A.I. Overview

An overview of Artificial Intelligence Systems and why the Unlimited Potential, Inc. method is the right one for you.

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Summary

We are at a point in the evolution of artificial intelligence (A.I.) where the systems fall far short of matching their human creators, but in specific applications, such as offloading the responsibility of answering frequently asked questions, the time and the solution has arrived. In the following pages, we will teach you to have a better understanding of A.I. in general, and how the hybrid A.I. behind My[Q]Box stands up strong against the competition.

It is clear, from the results of the Loebner contest (see below), that A.I. has not yet advanced to the point where it has the capacity to independently create output in response to human input. Liability challenges and the inability to deliver a clear and consistent message plague any system which creates machine constructed responses.

Our proprietary S/R Technology approach eliminates any liability challenge and delivers a consistent and predictable set of responses. Our system only delivers answers which it was taught to give and always shows the actual question that is being answered. The user can then easily decide if the question being answered has the same meaning as the question they asked. In doing so, they qualify the answer.

Our system delivers only approved question and answer sets, and as such, never delivers a wrong answer. It can deliver an answer that does not exactly match the users' question, but the user then has the opportunity to request that the question be forwarded to your experts for a resolution. Then when your expert answers the question, it is added to the system and future users get the answer immediately

Loebner 2000 Contest

In this contest, ten judges try to discern if they are chatting electronically with one of six computer programs or one of four human participants. The results are included below and more information can be found at **http://www.dartmouth.edu/~phil/events/TuringTestConference.html**

Human Participants

Human#1: Retired Teacher

Human#2: Financial Advisor

Human#3: Minister

Human#4: Yoga Instructor

Judge#1: Linguist

Judge#2: Chemist

Judge#3: Philosopher

Judge#4: Musician

Judge#5: Psychologist

Judge#6: Journalist

Judge#7: Undergraduate Student

Judge#8: Author

Judge#9: Graduate Student

Judge#10: Philosopher

Computer Programs in the Loebner 2000 Contest

A-Life	Artificial Life, Inc.
Algernon	Gerold Gorman
Alice	Richard Wallace
ChatRascal	Michael Onofrio & Stephen Hildebrand
e-Brain	Jason Hutchens
Talk	Chris Johnson & Sandy Johnson

Decision: Human or Computer at 5 minutes/15 minutes

JUDGE >>	1	2	3	4	5	6	7	8	9	10
Human#1	C	C	H	H	H	H	C	H	C/H	H
Alice	C	C	C	C	C	C	C	C	C	C
ChatRascal	C	C	C	C	C	C	C	C	C	C
Human#2	C	C	H	H	H	H	H	C/H	H	H
Algernonn	C	C	C	C	C	C	C	C	*	C
Talk	*	C	C	C	C	C	C	C	C	C
Human#3	C	H	H	H	H	H	H	H	H/C	H
Human#4	H	H	H	H	H	C/H	H	H	H	H
A-Life	C	C	C	C	C	*	C	C	C	*
e-Brain	C	C	C	C	C	C	C	C	C	C

*Insufficient information to make decision due to program stall or crash.

In this test judges were 91% correct after 5 minutes and 93% after 15 minutes.
No computer was mistaken for a human. (C=Computer, H=Human)

Popular types of A.I.

Reasoning Systems

Overview

These systems use linguistic based systems to draw meaning from input by the user and then attempt to construct unique output in response to the input. This is the ultimate goal of all A.I. research but also is the least mature and has the greatest number of failings in all tests.

Advantages

If this form of system could achieve the desired goal, then it would be the best possible system, as it would most closely mimic human thinking. This is the most sought after form of A.I. for human form robotics.

Disadvantages

This form of system is not possible any time in the near future. This system also suffers from the difficulty of assigning liability for errors. The only examples of this technology show very loose comprehension and rarely give any series of quality answers. The simplest systems only respond with answers and cannot even form an answer. These systems very often reply with gibberish, as the reasoning is incomplete.

Teaching

These systems are the most difficult to teach as they require connectivity between any and all points of knowledge. The teacher adds new goals, filters and definitions to the system so that it can reason new answers.

Neural Network Based Systems

Overview

These systems are based on research done on the cellular workings of the human mind. They work by firing software neurons to send signals down pathways of neurons to find possible answers.

Advantages

Closely resemble the working of the human brain. When computers are 1000x faster and memory is nearly limitless, these systems show promise to develop "Thinking" software.

Disadvantages

These systems are rarely used, as they are highly unstable if they are allowed to self modify or learn. These systems are also very hard to set up if the information is extensive. To date, no system has demonstrated much in the way of reasoning or problem solving. One company is advertising software that "Thinks" using neural Networks, but it is a pure advertising gimmick and these systems do not in any way begin to "Think". If they did, then they would be truly revolutionary, but unfortunately, the drawbacks strongly outweigh the advantages.

Teaching

These systems ultimately will self teach, but no system to date has reached that goal, as they are more likely to self-destruct then to grow. Currently the teacher must understand neural knowledge bases and construct the entire neural network manual. Teaching new knowledge often means a total reconstruction of the neural network.

Data Mining Systems

Overview

These systems use keywords entered by the user and scan available data for near matches using advanced thesaurus-based searches. They then display the area(s) of best match within the data. These systems are best suited to search text data such as news feeds.

Advantages

Teaching this type of system is not data related, but instead they build up a powerful data-searching engine that helps weed out nuggets of data from large amounts of text.

Disadvantages

The user has to know something about the information they are searching for. They must enter key words that will match or near-match the text that is included in the text to be searched. If the amount of text is large or the keywords are not carefully selected, the search returns large amounts of data or no data at all.

Teaching

These systems are fairly easy to teach, as they do not have a knowledge base but instead a thesaurus. The teacher sets up relationships between words and phrases to allow the system to scan text for similar meanings

Script Based Systems

Overview

These systems are based on a layered script. Each layer has any number of possible inputs they are monitoring for. If the user input matches one of the possible known inputs, then the response is given and the system starts to monitor a new layer as directed by the response.

Advantages

These systems are very conversational. Each response needs to include a question to keep the users responses targeted to the next level of possible inputs.

Disadvantages

These systems are very limited in scope. Each layer of possible inputs is finite and when the user responds in an unrecognized way, the script is broken and the system has a difficult time finding its place in the script to allow the conversation to continue. The normal response, when the system gets lost, is to end the conversation. Some systems move the user to a new script or a human to resolve the fact that they are lost.

Teaching

The level of difficulty in teaching these systems is directly proportional to the complexity of the subject matter to be taught. Simple conversational scripts can be developed easily, but complex systems are very difficult to construct. The design of the script is always done external to the system and then once the script is approved, it is input into the system. Making changes normally requires a reworking of the original script and a re-input of the entire script into the system.

Question Form Based Systems

Overview

These systems compare the question asked by the user to a set of question templates. Several templates that most closely match the question asked by the user are selected and the key words are extracted from the users' question. The system then checks a knowledge base for each matching form using the keywords selected to build up a list of possible responses. Pre-matching the form to a question yields huge gains in speed, but at the cost of potentially overlooking some possible matches.

Advantages

These systems are very fast as they limit the knowledge bases searched to only the knowledge bases selected as matching or nearly matching the form of the question asked.

Disadvantages

These systems are non-conversational. They can never return a single best answer, but only a list of best forms with each form having a list of best matches. These systems work more as a search engine rather than a true A.I. system.

Teaching

These systems use a fairly straightforward teaching method. New forms are input, which creates new knowledge bases that must be filled. The challenge is in adding the new information to every possible form for which it relates and updating each of the associated knowledge bases relating to those forms.

Expert Systems

Overview

These systems are among the most powerful systems available for capturing the abilities of an individual expert or group of experts. They work by having a strict question tree. The system asks multiple choice questions and the result of each question is used to define the next question until the branching reaches an end at which time the system gives an answer. The questioning period builds up a set of data that reflects the input from the user. This data is then compared to a set of known results, each having ideal sets of input data that define a perfect scenario for that response. One or more responses are given, each with a certainty factor that defines the relationship of the users data set to the ideal data set associated with the selection.

Advantages

Pre-approved question paths and assumption to response formula. These systems are used to diagnose, to plan and to limit risk. These are very powerful systems that replace or augment human experts with software.

Disadvantages

These systems are non-conversational and limited to only a single goal. They are difficult to construct and modify. The user must select from a pre-defined set of responses given as multiple choice. The user cannot define new paths of reasoning

Teaching

These systems are taught by monitoring experts, and recording the questions and possible responses they allow during a many consultations. The challenge in teaching comes from assigning weights to each question to help derive the certainty of the response. Once these systems are set up, adding new questions is difficult as it may change the linking of many branches.

Situation/Response Systems

Overview

These systems take any form of input and define the sum of that input as the current situation. The system compares that situation with every situation for which a response is known. The closest matching situation is selected and the response learned for that situation is given.

Advantages

Strict control over liability. Each answer given is taught exactly as-is and the system cannot self-modify the response. The teacher of each response is recorded along with the response so that liability can be assigned. These systems can mimic any of the other forms of A.I. by altering the Situation-to-Situation comparison algorithms or by including a programming language to allow rich responses.

Disadvantages

Accuracy of the system is dependant on repeated situations. Unique situations do not result in a response. The richness of the situation definition determines the richness of the resulting response. This system is potentially slow as they search large knowledge bases of questions to match to the users input. This requires smaller knowledge bases, faster systems or longer response times.

Teaching

These systems are among the easiest to teach as the system can query a teacher with a situation for which no answer was found and the teacher simply needs to enter the correct response.

Levels of Situation/Response Technology

S/R
Situation/Response
A single situation leads to a single response

MS/R

Multiple Situation/Response
Multiple situations lead to a single response

S/MR
Situation/Multiple Response
A single situation leads to any number of responses

MS/MR – (Current System is this level)
Multiple Situation/ Multiple Response
Multiple situations lead to multiple responses

MS/GBMR
Multiple Situation/ Goal Based Multiple Response
Multiple situations lead to goal based multiple responses

MS/GMRRGS
Multiple Situation/
Goal Based Multiple Response with Random Goal Seeking
Multiple situations lead to goal based multiple responses with random responses given when no available response helps to reach the goal.

My[Q]Box

My[Q]Box is a hybrid system based mainly on our proprietary S/R Technology, but expanded to included the most market applicable elements from Reasoning Systems, Script Based Systems, Question Form Based Systems and in the future Expert Systems. The expert system component exists in earlier models of our system, and will be integrated into our current offering as more of the A.I. BASIC language is incorporated.

Overview of our Development

We have focused primarily on the application of this technology to the "imitation game" as defined by Turing and demonstrated yearly by the Leobner Contest. We did this to create a marketable service that will allow the funding of the remaining development related to this technology.

Much of the effort of creating the current system centered on making it highly scaleable, highly available, highly configurable and multi-user. We have concentrated our efforts on the situation side of the equation, the matching of a current situation to one or more stored situations. The situation side of the technology as it is today does a good job of matching the users input to existing situations. The situation, as defined now, includes the text that the user types, with grammar, punctuation, case, word usage and context. We have achieved the MS (Multiple Situation) level of this side of the model.

Future development will focus on the response side of the technology. This is where the real power of this technology will be shown. We are currently at the MR (Multiple Response) level of technology on this side of the model, but only in its most simple form. As we add more of the A.I. BASIC programming language to the response side of the model, we open up many new possibilities such as moods, dynamic answers, question series (like Expert Systems), variables that allow the system to profile the user and supply a richer situation and much more.

We feel confident that this technology, which to date is proprietary only to Unlimited Potential, Inc. will lead the market and set the bar to which all other systems will be compared.

