The Reference Model Visualizes Gaps in Computational Understanding of Clinical Trials

In a Nutshell: The Reference Model accumulates knowledge, including models and observed outcomes from ClinicalTrials.Gov and shows gaps in our understanding.

New Interactive Interface in a Web Browser

The Reference Model Key Points
- Ensemble model
- Accumulates knowledge from:
  • Existing models
  • Observed outcomes
- Focuses on summary data
- Avoids individual data restrictions
- Larger merged population base
- Flexible Import from ClinicalTrials.Gov
- Applicable for other disease processes
- Traceable and reproducible
- Can map our understanding gap
- Currently focuses on diabetic populations

Convergence

Exploring Population Attributes

- Object Oriented Population Generation, MODSIM world 2015. 31 Mar – 2 Apr, Virginia Beach Convention Center, Virginia Beach, VA.
- Performance Computing to optimize the best model mixture and generate synthetic populations to match clinical trial reports.

Abstract:
There Reference Model accumulates knowledge from multiple publicly available sources in two categories. 1) It assembles the best fitting ensemble model from multiple published disease models that attempt to explain cardiovascular disease and mortality. 2) It accumulates observed information from multiple clinical trials for validation. It uses High Performance Computing to optimize the best model mixture and generate synthetic populations to match clinical trial reports.

Since the model aggregates two types of knowledge: 1) models and 2) observation data collected from clinical studies, it can show gaps in our cumulative understanding and our ability to explain phenomenon observed. The Reference Model has been accumulating such data globally since 2012 and connected to ClinicalTrials.Gov in 2017 which dramatically increased its access to data with greater future potential.

With the data already accumulated, it is now possible to visualize gaps in our understanding of outcomes reported in 22 diabetic clinical trials with 91 cohorts by showing the fitness of the best model mixture to those clinical trials. The Reference Model showed similar visualization in the past in this forum, then using a color coded fitness Matrix. The advances in this work, compared to the past, are: 1) The visualization is interactive through a web browser allowing exploration of data. 2) The Reference Model now mixes models, allowing improved fitness and accumulation of assumptions. 3) The size of the current validation effort has passed beyond the largest known validation exercise. These changes make it worthwhile presenting the new visualization capabilities and compare those to past work to show our current understanding gap.

The ability to aggregate the data, quantify the gap, and visualize it will aid development of better models to close the computational understanding gap.

The Reference Model

Now allowed as a U.S. Patent

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