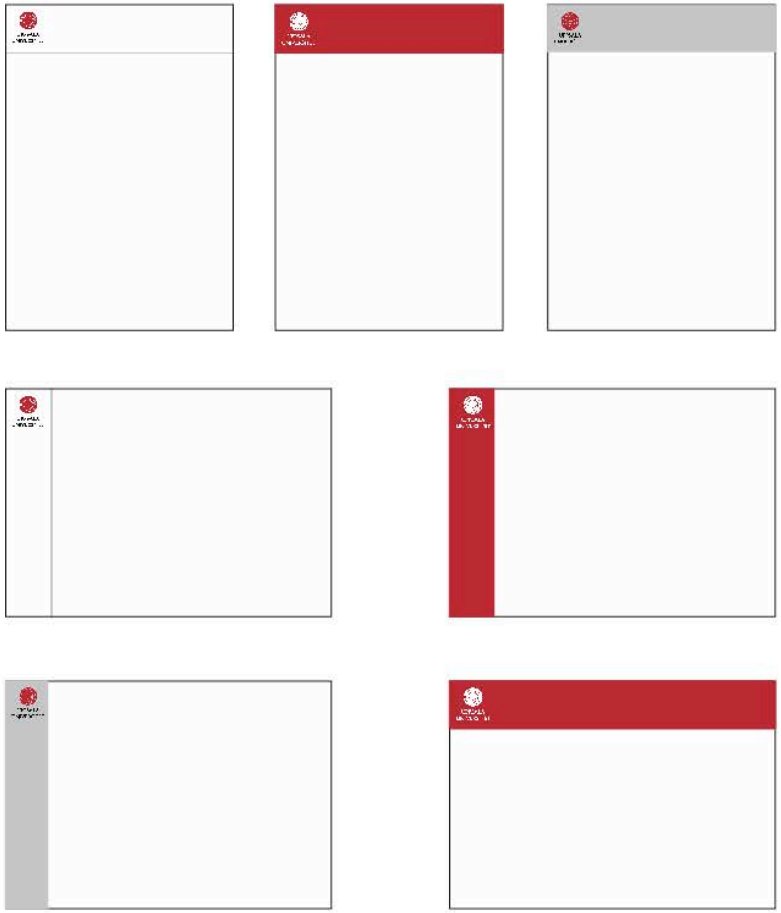
The poster: Think before you start making it



- What is your message?
- Focus on your audience
  - Who are the target persons?
  - Adapt you message to your target group
- How can you make people come to your poster?
- Always tell the most important first
  - You need to make you audience interested
- The headline and the general apperance decides if people want to keep reading

Uppsala University graphical profile

- Layout
  - 70 x 90 cm
  - Landscape or portrait
  - No images in the margin/top border
  - 2–4 colmns
  - Classic reading pattern: top left-> bottom right
- Logo
- Fonts
- Colours



Poster title goes here, containing strictly only the essential number of words...

Author's Name Goes Here, Author's Name Goes Here

Biology Department, Skyline College, San Bruno CA

Abstract

First…

Check with conference organisers on their specifications of size and orientation, before you start your poster eg. maximum poster size; landscape, portrait or square.

The page size of this poster template is A0 (84x119cm), landscape (horizontal) format. Do not change this page size, the printer can scale-to-fit a smaller or larger size, when printing. If you need a different shape start with either a portrait (vertical) or a square poster template.

Bear in mind you do not need to fill up the whole space allocated by some conference organisers (eg. 8ftx4ft in the USA). Do not make your poster bigger than necessary just to fill that given size.

Aim

Background

How to use this poster template…

Simply highlight this text and replace it by typing in your own text, or copy and paste your text from a MS Word document or a PowerPoint slide presentation.

The body text / font size should be between 24 and 32 points. Arial, Helvetica or equivalent.

Keep body text left-aligned, do **not** justify text.

The color of the text, title and poster background can be changed to the color of your choice.

Illustrate the procedure in figure (flow chart)

Methods

Tips for making a successful poster…

- Re-write your paper into poster format ie. Simplify everything, avoid data overkill.
- Headings of more than 6 words should be in upper and lower case, not all capitals.
- Never do whole sentences in capitals or underline to stress your point, use **bold** characters instead.
- When laying out your poster leave breathing space around you text. Don't overcrowd your poster.
- Try using photographs or colored graphs. Avoid long numerical tables.
- Spell check and get someone else to proof-read.

Captions to be set in Times or Times New Roman or equivalent, italic, between 18 and 24 points. Left aligned if it refers to a figure on its left. Caption starts right at the top edge of the picture (graph or photo).

Captions to be set in Times or Times New Roman or equivalent, italic, between 18 and 24 points. Right aligned if it refers to a figure on its right. Caption starts right at the top edge of the picture (graph or photo).

Captions to be set in Times or Times New Roman or equivalent, italic, 18 to 24 points, to the length of the column in case a figure takes more than 2/3 of column width.

Results

Importing / inserting files…

Images such as photographs, graphs, diagrams, logos, etc, can be added to the poster.

To insert scanned images into your poster, go through the menus as follows: Insert / Picture / From File… then find the file on your computer, select it, and press OK.

The best type of image files to insert are JPEG or TIFF, JPEG is the preferred format.

Be aware of the image size you are importing. The average color photo (13 x 18cm at 180dpi) would be about 3Mb (1Mb for B/W greyscale).

Notes about graphs…

For graphs use MS Excel

Captions to be set in Times or Times New Roman or equivalent, italic, between 18 and 24 points. Left aligned if it refers to a figure on its left. Caption starts right at the top edge of the picture (graph or photo).

Captions to be set in Times or Times New Roman or equivalent, italic, 18 to 24 points, to the length of the column in case a figure takes more than 2/3 of column width.

Discussion & Conclusion

Printing and Laminating…

Note: Do not leave your poster until the last minute.

Simply highlight this text and replace.

Literature Cited

Acknowledgements

Just highlight this text and replace with your own text. Replace this with your text.

What should you include?

- Pictures (relevant photos, tables etc)
- Text (title, attracting lead, subtitles, body text)
- Image captions
- References – not always necessary – depends …
- Contact information
- Acknowledgements (important contributions, funding)
- Picture of the author (small)
- Handout optional
- White space!!!

Figures/Diagrams

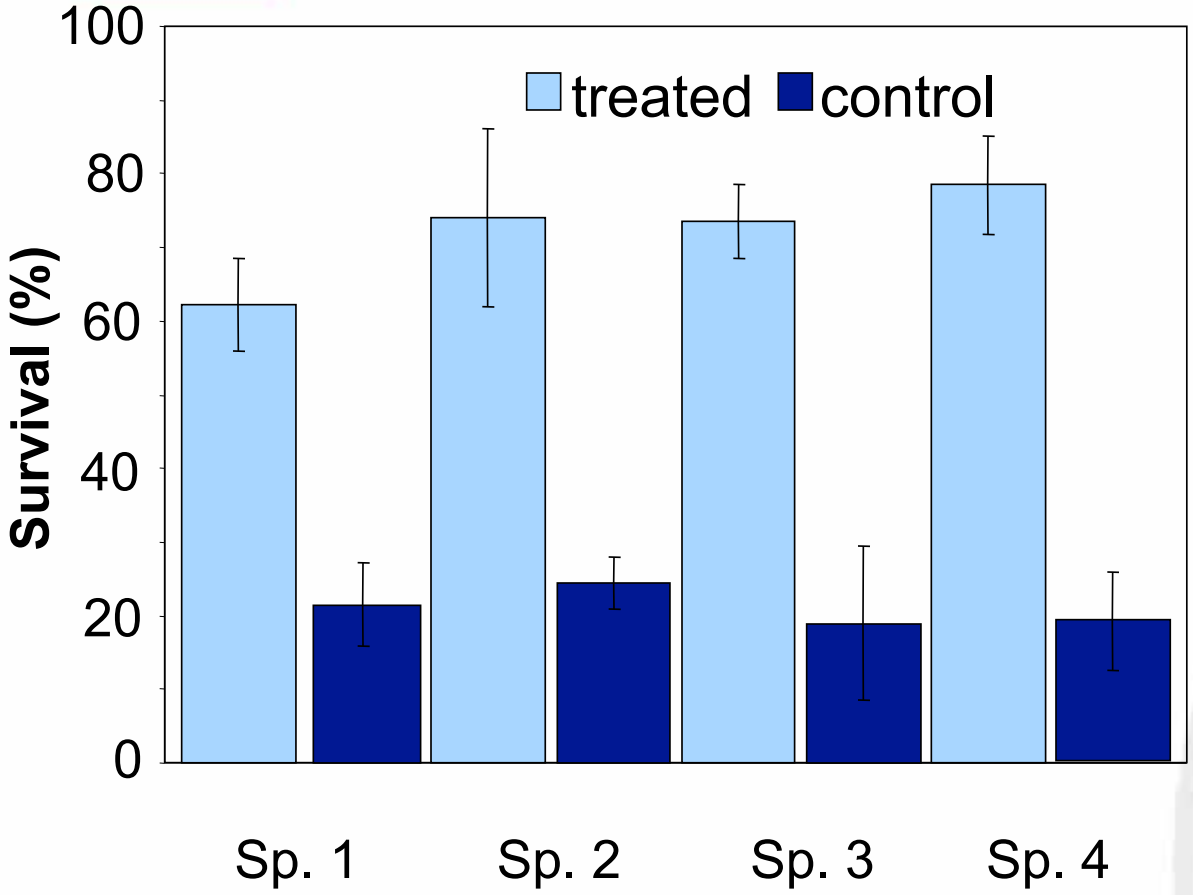


Fig. 1. The suvival increased after treatment for all secies. The bars show the ± sd.

- Avoid complex diagrams
- At least A5 size
- Explanation in the caption, not in the text.

The text

- Short striking header (lowe case/upper case) – ca 4–5 cm high – try it by printing parts in full size!
- Conclusions and intro
- Explaining subtitles –> a little less text
- Running text: all that information you want to give and write about – leave it out ☺
- Length of text lines – ca 35-40 letters (never more than 60), and up to ca 6 lines per paragraph
- References smaller font size (if included)
- Text adjustment left or straight right margin?
- Use a clean font without feet (sans serif) – not more than two different on one screen. UU: Times New Roman and Arial

The text – be concise…

- Do not use too much text
- Every word on the poster should be important. ”Wash” your text carefully.
- Aim for short concise sentences illustrated by the images.
- Also image captions should be short and readable (well written, adapted to the audience, good size).

Pictures

- Images
  - Start with high resolution pictures (300 dpi or more) since posters are quite large and you might have to use large pictures.
  - Try printing parts of the images in full poster format on a regular printer to get and idea about the resulting quality.
- Copyright
  - You have to have permission to reproduce someone elses images and tables.
  - You have to give references also to images (that you have permission to reproduce).

Handouts

- Handouts and business cards in a box or plastic folder hanging by your poster is a possibility
- It is a good idea to have handouts with the main message, explanation and contact information. It may be a small size copy of the poster.

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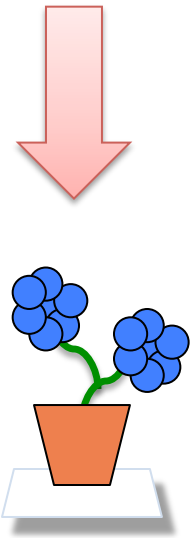
Don’t call me Lobelia



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Posters from your course

UPPSALA UNIVERSITET

Project in Computational Science Fall Term 2015

Project members:
Alexander Bilock
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Ylva Rydin

Supervisor:
David Marquez

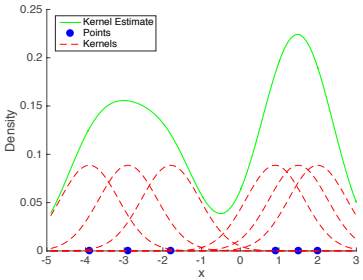
Course Coordinator:
Maya Neytcheva

Modelling Bivariate Distributions Using Kernel Density Estimation

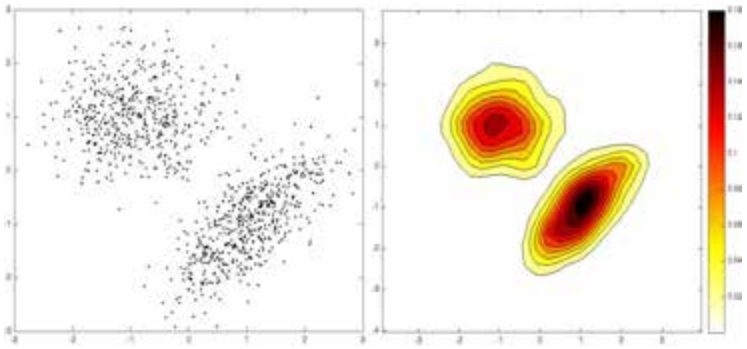
Kernel density estimation, KDE, is a topic covering methods of making nonparametric continuous estimates of the underlying density of a data set. In this project different methods to perform KDE have been tested and compared.

The idea behind KDE is to approximate the underlying density *f* of a data set by representing each point by a kernel *K*.

$$\tilde{f}(x,h) = \frac{1}{n}\sum_{i=1}^{n} K_h(x - x_i)$$



Example of univariate KDE



Example of bivariate KDE

To make the calculations more efficient binning can be used to assign the data points to fixed grid points and calculate the estimate on the grid.

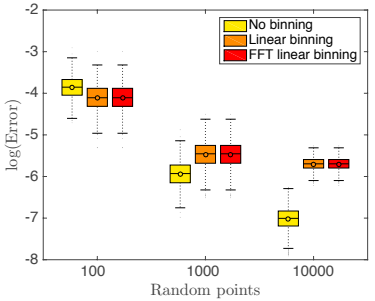
This allows usage of the fast fourier transform, FFT, yielding a significant speed-up. However the binning introduce errors to the estimate which are related to the sample size and coarseness of the grid.

The most important factor for an accurate KDE is the choice of the **kernel bandwidth**. This can be done automatically by minimizing an approximation of the error.

Two different bandwidth selection methods have been investigated in this project, plug in bandwidth selection (PI) and smooth cross validation (SCV). Our results showed that PI is the faster method, especially for small data sets.

Regarding accuracy it was found that an important factor is pre-transformation. Two **transformation** methods were compared, scaling and sphering (*). The scaling should be adjusted depending on the properties of the data set.

In **conclusion** kernel density estimation is a potent way to explore the properties of multivariate data. For a fast and accurate kernel density estimate the recommendation is to bin the data on a dense grid and use FFT for the estimation.



Error distributions on a test density comparing the impact of different computational methods and sample sizes.

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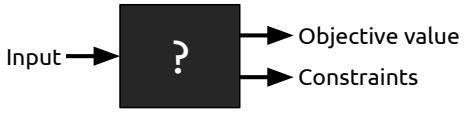
Analysis of different optimization algorithms for a black box problem



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Project in Scientific Computing, 2015

NLopt

NLopt is an open-source library for non-linear optimization. It contains several single-objective optimization routines.

Our task

Analyze the algorithms of the NLopt library with respect to (listed in order of importance)

1. Feasibility
2. Optimal objective value
3. CPU time

Based on these measures, nominate the best algorithm for a specific set of problems.

Methods

In order to assure a feasible solution different methods were applied

Standard runs

The sum of the objective function value and the constraint violations is minimized. The idea is that this should give a solution with a low objective value and a constraint violation of zero. However, it may fail when the algorithm finds a low objective value which is slightly infeasible.

Penalty multiplier method (PMM)

A scalar is multiplied to the constraint violation to penalize it more, such that feasibility is prioritized. PMM is identical to the standard run if the penalty multiplier is set to one.

Feasible initial guess method (FIGM)

A fully feasible initial guess is first generated by only minimizing the constraints and neglecting the objective function. This solution is then used as an initial guess when minimizing the objective function with a barrier-like method to remain feasible.

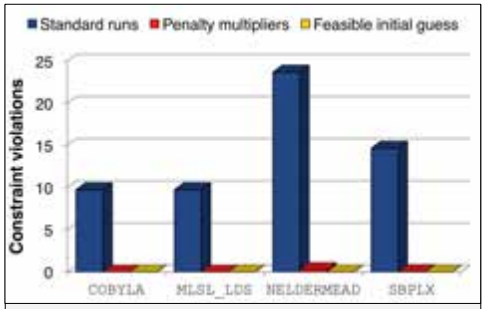

Figure 1: The violations of the constraints are shown for the different algorithms.

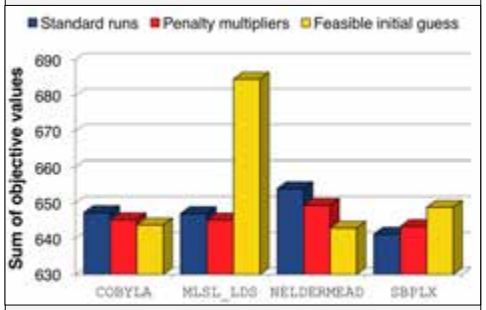

Figure 2: The sums of the objective values are shown for the different algorithms.

Results

In Figure 1 and 2 the feasibility and minimum objective value are displayed. It is clear that standard runs are not sufficient to achieve a feasible solution. Both PMM and FIGM yield completely feasible solutions, but FIGM has a greater number of successful algorithms. Also, FIGM gives a slightly better objective value than PMM. The best feasible objective value is achieved by `NELDERMEAD` with FIGM.

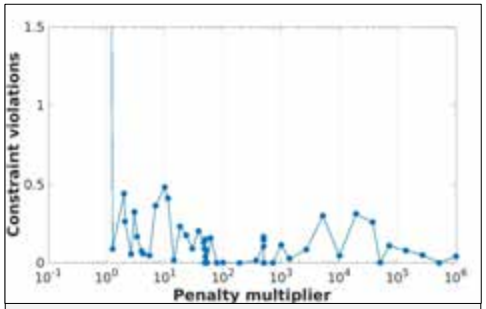

Figure 3: The sum of the constraints are shown as a function of the penalty multiplier for the `COBYLA` algorithm. Penalty multipliers less or equal to one give constraint violations greater than 1.5.

Figure 3 shows that there is no clear correlation between penalty multiplier and feasibility, making the choice of a penalty multiplier difficult. This lack of generality is the main drawback of PMM.

A drawback of using FIGM is that one has to first generate the feasible guess by minimizing the constraints only. It is likely that two different algorithms will be used, one for generating the feasible guess and another one for minimizing the objective function.

Conclusions

- Standard runs are not sufficient to achieve a feasible solution
- Both PMM and FIGM yield feasible solutions
- PMM lack generality therefore FIGM is the recommended method
- A feasible initial guess is best generated by `SBPLX`
- Given a feasible initial guess the preferred algorithm is `NELDERMEAD`

Odds Bias Based Football Betting Strategy for Premier League

A Study of Football Betting and Implementation of Statistical Algorithms to Enhance One's Betting Performance

UPPSALA UNIVERSITET

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Supervisor:
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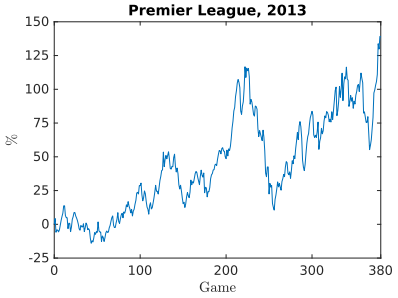
Please visit *www.betamatics.com* to enhance your betting performance.



Introduction

The aim of this project was to create a football betting model that gives a net gain in the long run. This was done by analyzing data from Premier League over the last 10 years. The model that was developed utilize that there exist a difference between the odds and the actual outcomes and has made a net gain between 30-300% per season in the last five years. The plot above shows how well the model performed during the 2013 season.

Method

We have evaluated three different methods that can be used to model the outcomes of the games.

The first two approaches we have been studying are commonly used in the football community and are called the Elo-ranking model and the Expected Goals model. Both of these methods use data from previous matches to predict the outcome of future games.

The Elo model, first developed in 1960 for chess players, is used to create a ranking for the playing teams and will change depending only on the outcome of the games. The more recent Expected Goals model is similar to Elo-ranking, but instead of the match results, the number of shots on goal is used to estimate the performance of a team. The advantage of using this variable is that the expected number of goals should be less random compared to the outcome, and thus a model using this variable could potentially achieve higher accuracy predictions.

The Odds Bias Model

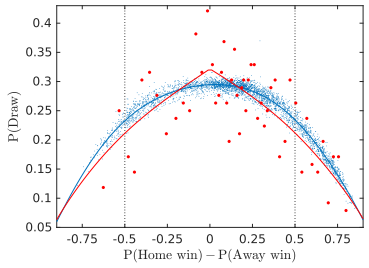
The bookmakers will attempt to set the odds such that the average game will make them earn money. Let the "true" probability of one outcome (home win, draw, or away win) be p. If the odds are b, and you bet a total of M on the outcome, your expected net gain will be

$$G = M(-1 + pb)$$

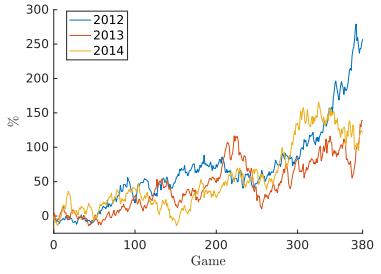
which comes from that you always pay M for the bet, but with probability p you win Mb. The bet will be "fair" if

$$p = \frac{1}{b}$$

since this makes G=0. The bookmakers will also add a margin on the odds (usually 4-8%) to prevent "sure bets". We can thus get the bookmakers probability by the equation and normalize p such that they sum to 1 for the three outcomes.

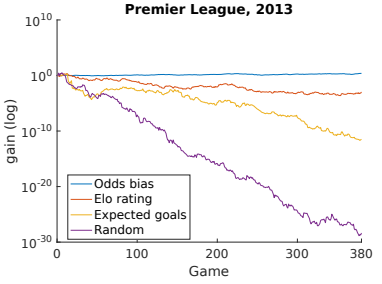


But what if there is a bias in the bookmaker probabilities compared to the actual match results? In the figure above we have plotted the home team advantage P(Home) - P(Away) versus the probability for draw, over the last 10 years. The blue dots represent the odds-probabilities, and the blue line is the corresponding trend line. The red line is a trend line for a multinomial logistic regression of the game outcomes. Even though these lines are close to each other they are not identical which implies that the odds are not perfect estimations of p. By utilizing this difference we have created a model that in the long run will earn money.



Result

Our research has resulted in three betting algorithms of which the Odds bias model, to our knowledge, is profitable in the long run as can be seen in the graph above. A comparison of all the three models for 2013 can be seen in the log scale graph below. As a part of this project a web application was built that shows live recommendations, and contain a lot more information about the project. Please go to www.betamatics.com (QR-code on your left) to see it and get the best bets of the week.



Solving the Linear Poroelastic Equations Using The SBP-SAT Method

Students
Kim Torberntsson
Vidar Stiernström

Project in Scientific Computing
2016-01-09
Uppsala

Supervisors
Eric Dunham
Ken Mattsson

Summary

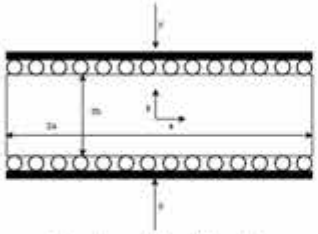
The linear poroelastic equations with spatially variable material parameters have been solved in 2D using the SBP-SAT method. Using the energy method, well-posed physical boundary conditions were derived and stability was proven. Simulations of Mandel's problem were conducted in order to verify the accuracy of the numerical scheme. The results show that the numerical solutions converge to the analytic solutions.

The SBP-SAT Method

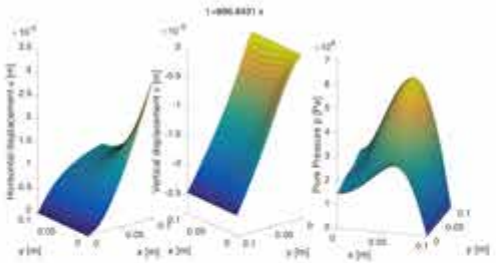
The SBP-SAT method is a finite difference method that allows for the implementation of physical boundary conditions. In the SBP-SAT method, derivatives are approximated using central finite differences and boundary conditions are imposed weakly. One of the main strength of the SBP-SAT method is that it allows for convergence proofs for linear or linearized problems.

Poroelasticity

The linear poroelastic equations describe the fluid flow in a porous material and the deformation of the material simultaneously. It is a system of coupled PDE:s that governs pore pressure p and displacements u of the medium. The theory of poroelasticity is used in civil engineering and geosciences to study for example stability of earthen dams, landslides and reservoir compaction.



The setup of Mandel's problem



Simulation of horizontal displacement u, vertical displacement v and pore pressure p in Mandel's problem with variable material parameters

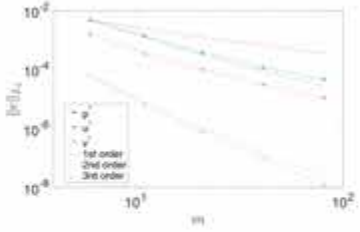
Governing Equations

$$\frac{\partial}{\partial x_j}\left[\left(K+\frac{G}{3}\right)\frac{\partial u_j}{\partial x_i}\right]+\frac{\partial}{\partial x_j}\left(G\frac{\partial u_i}{\partial x_j}\right)=\frac{\partial(\alpha p)}{\partial x_i}$$

$$\frac{1}{M}\frac{\partial p}{\partial t}-\frac{\partial}{\partial x_i}\left(\kappa\frac{\partial p}{\partial x_i}\right)=-\alpha\frac{\partial^2 u_k}{\partial x_k \partial t}$$

Mandel's Problem

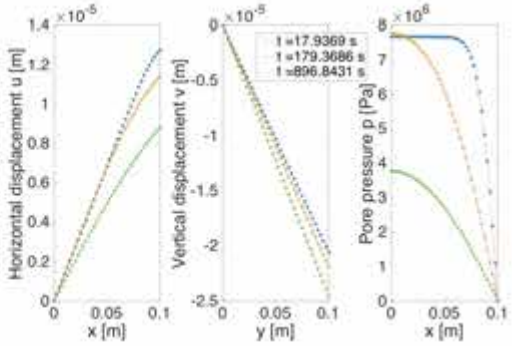
In Mandel's problem an infinitely long, rectangular plate of a poroelastic material is located between two rigid plates. At time zero an compressive force is applied at the top and bottom plates. The shear traction is zero at the north and south boundaries and the left and right boundaries are drained and stress free.



Convergence rate of horizontal displacement u, vertical displacement v and pore pressure p in Mandel's problem.

Results and Discussion

- Stability was proven for the linear poroelastic equations with physical boundary conditions discretized using the SBP-SAT method.
- It was shown that the numerical solutions converge toward the analytical solutions with expected convergence rates of the SBP operators used.
- For early times the solution has large spatial gradients giving rise to the π-mode. Operators that add artificial viscosity could damped the π-mode.
- With higher order SBP operators the temporal error quickly becomes dominant. A higher order time integrator than Euler Backward could therefore improve performance.



Simulation of horizontal displacement u, vertical displacement v and pore pressure p in Mandel's problem.

Future Work

- Use a higher order time integrator than Euler Backward.
- Use SBP operators with artificial viscosity to damped the π-mode.
- Analyze and simulate other problems, such as the finite length crack problem, the internal line source problem and fault slips.

Modelling and visualization of football data

Ricky Cheung, Johan Fernquist, Oscar Årling

UPPSALA UNIVERSITET

SUMMARY

From a database containing logged football data, we have built models and visualized playing patterns. These are used to reach a higher level of understanding in how teams have different playing styles.

THE DATABASE

The database contains information about all the events that occurs during a match including passes, tackles etc. For each of the events the time, place and what players that are involved in the event are logged. The data is logged by the company Opta.

MODELLING

Our models are based on the database, using data to visualize playing patterns. All of the visualisation data has been generated in MATLAB and the visualization applications are made in Processing.

MARKOV CHAIN SIMULATION

The application shown above is used to simulate ball movement for a user specified team.

The user drops a ball on the field and then a simulation starts. The simulation generates a markov chain, where every possible markov event is based on the data.The possible markov reactions are that the ball moves, a shot occurs or if the opposing team manages to take control of the ball.

The application can be run from *http://user.it.uu.se/~jofe2983/*

PASSING NETWORK

The application shown above is used to visualize how players have passed each other when facing specific teams.

The visualization shows the average position of made and received passes for every player in either the home or away team, as well as the pass frequency between the players in that team. The pass frequency is shown as a line between two players, with linewidth proportional to the number of passes.

The application can be downloaded from *http://user.it.uu.se/~osar8739/*

Towards moving Scientific applications in the cloud

UPPSALA UNIVERSITET

Project in Computational Science 2016

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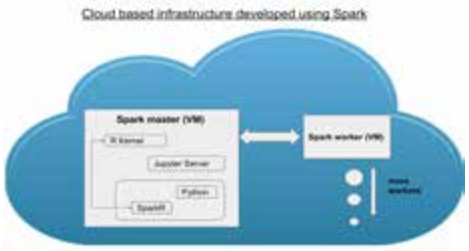
Aims:
Our aims are threefold:
1. Make this architecture viable for other scientific applications as well.
2. Make it ready & useable from scratch on any Cloud i.e. Amazon, HP Helion etc. with minimal effort.
3. Study the performance of a computationally intensive scientific application when executed in a cloud environment.

Directions:
1. Application as a service
2. Performance analysis of scientific applications

QTL as a service (QTLaaS):
Using already existing technologies i.e. **R** language, Apache **Spark**, SparkR, Jupyter notebook and **OpenStack** cloud infrastructure, we have designed a framework that help biologists run their **QTL** (Quantitative traits loci) code on cloud.

Problem:
Cloud computing provides **usability**, **scalability** and **on demand** availability of resources, remotely. That's why we are using it for scientific applications. We have designed an architecture in cloud that help scientists run their applications **elastically**. In addition we are also quantifying the performance overhead when using cloud to solve a numerical experiment. To evaluate performance, we ran already existing **MPI code** on the cloud.



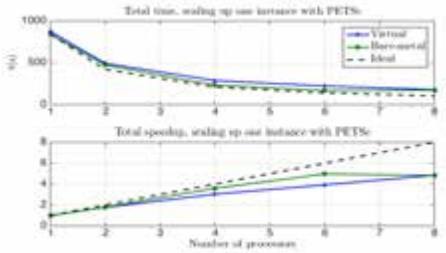
Features:
1. System Scalability
2. Interactivity
3. Automation
4. Portability
5. User familiar environment settings

Performance on the cloud:
In the scientific world, number of applications are well aligned with computing model. However, there are applications that require profound understanding to gain maximum performance together with the services, offered by the cloud concept.

Performance Analysis:
When performing numerical experiments using cloud, there are two potential causes for performance degradation. The causes are **consolidation and virtualization**. Consolidation occurs when more and more applications run on a single physical server, and virtualization is the layer between an application tier and the physical hardware in addition to the operating system.

Method:
When trying to evaluate the performance using the cloud, Laplace's equation was solved, discretized using finite elements and solved by the **Algebraic Multigrid method** (AMG) and simulated using the open source scientific libraries – **deal.ii** and **PETSc**. Deal.ii handles the mesh generation and the discretization. The arising large linear system of equations is solved by the AMG implementation, provided by PETSc. The code is parallelized using MPI.

Results:
From the results we see that, the run time while solving the problem on the cloud scales as well as when solving it on the bare metal machine. The increase **usability** and **simplicity** that comes with our framework can be seen as a tradeoff with performance degradation that appears when using the cloud.



Printing the poster

- Find out where.
- When: Normally you should have at least a week extra in case something goes wrong.
- Spell check and read through carefully before print. Send it in as a pdf and check that the pdf looks the same as your original file.
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This is how it may look in a science conference

The poster exhibition

- Think through how you want to present your poster to your audience and practice. You will have ca 3–5 minutes – several times if you are lucky ☺

10 January
14.30–15.30