Sandbox UPDATE

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The goals
The work packages

The goal of WP3 (lead: Edinburgh) is to:

- develop and evaluate **automated techniques** for recovering from situations of trust breakdown

The goal of WP4 (lead: Edinburgh) is to:

- develop a **concrete web software** from the computational methods of WP3.
The goals
One software, three functionalities

- **Sandbox component** for users to play with
- A component to capture experiences and opinions
- A mediation component for debating and negotiation

**Web Software**

**Sandbox**

**Capture Component**

**Mediation Component**

**Sandbox component** for users to play with

A component to capture experiences and opinions

A mediation component for debating and negotiation

Bruno Yun and Benedicte Legastelois
The successful sandbox should have:

- Different variations of algorithms
- Different datasets where algorithms can be applied on
- Tools for performance measurements (trust index, etc.)
We first have to answer the following questions:

- What are the purposes of the considered algorithm?
- What type of algorithms?
- What is the input and output?
- Should we provide explanations to the user?
We first have to answer the following questions:

- What are the purposes of the considered algorithm? → Hotel recommendation algorithms
- What type of algorithms?
- What is the input and output?
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We first have to answer the following questions:

- **What are the purposes of the considered algorithm?**
  - Hotel recommendation algorithms

- **What type of algorithms?**
  - Machine learning algorithms

- **What is the input and output?**

- **Should we provide explanations to the user?**
We first have to answer the following questions:

- What are the purposes of the considered algorithm?  
  → Hotel recommendation algorithms

- What type of algorithms?
  → Machine learning algorithms

- What is the input and output?
  → User data and the algorithm parameters

- Should we provide explanations to the user?
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- What are the purposes of the considered algorithm?  
  → Hotel recommendation algorithms

- What type of algorithms?  
  → Machine learning algorithms

- What is the input and output?  
  → User data and the algorithm parameters

- Should we provide explanations to the user?  
  → Metrics, Venn diagrams, etc.
Overview

1. Introduction
   - Context
   - The sandbox

2. First draft
   - Hotel recommendation
   - The input
   - The results
   - Explaining to the user
   - Getting feedback

3. Data generation
   - Hotel data
   - User data
   - Rating data

4. The algorithm

5. Questions
We built a tool for recommending hotels to users w.r.t. their personal data.

Users are anonymous and we do not save anything.

We are only focusing on hotels from Paris.
Hotel recommendation

The frontpage update

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The algorithm

Questions

Hotel Recommendation
Personalised Booking System

Sandbox Scenario

You want to find a hotel for your next journey in Paris. In the next page, we provide you with a new tool that recommends hotels with respect to your profile. You are free to interact with the different parameters available.

What is this tool?

Hotel Recommendation is a tool that recommends hotels by using your personal details. Your profile will be compared with thousands of other users. Our database of ratings and hotels will make sure that you find the perfect match.

A problem? Contact Us

Address: 10 Erciston St, Edinburgh EH8 8AB, UK
Phone: 0131 650 1000
Email: school.office@inf.ed.ac.uk
Hotel recommendation
The frontend update
The user’s input
Personal data & algorithm selection

- Users can input different kind of personal data (gender, age, ideal price, wheelchair user, etc.)
  - Added new fields (reason for trips, etc.)

- Users have access to different versions of the algorithm
The user’s input
Personal data & algorithm selection

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  - Added new fields (reason for trips, etc.)

- Users have access to different versions of the algorithm

- NEW: Access to different datasets of ratings
The user’s input
The input interface
The user’s input
The input interface

Gender:
- Male
- Reason for trip:
- Leisure

Age:
- 18
- Wheelchair User
- Traveling with partner
- Traveling with kids

Ideal price per night & per person (£ 200)

Algorithm selection:
- Algorithm 1
- Algorithm 2
- Algorithm 3

This algorithm uses both the ratings on hotels from the users and the similarity between hotels to recommend the best hotels.
The importance of the ratings and the similarity between hotels is equal with this algorithm.

Data selection:
- No preference
- Location preferred
- Rating preferred
- Price preferred
Questions to discuss:

- How should we explain the different algorithms/datasets?
- Should we re-think the input (sliders, etc.)?
- Should we add the possibility for the user to have a history?
The hotel recommendations
The output

We provide several outputs to the user:

- An ordered list of 10 hotels with their details
- Some statistics on the recommended hotels
The hotel recommendations
The list of recommended hotels

<table>
<thead>
<tr>
<th>#</th>
<th>Hotel Name</th>
<th>Address</th>
<th>City</th>
<th>Night</th>
<th>Room Type</th>
<th>Wheelchair Accessible</th>
<th>Swimming Pool</th>
<th>Breakfast Available</th>
<th>Reviews</th>
<th>Michelin Restaurant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HÔTEL PALAIS DE CHÂLLOT</td>
<td>35 AVENUE RAYMOND POINCARE - 16, TRINIDAD - P@IS-75016</td>
<td>Paris</td>
<td>139.5</td>
<td>Double</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>HÔTEL L'OISEAU BLEU</td>
<td>24 RUE AVION-PARIS-FRANCE</td>
<td>Paris</td>
<td>81.8</td>
<td>Single</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>HÔTEL FURMAN PARIS NONT PARANISE</td>
<td>13 RUE DU COMMANDEANT RENÉ MOUCHOTTE-PARIS-FRANCE</td>
<td>Paris</td>
<td>110.0</td>
<td>Twin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>HÔTEL ATLANTIQUE</td>
<td>54 RUE FALGUÈRE-PARIS-FRANCE</td>
<td>Paris</td>
<td>88.9</td>
<td>Double</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>HÔTEL RELAIS DU PRES</td>
<td>16 RUE PIERRE SEMARD-PARIS-FRANCE</td>
<td>Paris</td>
<td>120.6</td>
<td>Double</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>HOLIDAY INN PARIS SAINT GERMAN DES PRÊS</td>
<td>PARIS-FRANCE 92- RUE DE VALIGARDO-ON-SAINT-GERMAN-LUXEBROUG-75009 PARIS</td>
<td>Paris</td>
<td>229.7</td>
<td>Twin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>LES JARDINS DE LA PAILLE</td>
<td>PARIS-FRANCE 5 RUE BELLOR-17-PALMAS DES</td>
<td>Paris</td>
<td>142.6</td>
<td>Double</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The hotel recommendations
Overview of the recommendation (OLD)

- We provide the average price and review
- Compact visualisation the data of the recommended hotels
The hotel recommendations
Overview of the recommendation

Algorithm 1 with no preferences, gives the following recommendation for a 18 years old male person that is not a wheelchair user, is traveling for leisure, is not married, does not have kids and have an ideal price of £200.

The average price per night for the recommended hotels is £142.5 and the average review is 3.1/5.
In order to explain machine learning algorithms to basic users, we thought of two ideas:

- Explaining the algorithm in plain english
- Give the user a glimpse of the data used for learning.
Explaining the algorithm to the user

Showing similar users

Similar Users

Our database regroups more than 1000+ users.

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Gender</th>
<th>Target Price</th>
<th>Is Married</th>
<th>Wheelchair User</th>
<th>Have Kids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papilio Santon</td>
<td>18</td>
<td>M</td>
<td>196.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mark Foxton</td>
<td>20</td>
<td>F</td>
<td>197.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimitry Carwadine</td>
<td>22</td>
<td>M</td>
<td>196.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yorgos Hindsberg</td>
<td>26</td>
<td>M</td>
<td>202.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beauregard Capaldi</td>
<td>31</td>
<td>M</td>
<td>197.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Explaining the algorithm to the user
Ratings from similar users

**User Profile**
- Firstname: Pepito
- Lastname: Sention
- Age: 18
- Gender: Male
- Ideal price for a night: 196.1
- Wheelchair User: Yes
- Is married: Yes
- Have kids: Yes

**User History**
Ratings from this user.

<table>
<thead>
<tr>
<th>Hotel Name</th>
<th>Price Per Night</th>
<th>Room Type</th>
<th>Breakfast Available</th>
<th>Swimming Pool</th>
<th>Michelin</th>
<th>Disable Access</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>LE PAVILLON DU LAC</td>
<td>377.8</td>
<td>Twin</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>HOTEL NOTRE-DAME SAINT MICHEL</td>
<td>81.8</td>
<td>Single</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>HOTEL DE NESELE</td>
<td>151.8</td>
<td>Double</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>4</td>
</tr>
<tr>
<td>BED AND BREAKFAST IN PARIS - ALOVE &amp; AGAPES</td>
<td>151.2</td>
<td>Double</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>B &amp; B LES ROSIERS</td>
<td>103.0</td>
<td>Single</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>PARIS SWEET 36</td>
<td>97.7</td>
<td>Twin</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>2</td>
</tr>
<tr>
<td>CLFT</td>
<td>184.8</td>
<td>Double</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>GARDEN ELYSEE</td>
<td>66.9</td>
<td>Single</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>3</td>
</tr>
</tbody>
</table>
Questions to be discussed:

- Is this an efficient way of explaining algorithms to the users?
- What are the other way of explaining recommender algorithms to the users?
- Should we explain or let the user experiment?
Algorithm 1 with no preferences, gives the following recommendation for a 18 years old male person that is not a wheelchair user, is traveling for leisure, is not married, does not have kids and have an ideal price of £200.

The average price per night for the recommended hotels is £142.5 and the average review is 3.1/5.
The data used
A combination of three datasets

This algorithm uses three datasets:

1. A set of hotels
2. A set of users
3. A set of ratings from users to hotels

Most of the data used was generated!
Real hotels
Tour-pedia dataset

We used the hotel dataset from the **Tour-pedia** website

- Same source as the hotel data from the fake booking website
- A set of 1766 handpicked hotels
- Real data (name, address, reviews, etc.)

We generated the **missing data**:

- Room price per night
- Wheelchair accessible
- Swimming pool, etc.
Fake users
Mockaroo: a realistic data generator

We created a set of 1000 users using the Mockaroo generator:

- First name, last name, gender and age

We added the missing fields:

- Annual salary and ideal price
- Marital status, children
- Wheelchair user, etc.
Fake ratings
Manually creating ratings

We produced rating using a two-steps process:

1. We assigned some hotels to the users
2. The user rated the hotels using the following criteria:
   - An intrinsic preference from the user
   - The price of the hotel room w.r.t. ideal price range
   - The probability to like the room w.r.t. gender and age
   - The probability to like swimming pools w.r.t. age and gender
   - The probability to like Michelin restaurants
   - The probability to want wheelchair accessible hotels
Questions

Questions to be discussed:

- Do we continue with this generated dataset or should we switch to realistic datasets?

- Should we revise the way users rate hotels?
The recommender algorithm

The algorithm is based on two components:

- A hybrid recommender system
- A similarity measure between users
The recommender algorithm

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Rating data

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Hybrid Recommender System

Users

Hotels

Ratings

Similarity

Recommendation

User 1

Recommendation

User 2

User
Questions