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

http://project-iasis.eu

@Project_IASIS

Coordinator: NCRS Demokritos, Greece (George Paliouras)

iASiS: Big Data to Support Precision Medicine and Public Health Policy

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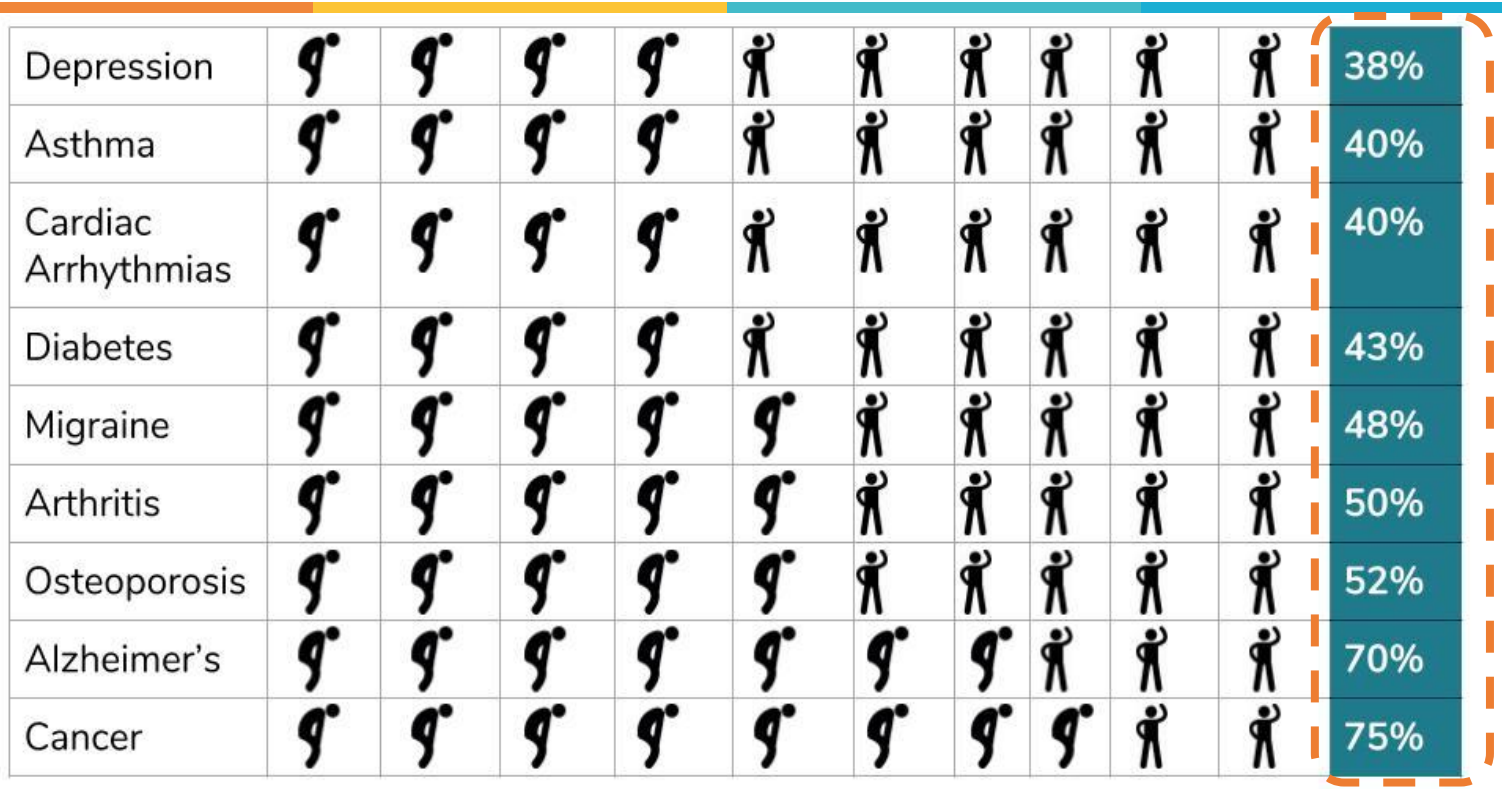
SC1-PM-18-2016: Big Data supporting Public Health policies

Motivation



[Source: Brian B. Spear, Margo Heath-Chiozzi, Jeffrey Huff, "Clinical Trends in Molecular Medicine," Volume 7, Issue 5, 1 May 2001, pages 201-204.]

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Vision and Objectives

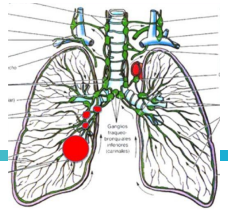
iASiS Vision:

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

Objectives:

- **Integrate** automated **unstructured** and **structured** data analysis, **image** analysis, and **sequence** analysis into a **Big Data framework**
- **Develop** a **framework** for supporting **personalised** diagnosis and treatments

Pilot 1: Lung Cancer



Motivation:

- **Lung cancer** among the most
  - **Common** and **deadly** diseases
  - **Costly** cancers
- **Lung cancer** is a **heterogeneous** disease. Characteristics **differ** among
  - Patients
  - Tumor regions

iASiS will enable:

- **Discovery** of correlations among tumor spread, prognosis, response to treatment
- **Unraveling** molecular mechanisms that **predict response** to different tumor types (signatures)

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Pilot 2: Alzheimer's Disease

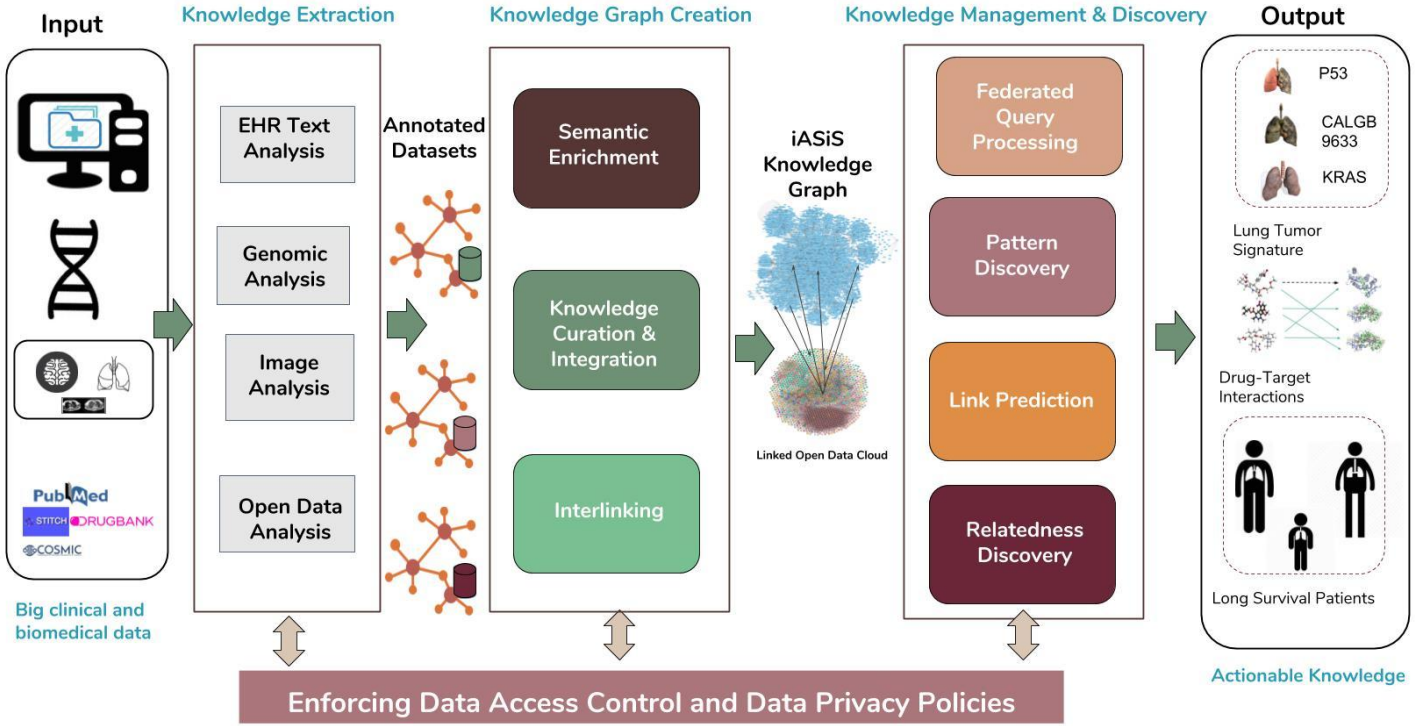
Motivation:

- Approximately, **10% of people** over 65 suffer from Alzheimer's
- **Heterogeneity** of the symptoms impedes accurate diagnosis and treatments

iASiS will enable:

- **Discovery** of **patterns associated** with prognosis, outcomes, and response to treatments
- **Association** of **medical** and **lifestyle advice** with Alzheimer's risk and stages of severity

The iASiS Pipeline



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How the Community can contribute?

Datasets:

Pharmacogenomics and **Clinical** datasets:

- Information about **Lung cancer** or **Alzheimer's** patients
- **Clinical record** data, **images** related to clinical records, and **genomic** data

Data Analytics Tools:

Data analytics tools able to

- **Discovery** communities of similar entities
- **Predicting associations** in the iASiS KG
- **Determining relatedness** between entities in iASiS KG

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How iASiS will contribute to the community?

iASiS Knowledge Graph (KG)

RDF knowledge graph integrating

- Information about **Lung cancer** or **Alzheimer's** patients
- **Pharmacogenomics** data
- **Interactions between** drugs, drugs and proteins, and drugs and side effects.

Data Analytics Tools:

Data analytics tools able to

- Predict interactions between entities in the iASiS KG
- **Uncover unknown** patterns in patients with **Lung** cancer or **Alzheimer's** disease.

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Available Tools

GADES, a **semantic similarity measure** to determine relatedness between entities in a knowledge graph

https://github.com/RDF-Molecules/GADES

semEPNode, a community detection tool for knowledge graph partitioning

https://github.com/SDM-TIB/SemEP-Node

A demo reporting the behavior of state-of-the-art approaches for predicting interactions between drugs and targets

https://project-demo-bayer.herokuapp.com/indexpage/index.html

Partners Involved

THANK YOU!

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Leibniz Universität Hannover

Hospital Universitario Puerta de Hierro Majadahonda

St George's University of London

CRG Centre for Genomic Regulation

Alzheimer's Research UK

ATC Athens Technology Center

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