Server and Interface for Patient Risk Assessment

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Abstract

• There is an advantage to spotting diseases early
• For hereditary diseases, we can do so by focusing on high-risk genes
• Genetic risk evaluations based on family disease history can be simple and effective
• Current solutions, however, are too technically demanding

Research topic:
• Making computer risk evaluations more accessible
Goals

- Builds on current software back-end
  - Incorporates and runs the software
- Compatible with industry-standard format (FHIR)
- Allows end-user interaction
- Easy to deploy
Methods

We employ a two-part solution:

• **FHIR Server**
  • Communicates with existing prediction model
  • Used by applications, including the web interface

• **Web Interface**
  • Communicates with FHIR server
  • Used by the end user
API Function

Application Client

Data

Response

FHIR Server

Prediction Model
End-User Function

End User

Browser (Web Interface)

Data

Response

Webpage

FHIR Server

Web Server

Prediction Model

Server-side
(full deployment through Docker on a single machine)
FHIR Server

- Uses prediction model for risk assessment calculations
  - Launches software with server
  - Loads datasets
  - Converts and relays data
- Works standalone as API that allows usage of existing patient data

- Technologies:
  - Python (Flask)
  - Docker
JSON Request

FHIR Server

Input Validation

Interpretation & Conversion to Matrix Format

Prediction model

Parsing of output

JSON Response
Web interface

- Browser-based, client-side
- Communicates with FHIR server on the same host as web server
- Enables end-user interaction

Technologies:
- JavaScript (React.js)
- Docker
- Web server: Nginx
Raw user data from input form

Data conversion logic

JSON request

FHIR Server

Prediction Model

JSON response

User-friendly data display
Future

- New backend prediction model
  - Open-source for unrestricted deployment
  - Circumvents limitations in the old program's design and formats
  - Optimized to optionally take some already available data
  - Incorporates more datasets
Future (cont.)

• More flexible specifications
  • Easier to use existing data as input to standalone FHIR server
• Web UI design
  • Tabs, hints, about page, etc.
• Additional supported diseases/features
• Security
• User testing and evaluation
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