Integration and analysis of heterogeneous big data for precision medicine and suggested treatments for different types of patients.

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iASiS Basic Facts

• Title: Integration and analysis of heterogeneous big data for precision medicine and suggested treatments for different types of patients

• Topic: H2020-SC1-PM-18-2016 - Big Data supporting Public Health policies

• Contract No.: 727658

• Budget: € 4.3M
Motivation

• Epidemiological data analysis is not sufficient for public health policies in the era of personalized/precision medicine
• We also need explanations, e.g. why a treatment ought to work better for one type of patient than another
• Therefore, we need to combine breadth (across a population) with depth (e.g. personal genome) in the analysis
• Big data analysis can address both breadth and depth, under the appropriate framework. That’s iASiS!
Vision and Objectives

iASiS Vision:

Turn clinical, pharmacogenomics, and other Big Data into actionable knowledge for personalized medicine and health policy-making

iASiS Objectives:

• Integrate automated unstructured and structured data analysis, image analysis, and sequence analysis into a Big Data framework

• Use the iASiS framework to support personalized diagnosis and treatment
The iASiS Framework

- iASiS focuses on **two use cases:**
  - Lung cancer
  - Alzheimer’s disease

- General-purpose drugs are often ineffective

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Ineffective Patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-depressants (SSRIs)</td>
<td>38%</td>
</tr>
<tr>
<td>Asthma drugs</td>
<td>40%</td>
</tr>
<tr>
<td>Diabetes drugs</td>
<td>43%</td>
</tr>
<tr>
<td>Arthritis drugs</td>
<td>50%</td>
</tr>
<tr>
<td>Alzheimer’s drugs</td>
<td>70%</td>
</tr>
<tr>
<td>Cancer drugs</td>
<td>75%</td>
</tr>
</tbody>
</table>
The iASiS Framework

- **iASiS analyzes:**
  - EHRs (English & Spanish)
  - MRI & PET/CT images
  - Genomic data (e.g. liquid biopsy samples)
  - Related bibliography (e.g. PubMed)
  - Biomedical databases (e.g. DrugBank)
  - Biomedical ontologies (e.g. GO, UMLS)
The iASiS Framework

- Extracted knowledge is fused in the iASiS knowledge graph
  - Unified semantic schema
  - Linked data
  - Machine-processable knowledge

- iASiS end-users can:
  - Perform natural language questions
  - Receive answers along with justifications
  - Identify patterns in patient populations
  - Make informed decisions

- All steps of data management and analytics enforce privacy and access control
iASiS Partners
Thank you for your attention

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