Context-awareness has been defined as the ability of an application to discover and react to changes in the user’s environment [1][2].

How to automatically identify relevant context information in a prediction / recommendation process for a given user?

**Contribution to Context Management**

- Impact on User Actions
  - Formal Concept Analysis [3]
  - Galois lattice [4]
  - Recommending Specific Actions
  - Association Rules [5]

1. Data Collection and Formatting

- Collection of Context Elements and User Activities:
  - Set of raw data collected by sensors or recorded in log files.
- Data Formatting:
  - Organising data for processing by Formal Concept Analysis (FCA).

2. Extraction of Relationships among Data with Formal Concept Analysis

3. Association Rules Extraction for Recommendation (A-priori Algorithm)

- Support (\(Ci, Cj\)) = frequency of simultaneous occurrences of context \(Ci\) and \(Cj\)
- Confidence (\(Si \Rightarrow Cj\)) = Support (\(Cj, Si\)) / Support (\(Si\))
- Example: Support (\(C1, C3\)) = 2/4 = 0.5
- Confidence (\(C1 \Rightarrow C3\)) = 0.5 / 3 = 0.16

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**TABLE I: EXAMPLES OF RECOMMENDATIONS**

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Conf</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1 (E-mail, Gmail, l_soir, Network1) = (Google+)</td>
<td>80.33%</td>
</tr>
<tr>
<td>R43</td>
<td>13.51%</td>
</tr>
<tr>
<td>R57 (E-mail, l_soir, Network1) = (Google+)</td>
<td>80.33%</td>
</tr>
<tr>
<td>R71 l_soir, Localisation1, Chroma = Facebook</td>
<td>36.71%</td>
</tr>
<tr>
<td>R92 [Network1] = [Facebook]</td>
<td>80.33%</td>
</tr>
<tr>
<td>R86 [l_soir, Network1, Chroma] = [Google+]</td>
<td>80.33%</td>
</tr>
<tr>
<td>R95 [l_soir, Network1, Maps] = [IGAG]</td>
<td>100.00%</td>
</tr>
<tr>
<td>R101 [l_soir, Localisation1, Network1] = [LaStampa.it]</td>
<td>45.00%</td>
</tr>
<tr>
<td>R109 [l_soir, Localisation1] = [Gmail]</td>
<td>40.90%</td>
</tr>
<tr>
<td>R123 [l_soir, Music, Localisation1] = [Chrome]</td>
<td>61.11%</td>
</tr>
</tbody>
</table>

**References**