LabVis: Simple and Intuitive Visualization of Medical Laboratory Results

Adam Bodnar and Dmitry Nekrasovski

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Current Method

<table>
<thead>
<tr>
<th>Test</th>
<th>Range</th>
<th>Result</th>
<th>Normal</th>
<th>Supplier 1</th>
<th>Supplier 2</th>
<th>Supplier 3</th>
<th>Supplier 4</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
<td>12-18 g/dL</td>
<td>14.5 g/dL</td>
<td>Yes</td>
<td>Supplier 1</td>
<td>Supplier 3</td>
<td>Supplier 4</td>
<td>Supplier 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creatinine</td>
<td>0.5-1.0 mg/dL</td>
<td>0.8 mg/dL</td>
<td>Yes</td>
<td>Supplier 2</td>
<td>Supplier 3</td>
<td>Supplier 1</td>
<td>Supplier 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glucose</td>
<td>70-110 mg/dL</td>
<td>90 mg/dL</td>
<td>Yes</td>
<td>Supplier 4</td>
<td>Supplier 1</td>
<td>Supplier 2</td>
<td>Supplier 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Project Goals

- To develop an effective visualization for displaying and interacting with medical laboratory results
- Must support diagnosis, monitoring of treatment, and education of medical students
- Evaluate using real scenarios

Vis 1 - Time-Series Overview

Proposed vs Delivered

Vis 2 – Scatterplot View

Proposed vs Delivered

Vis 3 – Test Details

Proposed vs Delivered
LabVis Interface

Visualization Details
- Colour and transparency
- Information density
- Linked highlighting
- Spatial layout

Usage scenarios
- Clinician: single patient data
  - Diagnostics: what's wrong now?
  - Monitoring history over time
- Clinical researcher: full dataset
  - Overall trends, outliers, ...

Thyroid test terminology
- Primary tests:
  - TSH (thyroid stimulating hormone)
  - FT4 (free thyroxine)
- Relationship determines likely diagnosis
- Secondary tests
  - T4, FT3, ATPO, ...
  - Used to confirm some diagnoses

Demo!
- Clinician diagnostic scenario

Evaluation
- Informal cognitive walkthrough
  - Domain expert user: Dr. Wes Schreiber
  - Non-expert users
- Results
  - Linked highlighting, colour cues helpful
  - Some suggestions for detail visualization
  - Overall: easy to use, intuitive
Summary

- LabVis: rapid, intuitive visualization and interpretation of medical laboratory test results