

Informatics Network with Simulation and Prediction using Intelligent Agents for Recursive Evaluation (INSPIRE)



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Introduction

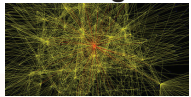
We are proposing a novel approach to give translational researchers a valuable data analysis tool which will incorporate enhanced access under strong governance in an ethical framework by:

- Using Multi-Agent design principles for data mining and analysis
- Using Data Modelling techniques to create an iterative research process
- National/International integration to encourage and develop data sharing

Multi-Disciplinary Team

We are combining a wealth of experience and knowledge from various sections of the research community. It will include clinicians, biomedical researchers, with bioinformaticians and computer scientists. We are also extending links in the local commercial sector to draw on further local expertise.

Multi-Agent Design



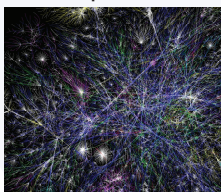
Agents are self-contained selfish software entities that exist in a community and work together (or, sometimes, in competition) to solve problems and reach solutions that none could achieve individually. The power of multi-agent systems lies in the social interactions between agents that allow, for example, high priority parcels to be routed efficiently, rapidly changing commodities to be traded competitively, or statistically significant results to be recognised quickly.

Data Analysis

Every patient will be assigned an agent. They will collect all associated data and become the guardian of this data. The agents will communicate between each other to find common characteristics and actively seek significant relationships. Once hypotheses have been generated, a researcher is contacted to inform them of the findings. Therefore no human is asking the initial question, rather the process is driven purely by the characteristics of the data. We will also enable the researcher with mathematical, statistical and predictive tools to personally query the data, so they can drive their own research and benefit from enhanced data analysis.

Data Modelling

Using the agents for data collection and manipulation, we will attempt to make in silico predictions which can be tested in vitro and in vivo in the laboratory so creating a complete iterative process between the researcher and the database system. The data generated by laboratory researchers will be used initially to elucidate potential relationships. These will then provide hypotheses which will be used to inform subsequent research. There are many predictive modelling tools which may be utilised for supervised, unsupervised and reinforced learning methodologies, including Artificial Neural Networks and Bayesian Belief Networks. Any hypothesis generated can be modelled using these predictive tools.



National Integration

We are committed to building a national framework to enable data sharing. The Tayside Tissue Bank is a founding member of the Confederation of BioBanks and will be part of the national portal. The ultimate aim is to link up with national and international partners so that relationships can be tested against thousands of samples, rather than sometimes geographically or numerically limited local resources

Data Monitoring

If new data is submitted that influences previously performed studies, the original researcher will be contacted by the intelligence system. This means that research findings avoid becoming 'stale', since they are constantly re-evaluated by the system.

Teaching

By exploiting the links with the School of Computing and by running undergraduate summer placement schemes as well as MSc and PhD projects we aim to bring fresh ideas from a high quality teaching institution.

Prototypes

We have brought a prototype of the software for demonstration. Please ask for a demo of either the data modelling or the agent based data analysis