AI Technology Comparison for Decision-Making Systems

	EXSYS CORVID EXPERT SYSTEMS	COLLABORATIVE FILTERING	CASE-BASED REASONING	NEURAL NETWORKS	GENETIC ALGORITHMS	DATA MINING	SIMULATION MODELING	DATABASE FILTER
BASIC CONCEPT	Represents knowledge as nodes which are processed with an Inference Engine	Finds match within "group" that has similar criteria to predict other possible criteria	Finds nearest match to historical case	Extracts correlation between data elements in large, complex sets of data	Uses "evolution" to find best functions for prediction	General umbrella category for neural networks and genetic algorithms	Mathematical model of a process that can be tested for predictions	Searches databases for match on multiple criteria – Boolean filter
CAPTURES EXPERT KNOWLEDGE	Yes	No	No	No	No	No	Yes – but in mathematical representation	No
CAN EXPLAIN AND VISUALIZE CONCLUSIONS	Yes – fully	Very limited	No	No	No	No	Yes-but may be very complex math	No
REQUIRES LARGE SET OF HISTORICAL DATA	No	Yes	Yes	Yes	Yes	Yes	Yes	No, but works best with large database
COMPLEXITY OF REPRESENTATION	Easy to understand "English" IF/THEN rules No more complex than a word processor	Statistical	Case Histories	Math Formulas	Math Formulas	Math Formulas	Math Formulas	SQL, but may be simplified to test via interface
DEVELOPMENT METHODOLOGY	Domain expert heuristics and/or data are converted to IF/THEN "English" rule form	Algorithm processes statistical data to find "groups"	Large set of historical data built up in an accessible form	Complex algorithm processes historical data to find correlations	Complex algorithm processes historical data to find correlations	Complex algorithm processes historical data to find correlations	Math model of physics, manufacturing or engineering processes	Develop large searchable database

	RULE-BASED EXPERT SYSTEMS	COLLABORATIVE FILTERING	CASE-BASED REASONING	NEURAL NETWORKS	GENETIC ALGORITHMS	DATA MINING	SIMULATION MODELING	DATABASE FILTER
BEST UTILIZATION	Deciding among a group of goals based on logical rules	Finding out what a person "might" like based on a similar pattern of others	Help desks with a large database of cases	Finding new relationships in data from difficult to understand processes	Finding new relationships in data from difficult to understand processes	Finding new relationships in data from difficult to understand processes	Predicting future consequences of a change in a process	Finding relevant item that matches all required criteria
STRENGTHS	Captures and delivers knowledge, not just information Explains conclusions Always provides a "best fit" answer Representation is easy to understand and maintain Java applet delivery for cross-platform compatibity	Statistics Can handle non-logical "like/dislike" concepts	Does not require heuristic understanding to build	May find interesting and useful relationships in data	Optimizes functions based on historical data	May find interesting and useful relationships in data	Can predict future effect of change	Fast and effective for searching text databases
WEAKNESSES	Requires domain expert/ knowledge	Statistical relationships not based on logic Some errors will occur due to individual variation	Requires large database Often requires several tries to find true solution May not find match due to differences in terminology	No explanation of conclusions May find erroneous correlations No way to handle biased data	No explanation of conclusions Local vs. global solution to problem No way to handle biased data	No explanation of conclusions May find erroneous correlations No way to handle biased data	Very difficult to fully model a complex process – requires very detailed understanding	May not find and match for criteria Only works well when there are very large numbers of different items to search

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