University of Hertfordshire

Using Logic Systems to Interpret Human-relevant Biometric and Non-Biometric Sensor Data

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Logic Systems

Using logical models such as Neural Networks and Fuzzy Logic either separately or together can be very useful when interpreting individual data sets.

- Neural Networks
  - mathematically separate data
  - Unsupervised Learning - what ever classification system it deems suitable
  - Supervised Learning - the classification is predetermined

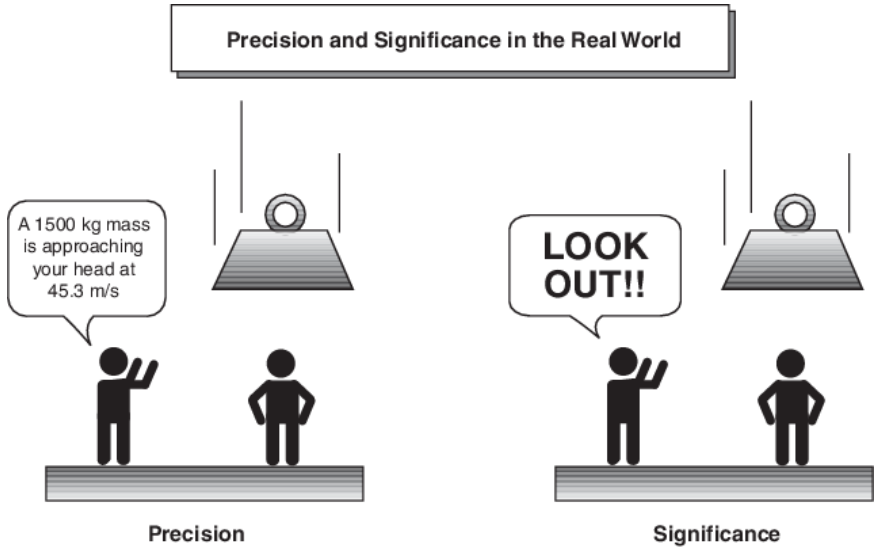
- Fuzzy Logic
  - conversion of precise data, to less precise but still significant (fuzzy) axioms of what that data means.

(Light Levels) 10.8 Lux → Twilight

Logic Systems

In order for a system to recall in the way humans do, it can be necessary to make the transformation from *precision* of data to *significance* of data.

For data to be *significant*, it doesn't have to be *precise*, which is where fuzzy logic can be helpful. Storing fuzzy axioms rather than specific data values both reduces number of database entry requirements and adds greater human value to the data.



Interpretation

People interpret data based on their own learning system. Chiefly this system consists of storing data as an answer to a problem, then when the same problem occurs, recall the solution.

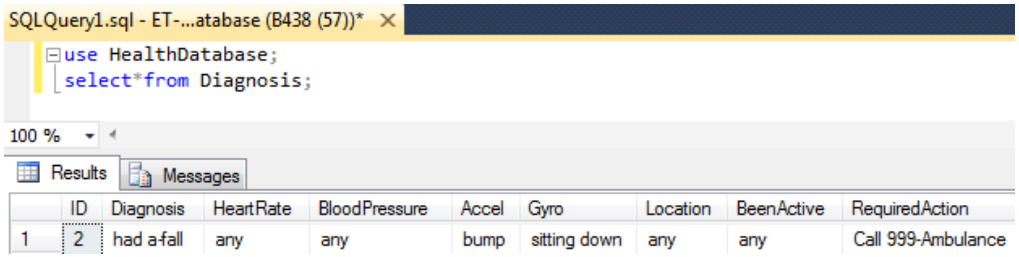
This isn’t where human intelligence stops, we are also able to adapt solutions based on problems which are similar to those we have seen before, or even take pieces from previously observed problems and reach a hybridised logical conclusion.

Database Logic

Using a database for storing diagnosis could be the closest thing to the first phase of human intelligence (recalling solutions).

Combinational parameter searches are both how people and databases search for results, but creating a logic basis where these results are meaningful is the implementation challenge.

Intelligence is communicable… Meaning that an intelligent system needs to be able to communicate its intentions and interpretations to all users, not just expert users.



	ID	Diagnosis	HeartRate	BloodPressure	Accel	Gyro	Location	BeenActive	RequiredAction
1	2	had a fall	any	any	bump	sitting down	any	any	Call 999-Ambulance

Communication

Humans communicate in many ways, but our primary means of communication is speech. That being said, compared to a computer language, ours is itself fuzzy.

Humans can create dozens of unique phrases which hold the same meaning, but its our ability in extract contextualising key words from those phrases to understand the fundamental meaning of a phrase.

“I doubt it”… “It’s Unlikely”… “Probably not”… “I wouldn’t have thought so”…

These are all phrases saying the same thing… “I am responding in support of the negative with more than 50% certainty”.

This manner of interpreting information is known as semantic interpretation.

Revised Model