IBM Watson Tradeoff Analytics

Helping people make better informed decisions

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Session PA
What is IBM Watson Tradeoff Analytics?
What makes a choice so hard?

- Objectives become a “needle in a haystack”

- Impossible to judge the trade-offs among the objectives.
  - Cost vs Value?
  - Benefit vs Cost?
  - Performance vs Economy

- Cognitive overload as a result of:
  - Too many alternatives to consider
  - Too much irrelevant information to “screen out”
Take the guesswork out of decision-making

Narrow down to the best options to meet multiple goals

Explore visually

Recommend based on the preferred choices

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A Watson Cognitive Service

Tradeoff Analytics

Helps users make better choices to best meet multiple conflicting goals, combining smart visualization and recommendations for tradeoff exploration.

The Tradeoff Analytics service helps people optimize their decisions while striking a balance between multiple, often conflicting, objectives. The service can be used to help make complex decisions like what mortgage to take or which laptop to purchase. Tradeoff Analytics uses Pareto filtering techniques to identify the optimal alternatives across multiple criteria. It then uses various analytical and visual approaches to help the decision maker explore the pros and cons of their alternatives.

Access the service on Watson Developer Cloud at:

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How It Works

*(not just another comparison tool)*
Three Pillars of the Tradeoff Analytics Technology

- Applied Mathematics
- Visual Analytics
- Cognition

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Pareto filtering techniques

Red circles represent **Optional**

Blue circles represent **Optimal**

Tradeoff Analytics provides a set of visual means to assist decision makers to select the optimal solution.

**Mathematical Filtering**

**Optimal Trade-offs**

**Feasible Solutions**

**Visual Analytics**

**Decision Made**

Chosen Solution

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Transform Decision-making

Many options and multiple criteria

Filters out less attractive options based on a user’s specified objectives, preferences, and priorities

Optimal Solutions

Combines smart visualization with analytical recommendations

Final, informed decision

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Car Scheme Scenario

Meet Jane!
Jane is a professional living in Hampshire, working at a large car leasing firm. She helps people to compare lease deals for cars, across many and various dimensions:

• Monthly lease cost
• Benefit In Kind tax (CO₂)
• Mileage Costs
• Range and Environment
• And others
Jane decides to use Watson Tradeoff Analytics

I would like to choose the best option according to the following criteria:
- minimize Mthly Cost
- minimize BIK @ 40%
- maximize MPG
- minimize CO2
- minimize P11D Price
- minimize Insurance

Top options (7/40)
- BMW i3 eDrv S/IN AUTO
- Nissan Leaf Tekna
- Peugeot iOn Electric
- Renault Zoe i-Exp Nav
- Toyota Auris Exc TSS PR
- Toyota Prius CVT
- Volkswagen E-Golf

Auto Excluded (33/40)
Some Cars Are Automatically Excluded

Cars that have inferior ratings in all of the criteria were Auto excluded. Here Jane can understand why the Audi e-tron does not appear on the Tradeoff Analytics map.

Click on the bulb to see why?
Why Some Cars Are Automatically Excluded

Cars that have inferior ratings in all of the criteria were Auto excluded. Here Jane can understand why the Audi e-tron does not appear on the Tradeoff Analytics map.

Cars are shown as a zigzag line grey for the Audi e-tron and yellow for the BMW.

Each objective is represented by a vertical bar.

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Still too many options?

I would like to choose the best option according to the following criteria:
- minimize Mthly Cost
- minimize BIK @ 40%
- maximize MPG
- minimize CO2
- minimize P11D Price
- minimize Insurance

Refine by:
- Mthly Cost: €300.00 - €600.00
- BIK @ 40%: €30.00 - €80.35
- MPG: 80.0 - 160.0
- CO2: 0.0 - 85.3
- P11D Price: €25000.00 - €34000.00
- Insurance: 10.0 - 27.1

Showing 4 top options

Top options (7/40)
- BMW i3 eDrv S/IN AUTO
- Nissan Leaf Tekna
- Peugeot iOn Electrique
- Renault Zoe i-Exp-Nav
- Toyota Auris Exe-TSS-PR
- Toyota Prius CVT
- Volkswagen E-Golf

Auto Excluded (33/40)
- Audi A3 e-tron
- BMW i3 e-tron S/IN RE...
- Ford Mondeo Vignale 2....
- Ford Mondeo Titanium ...
- Ford Mondeo Titanium ...

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Tradeoff Analytics makes automatic recommendations for alternatives where small sacrifices in one criteria lead to large gains in others. Or explain why they were rejected.
Missed Something?

By making small compromises in one area you stand to make much larger gains in the others

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Confident Solution!

BMW i3 eDrv S/IN RE AUTO

Favorite

five-door urban electric car with range extender

Details:
- Mthly Cost = €328.57
- BIK @ 40% = €60.21
- MPG = 124
- CO2 = 13
- P11D Price = €36125.00
- Insurance = 21.0

This is my decision

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Other Use Cases
Use Cases By Industry

- **Real Estate**
  - Focus only on top properties
  - Decrease the amount of missed opportunities

- **Marketing & Recruitment**
  - Select the optimal media strategy for a specific campaign
  - Find optimal candidates for job openings
  - Identify the best job openings for their unique objectives

- **Healthcare**
  - Select the best treatment & drugs for patients based on multiple objectives

- **E-commerce**
  - Identify the top options for purchase
  - Improve the overall shopping experience

- **Finance**
  - Compare mutual funds

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Oncology Treatment Selection

- Dr. Gray is considering treatment options for an oncology patient
- She consults Watson Oncology, which suggests, according to the patient’s medical record, 15 alternative chemotherapy treatments
Which treatment is right for the patient?
The doctor can now use Tradeoff Analytics to compare, together with the patient, the alternative treatments according to attributes such as:

- Percentage of success (maximize)
- Duration of effectiveness (maximize)
- Planned treatment duration (minimize)
- Level of adverse effects (minimize)
- Out of pocket expenses (minimize)

The list of options to analyze:

<table>
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<tr>
<th>Id</th>
<th>Name</th>
<th>Planned treatment duration (months)</th>
<th>Adverse effects (1 to 5)</th>
<th>Chance of success (%)</th>
<th>Duration of effectiveness (years)</th>
<th>Out of pocket expenses ($)</th>
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<td>12</td>
<td>5</td>
<td>50</td>
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<td>70</td>
<td>6.5</td>
<td>11000</td>
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<td>2</td>
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<td>65</td>
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</tr>
</tbody>
</table>
Housing selection (also suits Online Shopping)

- Emma would like to purchase a new house. Using the NESTS application she can retrieve all the properties for sale at a certain region (352 options). She uses the filter on the left hand side and filters out properties below a certain square footage and above a certain price. Yet she still has too many options (108) to compare.
Focusing in on the best housing options

- With Tradeoff Analytics, Emma can focus on only the top houses, that do best on the array of her objectives (Price, Square footage, Beds, Baths, Year Built), without missing out on a valuable opportunity!
Customer Stories
helps advertisers create a better-informed media mix.

Need
• Better selection of the mix of media for product promotion
• Optimization of ad-buys given a certain budget

Solution
• Allows advertisers to navigate options for ad buys based on multiple objectives (e.g. budget, target reach, etc) and secure the optimal media mix

Benefits
• Improved relevancy and impact of ad buy options
• Better-informed purchase decisions

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guides employers through the selection of job candidates.

**Need**
- Determine the best candidates for positions based on social & web content

**Solution**
- Filter out candidates based on multiple objectives
- Choose from only the top candidates

**Benefits**
- Improved relevancy of job candidates
- Faster candidate selection

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Where to Find Help

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Support for Tradeoff Analytics

1) Go to our Web page for:
   • Documentation about Tradeoff Analytics API
   • Video on Tradeoff Analytics
   • Live demonstrations
   • LINK: Tradeoff Analytics on WDC

2) Contact your local IBM team

3) Contact me
   Paul Read (paul_read@uk.ibm.com)
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