INTRODUCTION

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Business Analytics: Optimization of Business Processes

Research / Education:
- Decision making under uncertainty
- Control of complex high-dimensional systems
- Stochastic optimization
Why do professional baseball executives, many of whom have spent their lives in the game, make so many colossal mistakes? ...

It takes time and effort to switch from simple intuitions to careful assessments of evidence.”

Thaler and Sunstein review of Moneyball
Clinical versus actuarial judgment

RM Dawes, D Faust, PE Meehl

Abstract

Professionals are frequently consulted to diagnose and predict human behavior; optimal treatment and planning often hinge on the consultant's judgmental accuracy. The consultant may rely on one of two contrasting approaches to decision-making—the clinical and actuarial methods. Research comparing these two approaches shows the actuarial method to be superior. Factors underlying the greater accuracy of actuarial methods, sources of resistance to the scientific findings, and the benefits of increased reliance on actuarial approaches are discussed.
EXAMPLE 1: PUZZLING RELATIONSHIPS

Question:
- Jack is looking at Anne, but Anne is looking at George.
- Jack is married, but George is not.
- Is a married person looking at an unmarried person?

A. Yes
B. No
C. Cannot be determined
EXAMPLE 1: PUZZLING RELATIONSHIPS

Question:
- Jack is looking at Anne, but Anne is looking at George.
- Jack is married, but George is not.
- Is a married person looking at an unmarried person?

A. Yes
EXAMPLE 2: THERE’S SOMETHING ABOUT LINDA
Examine the following profile:

- Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.

- Which of these scenarios is more likely?

A. Linda is a bank teller

B. Linda is a bank teller and is active in the feminist movement
EXAMPLE 2: THERE’S SOMETHING ABOUT LINDA

Examine the following profile:

- Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.

- Which of these scenarios is more likely?

A. Linda is a bank teller
EXAMPLE 3: DECISION FATIGUE

Proportion favorable decisions vs. Ordinal position
There are two types of mental operations:

1. Type 1: automatic, effortless, associatively coherent
2. Type 2: controlled, effortful, logically coherent
Behavioral economics teaches us that the value of analytics is often in avoiding biased judgments and flawed decisions.

### THE MORAL OF THESE EXAMPLES

**Human Judgment vs. Algorithms**

Clinical Versus Mechanical Prediction: A Meta-Analysis

William M. Grove, David H. Zald, Boyd S. Lebow, Beth E. Snitz, and Chad Nelson
University of Minnesota, Twin Cities Campus

136 studies of expert vs. algorithmic prediction

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<thead>
<tr>
<th>Experts Clearly Better</th>
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<th>Algorithm Clearly Better</th>
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<tr>
<td>8 (6%)</td>
<td>65 (48%)</td>
<td>63 (46%)</td>
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Do computers play more intelligently than humans?
Google AI algorithm masters ancient game of Go

Deep-learning software defeats human professional for first time.

Elizabeth Gibney

27 January 2016
Panama papers (2.6 TB, 11.5 billion documents)
  > 5 billion emails
  > 3 billion databases
  > 2 billion PDF documents
  > 1 billion images
  > 320,166 text files
  > 2,242 other files
Google Unveils Neural Network with “Superhuman” Ability to Determine the Location of Almost Any Image

Guessing the location of a randomly chosen Street View image is hard, even for well-traveled humans. But Google’s latest artificial-intelligence machine manages it with relative ease.

by Emerging Technology from the arXiv
February 24, 2016
ANALYTICS: SHIFTING PARADIGMS
CASUS: WHO IS INVITED?

- Applicant tracking data of 48 companies
- 441,769 applicants
- 18 factors:
  > Demographic
  > Biodata
  > Vacancy
  > Candidate
  > Pool of applicants
### CASUS: WHO IS INVITED?

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<td>15. Applied after target reached</td>
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<td>18. Avg. % of applicants invited by company</td>
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<td>19. Occup. vacancy rate (per 1000)</td>
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</table>
CASUS: WHO IS INVITED?

- Accuracy of approx. 70%.
- When no cover letter is required, accuracy of approx. 80%.
- Age and experience are the most important predictors.
- Results suggest inconsistency in the evaluation of demographic and biodata.
TOWARDS ANALYTICS MATURITY

Business Analytics Maturity

- Analytics to justify actions
- Analytics to guide actions
- Analytics to prescribe actions
- Real time context aware objective decisions

Use of Business Analytics

- Data insights are critical for daily decision making
- Use rigorous data driven approaches for business decision making
- Moderate Insights sharing infrastructure
- Moderate data expertise, Moderate data management practices
- Foundation
- Ad hoc

Business Capabilities & Agility

- Breakaway
- Differentiating
- Competitive
- Foundational
CASUS: THE WHY BEHIND THE HIRE

- Cooperation with Endouble.com

BUILDING CAREER SITES IS NOT OUR MISSION.
TRUSTED BY BRANDS WHO UNDERSTAND THAT 1 HIRE SHOULD NOT EQUAL 1,000 REJECTIONS

IT IS OUR MISSION TO UNDERSTAND THE WHY BEHIND THE HIRE.
THE APPLICATION JOURNEY

01 Aware of career opportunity
02 Consider a company or job
03 Apply for a job
04 Commit to hiring process
05 Accept job offer
06 Onboarding
07 Successful in job
THE RECRUITMENT FUNNEL
THE RECRUITMENT FUNNEL

Criterium: 60+ years old, dog owner

SEO keyword: branded | non-branded | location

Device: mobile | tablet | desktop

Visit  Search  Job  Apply  Interview  Onboarding  Talent
THE RECRUITMENT FUNNEL

Facets: location | target group | # hours a week

Internal site search: trending keywords | doelgroep

Conversion: % of people applying with / without search and or facets
THE RECRUITMENT FUNNEL

Context: do they look at contextual information

Time on page: how long is a job looked at?

New / Returning: % of visitors who come back for more
THE RECRUITMENT FUNNEL

Cloud CV: what % have a cloud resume

Drop off rate: when are you asking too much

Peek a boo: check out the form, apply later

Visit | Search | Job | Apply | Interview | Onboarding | Talent

Sandjai Bhulai (s.bhulai@vu.nl)
THE RECRUITMENT FUNNEL

# interview / partners: with whom / how many

Quality: candidate & hiring manager

Visit  Search  Job  Apply  Interview  Onboarding  Talent
THE RECRUITMENT FUNNEL

Onboarding success: happy partner = happy developer

Visit  Search  Job  Apply  Interview  Onboarding  Talent
THE RECRUITMENT FUNNEL

Talent
Referral & talent development

Visit  Search  Job  Apply  Interview  Onboarding  Talent
THE RECRUITMENT FUNNEL

Apply → Screening → 1st interview → 2nd interview → Assessment → Offer → Hired!

Device: % mobile, tablet, desktop applications
Cloud CV: % of cloud resume
Content: content did they look at
Source: sources responsible for application

Time: time to hire application process
Source: sources of success & rejection
Cost: cost per application
Diversity: the collective mixture of differences and similarities that includes, for example, individual and organizational characteristics, values, beliefs, experiences, backgrounds, preferences and behaviors.

Inclusion: the achievement of a work environment in which all individuals are treated fairly and respectfully, have equal access to opportunities and resources, and can contribute fully to the organization’s success.
Why is diversity analytics important?

1) social case for diversity, whereby employers have a moral obligation to treat employees with fairness and dignity and should ensure that decisions are made without resorting to prejudice and stereotypes.

2) diversity allows for the ability to maximize people potential, better understand customers, draw from a wider candidate pool, develop a more positive company image, increase employee engagement, improve retention, innovation and team performance.
DIVERSITY ANALYTICS
Conclusion

- In this organization women are under-represented in senior roles (to a level of certainty that means it pretty much could never happen by chance alone).
Exploring ethnic diversity across teams

- Large financial institute: 29,976 employees with 928 teams
- BAME – Black, Asian, or Minority Ethnic

Comments

- Ethnicity data is often collected on a diversity form completed by employees on joining the organization
- Ethnicity data is rarely mandatory
- The term BAME is primarily used in the UK
DIVERSITY ANALYTICS
Conclusion

- In comparing the Sales and the Professional Service functions, the proportion of BAME staff is significantly lower in Sales than in Professional Service. The average proportion of BAME staff in teams within the Sales is 9.7 percent, and by comparison the average proportion of BAME staff in teams within Professional Service function is 14.39 percent.
Conclusion

- In comparing the Sales and the Professional Service functions, the proportion of male staff is significantly higher in Sales than in Professional Service groups within our organization. The average percentage of male staff in teams within Sales is 71.26 percent, and by comparison the average proportion of male staff in teams within the Professional Service function is 44.4 percent.
DIVERSITY ANALYTICS
Conclusion

- We have a significantly higher proportion of BAME in our teams within the “Professional Service” functions as compared to “Sales” teams even when we take into account that the diversity levels tend to be much higher in our London teams than our outside London teams.
Employee turnover: all leavers of an organization, including those who resign, are made redundant, take retirement, or exit the organization for any other reason.

The cost of employee turnover can be substantial and has been projected at 93-200 percent of each single leaver’s salary depending on the skill, level of responsibility and the difficulty to replace.
TURNOVER ANALYTICS
Conclusion

- Even though the descriptive report suggested quite large differences between countries in terms of turnover rates, the chi-square analysis confirmed there was no significant difference between what you would expect to see in each country (given its size) and what was observed.
TURNOVER ANALYTICS
Conclusion

- We can now deduce that the impact that “country” has on both “Survey Engagement” and “Team Turnover” within our ANOVA (and Welch) is mainly due to how different Spain is compared to the other countries in our data set.

We can say that Spain has significantly lower engagement than all other countries based on the survey engagement values, and significantly higher turnover than both the UK and the United States.
TURNOVER ANALYTICS
Conclusion

- Country differences do not come out as significant in accounting for turnover. However, women are more than twice as likely to leave as men and a higher appraisal rating will increase the chances of employees staying (thus women who get a low performance rating are a ‘higher risk of leaving’ category than other employees).
TURNOVER ANALYTICS
Conclusion

- When you take into account the various country effects in the model alongside the survey measures, it seems that the country differences no longer come out as being as important in predicting team turnover as much as levels of engagement and perceptions of the team experiences of the company’s ‘drive for performance’ culture.
QUESTIONS