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Chapter 1 : Welcome! | Natural Language and Dialogue Systems

*Integrated Natural Language Dialogue: A Computational Model (The Springer International Series in Engineering and Computer Science) [Robert E. Frederking] on blog.quintoapp.com *FREE* shipping on qualifying offers.*

Flexibly Instructable Agents by Scott B. Laird - Journal of Artificial Intelligence Research , " This paper presents an approach to learning from situated, interactive tutorial instruction within an ongoing agent. Tutorial instruction is a flexible and thus powerful paradigm for teaching tasks because it allows an instructor to communicate whatever types of knowledge an agent might need in wh Tutorial instruction is a flexible and thus powerful paradigm for teaching tasks because it allows an instructor to communicate whatever types of knowledge an agent might need in whatever situations might arise. To support this flexibility, however, the agent must be able to learn multiple kinds of knowledge from a broad range of instructional interactions. Our approach, called situated explanation, achieves such learning through a combination of analytic and inductive techniques. It combines a form of explanation-based learning that is situated for each instruction with a full suite of contextually guided responses to incomplete explanations. The approach is implemented in an agent called Instructo-Soar that learns hierarchies of new tasks and other domain knowledge from interactive natural language instructions. Instructo-Soar meets three key requirements of flexible Show Context Citation Context The general requirement for the mapping problem on a tutorable agent is straightforward: A tutorable agent must be able to comprehend and map all aspects of each instruc In contrast to current intelligent systems, which must be laboriously programmed for each task they are meant to perform, instructable agents can be taught new tasks and associated knowledge. This thesis presents a general theory of learning from tutorial instruction and its use to produce an instr This thesis presents a general theory of learning from tutorial instruction and its use to produce an instructable agent. Tutorial instruction is a particularly powerful form of instruction, because it allows the instructor to communicate whatever kind of knowledge a student needs at whatever point it is needed. To exploit this broad flexibility, however, a tutorable agent must support a full range of interaction with its instructor to learn a full range of knowledge. Thus, unlike most machine learning tasks, which target deep learning of a single kind of knowledge from a single kind of input, tutorability requires a breadth of learning from a broad range of instructional interactions. The theory of learning from tutorial Gordon - Computational Linguistics , " This paper presents an analysis of the dialogue structure of actual human-computer interactions. The dialogues analyzed were produced from experiments with a variable initiative spoken natural language dialogue system organized around the paradigm of the Missing Axiom Theory for language use. Results about utterance classification into subdialogues, frequency of userinitiated subdialogue transitions, regularity of subdialogue transitions, frequency of linguistic control shifts, and frequency of user-initiated error corrections are presented. Furthermore, they provide evidence that a spoken natural language dialogue system must be capable of varying its level of initiative in order to facilitate effective interaction with users of varying levels of expertise and experience A Computational Model of Expectation-Driven Mixed-Initiative Dialog Processing by Ronnie W. Smith , " Model of Task Processing: In user controlled dialog systems the computer acts as a passive agent Knowledge-Based Systems , " An important problem in developing natural language dialog systems is to computationally specify when and why the system should speak. This paper proposes interruptible theorem proving as a solution. Theorem proving is used to determine when domain goals are complete. Language is used to acquire mis Language is used to acquire missing axioms that may be inhibiting proof completion. The theory is illustrated with a sample dialog segment obtained from actual usage of an implemented dialog system. Performance results of this system based on over dialogs are also given. Designers of fully functional natural language NL dialog systems must create an architecture that simultaneously achieves a variety of behaviors necessary for efficient human-machine communication. General issues in user modeling are discussed in the collections [17] and [18]. Developing a theory on the role or purpose of language has interested many res Glass , " It may be a fairly long vector because of many words added together or a short one, but its direction will be determined solely by the relative contributions of the four components. When using Latent Semantic Analysis for informa

When using Latent Semantic Analysis for information retrieval the collection of documents is analyzed in this manner, producing factor-space vectors for each word and for each document. When a query is processed the query itself is treated as a document: Then the vector representation of the query-document is compared to the vectors for all the stored documents in order to retrieve ones which are similar. A common measure of similarity is the cosine of the angle between the vectors representing two documents. If your query contains only a few words, its vector may be quite short. Yet there should be a way to measure its similarity to documents, which because they are wordier may have longer vectors. If the factors in the query and a stored document are in the same proportion e. In this case the vectors point in the same direction, and the angle between the query vector and stored document vector is very small. The thing being modeled is a matrix of word frequencies in documents: A cell of the matrix contains the count of the number of times one word occurs in one document. Spoken Variable Initiative Dialog: Recent advances in speech recognition technology have raised hopes about the development of practical spoken natural language interfaces. Embedding the speech recognition technology within a sophisticated dialog processing mechanism can overcome many of the traditional problems in spoken natural Embedding the speech recognition technology within a sophisticated dialog processing mechanism can overcome many of the traditional problems in spoken natural language systems. This paper presents a theory of natural language dialog that enables: In addition to the theory, the paper also describes experimental results obtained from using an implementation of this theory. The Future is Now Major advances in recent years in speech recognition technology see [7] and [13] 1 have raised expectations about the development of practical spoken natural language interfaces. Such interfaces can provide use Tutorial natural language instruction consistently produces high quality human learning, and is a potentially powerful knowledge source for teaching artificial agents as well. Its power comes from being interactive, situated focused on specific tasks , and highly flexible, allowing an instructor to Its power comes from being interactive, situated focused on specific tasks , and highly flexible, allowing an instructor to communicate any type of knowledge in whatever situation it is needed. However, tutorial instruction has received little attention in machine learning. In particular, although some systems have learned from instruction-like input, there has been no attempt to identify and target the combination of capabilities required for fully flexible tutorability. The requirements fall into three categories, corresponding to comprehension, interaction, and learning. Identifying the requirements provides a target -- an evalu

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Chapter 2 : CiteSeerX â€” Citation Query Integrated natural language dialogue: A computational model

Natural language dialogue is a continuous, unified phenomenon. Speakers use their conversational context to simplify individual utterances through a number of linguistic devices, including ellipsis and definite references. Yet most computational systems for using natural language treat individual.

According to our motivation we made a selection for the demands of a specific user group in that we designed and implemented a prototype for a production planning and control system PPC as the nucleus for a later extension to a full CIM system [21]. The modelled enterprise manufactures precision t The modelled enterprise manufactures precision tools on demand, taking into account all of the three production factors materials, machines and labour [3]. For each product a complex component hierarchy is defined providing the single subparts with processing sequences. In the course of optimising the assignments of machines and workers to the individual production steps, advanced techniques of operations research are applied [15][12]. Finally the consideration of disturbances to the production process delay of delivery, drop out of machines etc. So the application was well chosen with regard to the required demands for the realisation of the PPC as well as the needed complexity of user input. Show Context Citation Context Kamp [13] for a review see [14]. There already exist very promising approaches Since one of the main obstacles to the efficient use of natural language interfaces is the high amount of required manual knowledge engineering, we provide an adaptive architecture to au Since one of the main obstacles to the efficient use of natural language interfaces is the high amount of required manual knowledge engineering, we provide an adaptive architecture to automate the acquisition of linguistic knowledge. This paper focuses on the semantic component of the system, which is guided by a machine learning module based on an XSE eXtended Semantic Enumeration tree. Linguistic tests from semantic, syntactic, and pragmatic analysis are selectively activated according to the requested feature tests during the traversal of the tree. The machine learning algorithm builds the XSE-tree automatically based on past user questions without the need for any additional linguistic knowledge Show Context Citation Context Semantic and syntactic analysis alone are doomed to fail to produce the correct interpretation for a user question if the user assumes that the system remembers previous questions. By combining the advantages of logic programming and relational database algebra, deductive databases provide important extensions relevant to the efficient solution of many practical problems. In this paper we present three successful case studies: It has its origins in logic programming and relational database algebra. By combining the advantages of both research fields, deductive databases provide the following important extensions with regard to functionality [19]: C there exists the possibility of formulating recursive queries, that is, transitive relationships can be considered C the nonmonotonic operation of negation is supported C not only atomic object types but also complex object types like sets, trees or lists can We applied a simple but efficient technique which abstracts from specific manifestations at the surface level ellipsis, anaphora by using the entity and entity type of the preceding analysis to k

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Chapter 3 : An Integrated Natural Language Processing Approach for Conversation System

xvi Integrated Natural Language Dialogue The design of this system demonstrates how flexible and natural user interactions can be carried out using a system with a.

Artikel bewerten Natural language dialogue is a continuous, unified phenomenon. Speakers use their conversational context to simplify individual utterances through a number of linguistic devices, including ellipsis and definite references. Yet most computational systems for using natural language treat individual utterances as separate entities, and have distinctly separate processes for handling ellipsis, definite references, and other dialogue phenomena. This book, a slightly revised version of the Ph. It presents a computational system, Psli3, that uses the uniform framework of a production system architecture to carry out natural language understanding and generation in a well-integrated way. This is demonstrated primarily through intersentential ellipsis resolution, in addition to examples of definite reference resolution and interactive error correction. Natural language input is interpreted within this framework using a modification of the syntactic technique of chart parsing, extended to include semantics, and adapted to the production system architecture. This technique, called semantic chart parsing, provides a graceful way of handling ambiguity within this architecture, and allows separate knowledge sources to interact smoothly across different utterances in a highly integrated fashion. Ellipsis in natural language. Ellipsis in natural language interfaces. Outline of the book. Work on ellipsis resolution. Semantic grammar ellipsis resolution. Case frame ellipsis resolution. Work on dialogue modelling. Syntactic focusing in discourse. Task-oriented focusing in dialogue. Speech acts and dialogue modelling. Dialogue modelling in Psli3. Work on chart parsing. How Psli3 differs from other systems. An Analysis of Natural Language Dialogue. An Analysis of intersentential ellipsis. Top-level taxonomy of intersentential ellipsis. Other factors in intended effects. Analysis of short story dialogues. Interactive recovery from user errors. Relationship of theory to implementation. Verb and noun phrase reference. Error recognition and recovery. Ellipsis handling in the chart. Verb phrase reformulation ellipsis. Noun phrase ellipsis resolution. Correction, elaboration, and dialogue charts. The Program in Action. The initial full sentence. Functional verb phrase ellipsis. Constituent verb phrase ellipsis. Another functional verb phrase ellipsis. Extensions within the framework. Extensions of the current framework.

Chapter 4 : Integrated Natural Language Dialogue : Robert Frederking :

Integrated Natural Language Dialogue by Robert Frederking, , available at Book Depository with free delivery worldwide.

The voice user interface may enable a user to make natural language requests relating to various navigation services, and further, may interact with the user in a cooperative, conversational dialogue to resolve the requests. Through dynamic awareness of context, available sources of information, domain knowledge, user behavior and preferences, and external systems and devices, among other things, the voice user interface may provide an integrated environment in which the user can speak conversationally, using natural language, to issue queries, commands, or other requests relating to the navigation services provided in the environment. Description FIELD OF THE INVENTION The present invention relates to a natural language voice user interface that facilitates cooperative, conversational interactions in an integrated voice navigation services environment, and in particular, to a natural language voice user interface in which users can request navigation services using conversational, natural language queries or commands. As a result, users tend to expect greater functionality, mobility, and convenience from their electronic devices, as exemplified by modern mobile phones, navigation devices, personal digital assistants, portable media players, and other devices often providing a wealth of functionality beyond core applications. However, the greater functionality often tends to be accompanied by significant learning curves and other barriers that prevent users from fully exploiting device capabilities e. Moreover, although increasing demand for mobility magnifies the need for simple on-the-go device interaction mechanisms, existing systems often have complex human to machine interfaces. For example, existing human to machine interfaces tend to primarily utilize various combinations of keyboards, keypads, point and click techniques, touch screen displays, or other interface mechanisms. However, these interfaces may often be unsuitable for mobile or vehicular devices e. As such, existing systems often fall short in providing simple and intuitive interaction mechanisms, potentially inhibiting mass-market adoption for certain technologies. As such, there is an ever-growing demand for ways to exploit technology in intuitive ways. In response to these and other problems, various existing systems have turned to voice recognition software to simplify human to machine interactions. For example, voice recognition software can enable a user to exploit applications and features of a device that may otherwise be unfamiliar, unknown, or difficult to use. However, existing voice user interfaces, when they actually work, still require significant learning on the part of the user. For example, existing voice user interfaces e. Similarly, when users may be uncertain of exactly what to request, or what a device may be capable of, existing systems cannot engage with the user in a productive, cooperative, natural language dialogue to resolve requests and advance conversations. Instead, many existing speech interfaces force users to use predetermined commands or keywords to communicate requests in ways that systems can understand. By contrast, cognitive research on human interaction demonstrates that a person asking a question or giving a command typically relies heavily on context and shared knowledge of an answering person. Similarly, the answering person also tends to rely on the context and shared knowledge to inform what may be an appropriate response. However, existing voice user interfaces do not adequately utilize context, shared knowledge, or other similar information to provide an environment in which users and devices can cooperate to satisfy mutual goals through conversational, natural language interaction. Furthermore, demand for global positional systems and other navigation-enabled devices has grown significantly in recent years. Navigation devices often tend to be used while a user may be driving, on-the-go, or in other environments where having a hands-free interface provides critical advantages. For example, a user may want to avoid being distracted by looking away from the road, yet the user may also want to interact with a navigation device, for example, to calculate a route to a destination, recalculate the route in response to traffic, find a local restaurant, gas station, or other point of interest, or perform another navigation related task. In these and other instances, efficiently processing a natural language voice-based input could enable the user to interact with the navigation device in a safer, simpler, and more effective way. However, existing systems often fall short in providing an integrated, conversational, natural language voice user interface that can provide such advantages in navigation and other mobile environments. Existing systems suffer from these and other problems. According to various aspects of the invention, the natural language voice user interface may resolve voice requests relating to navigation e. The navigation application can provide a user with interactive, data-driven directions to a destination or waypoint, wherein the user can specify the destination or waypoint using free-form natural language e. As free form voice destination inputs may be provided in many different forms, post-processing may be performed on full or partial voice destination inputs to identify a suitable destination address for calculating a route e. For example, an utterance containing a full or partial destination may be analyzed to identify one or more probable destinations e. The N-best list may be post-processed to assign weights or rankings to the probable destinations e. Further, when a voice destination entry includes a partial destination, a final destination may be successively refined over one or more subsequent voice destination entries. The navigation application may also provide dynamic, data-driven directions or routing to a destination. For instance, the navigation application may access data associated with various user-specific and environmental data sources to provide personalized data-driven directions along a route, which can be recalculated or modified based on information taken from the data sources. As such, data may be obtained dynamically to identify alternate routes, recalculate routes, or otherwise provide routing services. Further, possible answers or responses to a given utterance may be filtered according to a current route. Information contained in the dynamic recognition grammars may be used by a navigation agent, an Automatic Speech Recognizer, a context stack, or various other components in the voice user interface that use grammar information. By efficiently generating, updating, loading, extending, or otherwise building dynamic grammars based on various factors, processing bottlenecks can be avoided, conflicts can be reduced, and other aspects of interpreting an utterance using a recognition grammar can be optimized. For example, a size of a generated grammar may be constrained by an amount of resources available in a system e. In another example, the size of the dynamic grammar can be reduced by eliminating redundant keywords, criteria, or other information available in the context stack, the shared knowledge, or other local sources. Thus, favorability of correct interpretations may be improved by reducing perplexity in the grammar e. According to various aspects of the invention, the natural language voice user interface may generate dynamic recognition grammars using techniques of geographical chunking. For example, the topological domains may reflect physical proximities e. According to various aspects of the invention, the natural language voice user interface may include dynamic grammars formed from one or more topological domains, which may be subdivided into a plurality of tiles, which may be further subdivided into a plurality of subtiles. Thus, information used to build the dynamic grammar can be subdivided or weighed in various ways to determine what information should be included in the grammar. Moreover, geographical chunks based on physical, civil organization, temporal, directional, or other proximities may be extended into other domains in which a topological taxonomy can be placed. As a result, in addition to having relevance in navigation or other location-dependent systems, the geographical chunking techniques can be applied in other contexts or domains in which geography or location may be relevant. Further, a server operably coupled to the voice user interface may analyze various forms of information to build or refine a source of grammar information. For example, when various devices communicate with the server, information may be communicated to the server may be used to update proximities, topological domains, tiles, subtiles, peer-to-peer affinities, or other grammar information. According to various aspects of the invention, the natural language voice user interface may calculate routes, provide dynamic data-driven directions to a destination, provide dynamic routing to a destination, perform post-processing of full or partial destination entries, or otherwise provide various voice navigation services. However, it will be apparent that the successive refinement techniques can be applied to various tasks in which generalized approximations can be successively refined through voice or multi-modal commands to narrow down information sought by a user, including various other domains, contexts, applications, devices, or other components that employ the techniques described herein. According to various aspects of the invention, the natural language voice user interface may enable successive refinement of a final destination by progressively narrowing the final destination. For example, successively refining the destination may be modeled after patterns of human interaction in which a route or a destination may be narrowed down or otherwise refined over a course of interaction. For example, a user may generally approximate a destination, which may result in a route being calculated along a preferred route to the approximated destination. While en route to the approximated destination, the user and the voice user interface may cooperatively refine the final destination through one or more subsequent interactions. One or more interpretations of a possible destination corresponding to the voice destination input may be organized in an N-best list. The list of possible destinations may be post-processed to assign weights or ranks to one or more of the entries therein, thus determining a most likely intended destination from a full or partial voice destination input. Thus, the post-processing operation may rank or weigh possible destinations according to shared knowledge about the user, domain-specific knowledge, dialogue history, or other factors. Subsequent inputs may provide additional information relating to the destination, and the weighted N-best list may be iteratively refined until the final destination can be identified through successive refinement. As a result, when a suitable final destination has been identified, the route to the final destination may be completed. For example, navigation systems typically include various mechanisms for determining a current location e. The location detection system may thus detect information associated with a radio frequency identifier over a data channel used by a marketer to provide advertisements. The marketer may broadcast the advertisement via the data channel, such that the navigation system triggers an event when within a suitable proximity of the RFIDs. Thus, information associated with the event may be filtered according to the current routing information or other contextual parameters to determine what action should be taken in response thereto. In other instances, advertisements may be uploaded to a server by one or more advertising partners, wherein the uploaded advertisements may be associated with metadata or other descriptive information that identifies a target audience, location-dependent information, or other criteria. In another example, a plurality of advertisements may be stored locally at the voice user interface, and an inferencing engine may determine appropriate circumstances in which an event should be generated to deliver one or more of the advertisements to a user. According to various aspects of the invention, the natural language voice user interface may track user interactions with delivered advertisements. In this way, affinity based models may be generated, for example, to ensure that promotions or advertisements will be delivered to a likely target audience. In other examples, an advertising model may include mobile pay-per-use systems, peer-to-peer local guides or recommendations, or other forms of advertising. Additionally, various aspects of the advertising model, such as the local guides and recommendations, may be generated according to a mapping applied to various topological domains. For example, certain types of advertisements may be dependent on geographic or topological characteristics, and such advertisements may be associated with a topological taxonomy based on geographical chunks. According to various aspects of the invention, the natural language voice user interface may enable a user to provide requests e. As such, the user and the navigation device may engage in a cooperative, conversational dialogue to resolve the request. For example, the voice user interface may use prior context, dialogue histories, domain knowledge, short and long-term shared knowledge relating to user behavior and preferences, noise tolerance, and cognitive models, among various other things, to provide an integrated environment in which users can speak conversationally, using natural language, to issue queries, commands, or other requests that can be understood and processed by a machine. Accordingly, the voice user interface may understand free form human utterances, freeing the user from restrictions relating to how commands, queries, or other types of requests should be formulated. Instead, the user can use a natural or casual manner of speaking to request various voice services in an integrated environment, in which various devices can be controlled in a conversational manner, using natural language. For example, the voice user interface may be aware of data and services associated with the navigation device, a media device, a personal computer, a personal digital assistant, a mobile phone, or various other computing devices or systems available in the environment. According to various aspects of the invention, the natural language voice user interface may include an input mechanism that receives a voice-based input, which includes at least an utterance or verbalization spoken by a user. The input mechanism may include a suitable device or combination of devices that can receive voice-based inputs e. The input mechanism can be optimized to maximize gain in a direction of a user, cancel echoes, null point noise sources, perform variable rate sampling, filter out background conversations or environmental noise, or otherwise optimize fidelity of encoded speech. As such, the input mechanism may generate encoded speech generated in a manner that tolerates noise or other factors that could otherwise interfere with interpreting speech. For instance, the user could touch a stylus or other pointing device to a portion of a map displayed on a touch-screen interface, while also providing an utterance relating to the touched portion e. According to various aspects of the invention, the natural language voice user interface may include an Automatic Speech Recognizer that processes encoded speech to generate one or more preliminary interpretations of what was said in an utterance e. For example, the Automatic Speech Recognizer may generate the preliminary interpretations using phonetic dictation to recognize a stream of phonemes based on a dynamically adaptable recognition grammar. The dynamically adaptable recognition grammar may be based on dictionaries or phrases from various input domains e. Thus, the Automatic Speech Recognizer may generate one or more interpretations of an utterance, which may be represented as a series of phonemes or syllables. The one or more interpretations can be analyzed e. By formulating the hypothesis using various features and components that model everyday human-to-human conversations, the conversational language processor may generate a hypothesis as to the meaning or intent of the utterance, which can inform a process of resolving one or more requests contained in the utterance. According to various aspects of the invention, the natural language voice user interface may include, among other things, a context tracking engine that establishes meaning for a given utterance. For example, the context tracking engine can manage competitions among one or more context-specific domain agents that establish the meaning e. The domain agents may analyze preliminary interpretations of an utterance to generate a domain-specific probable interpretation. For example, one or more of the agents may include adaptable vocabularies, concepts, available tasks, or other forms of information specific to the respective domain or context. In addition, the agents can use a voice search engine to search a network for information that may not be available within the system. Thus, the winning one of the agents may be designated responsible for establishing or inferring further information e. The context tracking engine may also maintain a context stack to track conversation topics, track previously invoked agents, evaluate criteria, weigh parameters, or otherwise maintain information relating to a conversational context e. By identifying a context, or correlatively, by identifying capabilities, tasks, vocabularies, or other information within the context, the context tracking engine can provide relevant information for establishing intent in addition to phonetic clues associated with the utterance e. According to various aspects of the invention, the natural language voice user interface may utilize various forms of information to enable sharing of assumptions and expectations relating to a given utterance, conversation, or other human to machine interaction. For example, to inform decision making in the voice user interface, the voice user interface may include information sources containing short-term and long-term shared knowledge relating to user behavior, preferences, or other characteristics e. The short-term shared knowledge may accumulate information during a current conversation to dynamically establish awareness of a state of the voice user interface e. Storage of the short-term knowledge may be modeled after human interaction, such that certain information may be expired after a psychologically appropriate amount of time e.

Chapter 5 : Internet Argument Corpus | Natural Language and Dialogue Systems

Natural language dialogue is a continuous, unified phenomenon. Speakers use their conversational context to simplify individual utterances through a number of linguistic devices, including ellipsis and definite references.

Chapter 6 : CiteSeerX â€” Citation Query Integrated Natural Language Dialogue

An Integrated Natural Language Processing Approach for Conversation System. The main aim of this research is to investigate a novel technique for implementing a more natural and intelligent conversation system.

Chapter 7 : Natural Language Dialogue group

Natural language interfaces have been proposed as optimal candidate, however, in spite of the vast number of *ambitious attempts to build natural language front ends, the achieved results were rather disappointing.*