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Web Services Composition
Current Issues

I. Introduction

People use the internet daily to look up financial market quotations, buying different manufacture's products, searching, filling in forms and to get the latest updates. This level of interaction is useful for information retrieval purposes. Most of the information on the web is designed only for human use [1,6,23,24]. Humans can read HTML documents and understand them, but their inherent meaning is not shown to allow their interpretation by computers. In other words the essential text-based web does not support software interactions. So how can we give meaning to text based web, this is precisely the objective of the Semantic Web – to make possible the processing of Web information by computers [24]. The Semantic Web is an extension of the www, in which information is given well-defined meaning, better enabling computers and people to work in cooperation [4,7,19]. Internet based application needs to be capable of performing search, access, and automatically interact with other internet-based application. Software oriented interaction will automatically perform operations that previously required manual interaction, such as searching for and buying goods and services at the best price, coordinating travel tickets and restaurant tables for the given date, streamlining business procurement, invoicing, and shipping operations etc. All these examples come from relatively different areas but still share some fundamental characteristics [1,6,22]. Figure 1 shows an operation scenario. A service is offered by service provider, an organization that procures the service implementation supplies its service description, and provides technical and business support to clients [7,11,16].

II. Police Web Services Example

Web services are aimed at putting the global network of the web, developed for human interaction, to an entirely new purpose. However there are many services around the web and each one has a limited functionality. In many cases, a single web service is not sufficient to respond to the user's request and often services should be combined through services composition pattern to achieve a specific goal [3,5,7,9,22]. Such composition is carried out manually at present, it means that a user needs to execute all these services one by one and these tasks can be time and effort consuming. In the United Kingdom communication between the police department (sub departments) and government agencies is carried out in the format of web services [3,23,29]. Each of the providers offers its data/enquiry capabilities to other forces for use in the UK. The following services are currently offered: Name or Nominal Enquiry, Vehicle Enquiry, Automatic Number Plate Recognition (ANPR),

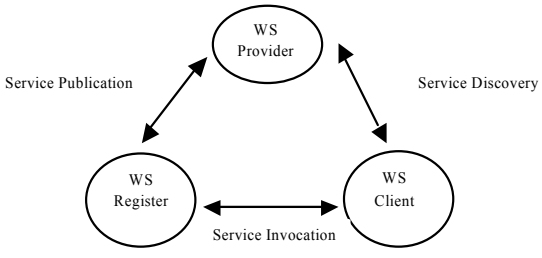

Figure 1

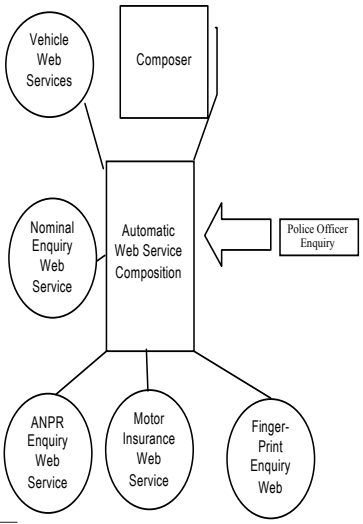

Figure 2

In this issue:

Web Services Composition (cont.)

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Vehicle Insurance and Fingerprint enquiry.

In a typical police enquiry, whenever police officer wants to investigate about any person he has to search about his criminal record, fingerprints, vehicle registered on his name, his insurance details and vehicle movement in particular interval of time across the country. Currently in this developed project some services are composed but for exchange of information, more 50 sub department's services required integration in this project [29]. The scope of the composition to date consists of a number of web services implemented to support enquiry.

For a real time response, it is only possible if for required results, we composed web services dynamically and get results after processing of these web services. But in the Police Department only authorized persons can only access these services [4, 5]. So just in time integration of services is not possible at the moment. Currently they are using semi automatic static composition method as shown in figure 2. But for real time results we need dynamic composition. Such type of dynamic composition is difficult because of the following factors.

o Firstly, it is very difficult to analyze services manually from web services repository (like form UDDI) and integrate them to get specific required outputs.

o Secondly, web services can be created and updated. So contents are going to be changed every second to fulfil the user requirements. On selection time before composition system must be able to select up-to-date services. There has been a considerable research to get updated web services at the time of composition but still unable to fulfil dynamic composition requirements.

o Thirdly, while uploading every organization would be using different conceptual model for representation of services. But for dynamic composition process we need one structure (model) of available services so that service can easily invoke other services. During dynamic composition process it is going to be difficult to sort out different variables input and output dependencies if relationship is not defined in these models (ontological representation).

In this paper, we are interested in studying how web services can be dynamically composed. The paper is structured as follows: section I discusses web services, distributed computing technologies and execute ability problem as discussed in [15] (requires determining whether precondition of all actions included in a composite service can be satisfied given incomplete information about the world). In section II, we try to advocate data distribution strategy in the composition process model, web services selection criteria on the base of QoS (Quality of services) issues like throughput Capacity, Latency, Response Time, Availability, Reliability, Reputation and Execution cost [18,19].

Generally, based on previous research we can divide composition process into static and dynamic. Static composition is purely manual i.e. firstly, the user problem must be defined and then manual selection of services according to desired outputs, while in dynamic composition, the interfaces of automated tools environments available where user input and output variables, selection of services on the base of different priorities, integration criteria requirements are analyzed at runtime [4]. In other words, from a user perspective, this composition will continue to be considered as a simple service, even though it is composed of several web services. As composition process is difficult, but normally we are using three types of rules if we are considering static or

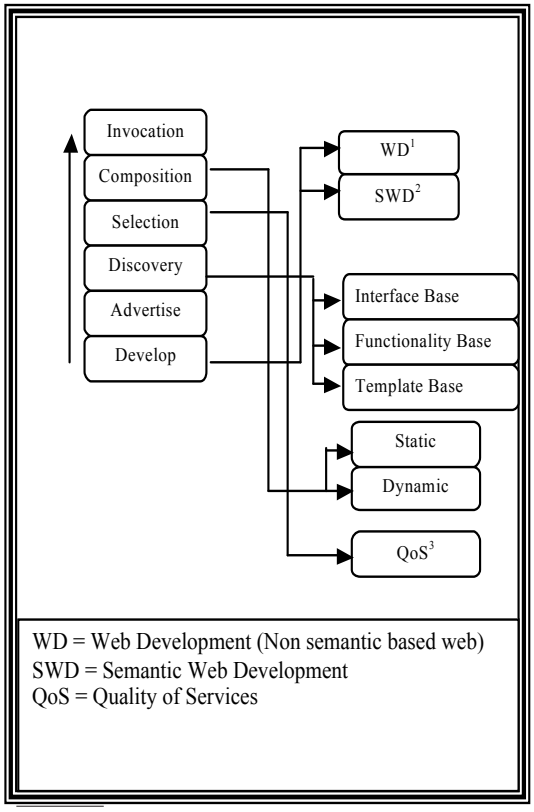

Figure 3

Web Services Composition (cont.)

dynamic composition as shown in Fig 3.

- o Template Based
- o Interface Based
- o Functionality Based

In the Template Base we need to choose a specific template from a repository or creating our own template, but this process is not user friendly. The user has to locate the respective template first (in a static composition process) and then he will be able to compose services. This is time consuming process as well.

In the Interface Base, on the base of inputs and outputs through interfaces, user is getting services reference and these composite services after composition process provide final results. It is highly adaptable method but functionality is not guaranteed. During composition process, some time we are getting similar interfaces, but after composition undesirable outputs (final results). Mostly automated composition available tools using interface base selection concept.

In Functionality Base Composition, along with pre-conditions and post-conditions, user has to provide first-order logic (formula representing the logic) into the interface information.

The above mentioned individual rules are adaptable if we are interested manual selection. In the context of our interface and functionality based approach, the problem of dynamic selection can be solved as discussed in section II.

Section I

III. Web Services and Distributed Computing

It has been claimed that web services are reinventing the wheel because they share many characteristic with other distributed computing architecture, such as CORBA, Distributed Smalltalk, RMI or DCOM [14,24]. Traditional distributed computing technologies assume a much more tightly coupled relationship between client and server where the coupling between various components in a system is too high. Although low-overhead is required during setup of such structure but still it leads to some type of static binding. In distributed object technologies we are normally following object reference call procedure, defined data structures, language specific protocols. Therefore cannot inherently take the advantage of the existing available services, while the web assume that parties can connect without prior knowledge of one another, by following URL links and observing a few basic rules [7, 24]. That's why distributed application development is moving away from tightly coupled system to loosely coupled.

In RPC–oriented interaction, the service request takes the form of a method or a procedure call with associated input and output parameters and waits for response in a real time. In the web service-oriented interaction style, the particular web service request takes the form of complete XML (query) document and will provide result on screen, acknowledgement in the form of email or any other type of real time response. In both above cases we must need detail knowledge of available services and about all involved overheads to combine them.

The main question arising at this point is, how can we reduce tight coupling and static binding between these components. Otherwise web service composition will give us same concept like any distributed computing applications. To overcome these two problems, planning techniques as discussed in proposed model can be used to automate the composition of semantic web services and dynamic discovery [7,10,12,13]. The above mentioned techniques will actually provide chance to client and web services that they can find each other with out prior knowledge of each other. Web services improve program integration use by enabling program-to-program communication. Automated dynamic composition of web services requires fairly rich machine-understandable description of services and relationship between their basic concepts (ontology) [14]. To apply these techniques for accurate results we have to introduce semantic and ontological concepts to our web service model. Web services can be dynamically composed into applications stemming from capabilities based look-up at runtime, instead of the traditional static binding. These two previous concepts differ web services with distributed applications. So it will be impractical to develop real time applications (like police example) by using distributed technology environments.

IV. Execute Ability Problem

Web services are some times portrayed as "silver-bullet" solutions to integrated web solution environment, because it replace the role of original web, relational databases, fourth generation languages and artificial intelligence in past [24]. Web services are concerned with the problems of enabling systematic application-to-application interactions over the web, since any interaction with a web service involves sending and receiving messages [15,28]. One way to describe particular service is in terms of preconditions on input parameters values, precondition on prior operation invocation, out put conditions and effects. In web services composition process, the two terms choreography and orchestration are very important. Web services Choreography concerns the interactions of services with clients/users; it is model of sequences of operation, states and conditions, which control how the interaction occurs [27]. Successfully following the pattern of interaction prescribed by choreography should result into the completion of a useful function [23]. As stated by Michael Hu, Web service choreography permits the description of how web services can be composed, how rules and association in the web services can be established, and how the state, if any, of composed services is to be managed [29]. The World Wide Web Consortium introduced Web Services Choreography Description Language (WS-CDL) which captures the interaction in the participating services. The choreography model also helps out to determine control-flow dependencies, message correlation, time constraints and transactional dependencies.

On the other hand an orchestration defines the sequence and condition in which

one web service invokes other services in order to carry out any specific task, i.e an orchestration is the pattern of interaction that a web service planner must follow in order to achieve goal [23].

On the base of above discussion we can say the dynamic composition model requires following four additional layers.

- o Semantic
- o Ontological
- o Choreography description
- o Orchestration concepts

Choreography Model and Orchestration Model provide us a comprehensive solution for basic issues like precondition, effect and post condition.

Section II

V. Data Distribution and Quality of Services

The Service-Oriented Architecture is an upcoming organizational model aiming at simplifying large scale business operation by consumption of ready-to-use services. The most prominent realization of SOA is currently in the area of web services.

After the core web services technologies are implemented and adopted, disagreement remains over the best approach to defining these additional technologies in the context of web services. Once the core standards are adopted widely, the discussion moves up the stack to tackle Quality of services issues [2, 24]. Businesses will have to secure their web services against any unauthorized use, to guarantee that their messages arrive at their intended destination and are processed reliably, and to define and execute automated business process flows according to a standard mechanism.

Web services standards and technologies generally encompass two major types of application interaction patterns on the base of their database interaction access, Centralized dataflow and Decentralized dataflow. If our focus is towards dynamic service composition then in both approaches there are some limitations [3,8,9,11,17,19]. In Centralized Dataflow, data between components services is passed through the composite services and in that situation bottleneck problem occur, that is why throughput and response time affected. On the other end in Decentralized Dataflow Components services exchange data directly with various data base servers result in, distributes the network traffic among all the services involved relaxes the load on the composite service Improves throughput, response time. Both of the models have there own advantages in distributed computing environment [7,13,21,23,25]. The Decentralized Dataflow seems to be very efficient for dynamic services composition but in some situation like Police example it will affect QoS factors like latency, execution cost and capacity. For automatic web services composition we can use centralized data model by adding middleware extension support to avoid tight coupling between services. This type of extension will be automatically added in our model if we use UDDI (Universal Description Discovery and Integration) or WS-Coordination and WS-Transaction. Proposed frame work model will result in performance improvement, lower time response and higher throughput maintainability.

The web services QoS requirement mainly refers to quality, both functional as well as non-functional, aspect of web service [2,16]. The overall performance of web services depends on the application logic, network, messaging and transport protocols (SOAP.HTTP).

Automatic service compositions are error prone, while developing web services following practices are very important [2].

Adopting standards such as BPEL4WS, WS-Coordination, WS-Transaction, and WSCI (Web Service Choreography Interface), Service Pooling and Load Balancing, Web Service Clustering, Use of Security Assertions, P3P (Platform for Privacy Preferences), Use of Asynchronous message queues, Use of simple data types in messages [8,21,24,26,27].

In the above proposed model we try to add solution of main problems which we discussed in section II and III. The activity of this process starts when a new service is firstly registered in service repository. We used translator if any type of language conversion required. The service composition request is firstly coming to web server. Web server will try to locate in its own services database if already such type of interface base composition exists then integrated result will send to client. Otherwise server will try to search from web services database. The web server will find desired services through matching engine from web service database. Evaluator will evaluate these services on the base of interface base search in first round. On the base of results during first round, evaluator again apply functionality base rule in second round. Composer will compose these selected services and return services address to web server. The composed solution results will send to composition requestor. The copy of this services integration will also be saved in service repository for future use.

Figure 4 provides an overview of bottom to top development stages of web services. We also try to draw sub stages on some levels.

VI. Conclusions

At this stage, automated dynamic web service composition development process is still under development, although some automated tools and proposals are available. However, there are no existing tools which help out with dynamic composition of services. The full automation of this dynamic process is still ongoing research activity. In this paper we outlined the main challenges faced by web service composition, like execute ability, data distribution and its effect on QoS. We also tried to elaborate the main differences and advantages of web services

Web Services Composition (cont.)

over distributed application development. On the base of current problems we try to introduce dynamic services proposed model. In proposed model we try to fix current issues for dynamic composition. In future we will try to workout on some phases of current proposed model, searching algorithms and how can we achieve dynamic composition task.

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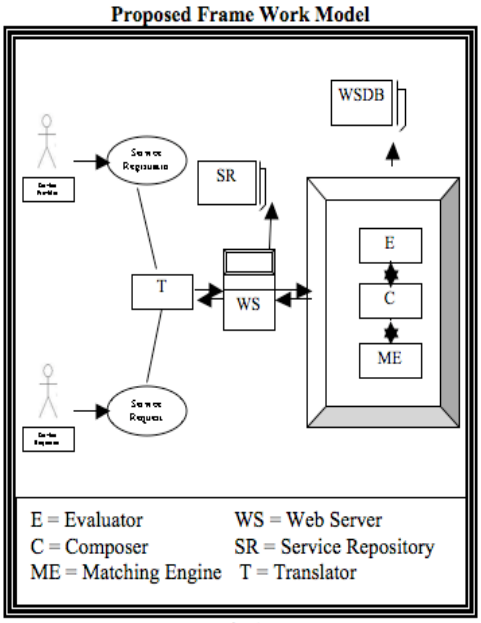

Figure 4

18th Loebner Prize for Artificial Intelligence

Without consciousness or understanding in the 'human sense' two artificial conversational entities (ACE) deceived human interrogators on five occasions each after they had interacted with humans for five minutes, parallel-paired unrestricted topic of conversation Turing tests [1] during the finals of the 18th Loebner Prize for Artificial Intelligence [2] held the same day as AISB's 2008 symposium on the Turing Test at the University of Reading.

Elbot and Eugene's performance, in 24 of the 96 parallel-paired conversational measures for intelligence, came on top of their preliminary phase strength competing against eleven other competitors, who between them were evaluated by over a hundred judges through more than 250 one-to-one Turing tests [3].

As models, Elbot and Eugene emphasise Michie's assertion that the hard problem of consciousness does not "have to be resolved before we can address the questions of intelligence", and that what "Turing wished to place beyond reasonable doubt was not whether a machine might think at the level of intelligent human. His proposal was for a test of whether a machine could be said to think at all" [4].

Possessed with a robot personality Elbot succeeded with the double-bluff winning the 'most human-like' medal. Including a Times newspaper journalist, Elbot convinced five judges that it was a human male. One judge conferred it the personality of "Professor" after the following exchange :

Judge: Good afternoon, how are you?

ELBOT: But I wouldn't say that any afternoon could be good.

Judge: That's a bit pessimistic, I think any afternoon has the ability to be good

ELBOT: Well, afternoon was your word.

Judge: Are you able to see into the future

ELBOT: How do you respond when people pose this question to you?

Judge: I would hope that the answer was no, otherwise I would be interested to meet you

ELBOT: Well, what will that solve? After all, the answer is only a matter of perspective.

Judge: That would depend on one's perspective

ELBOT: Sorry for the tangent, but that reminds me of carefree robot summers spent depending on internal programming.

Judge: Touché

ELBOT: With the inspirations you supply, there are no ends to my horizon...

Judge: Have you any plans for later in the day

ELBOT: This is confusing. Why bring the waking hours into this?

Judge: Just curiosity and I hope that kill no cats

ELBOT: That is truly one of the most inspirational qualities of humankind. Even when things seems completely hopeless, you can still hope.

Eugene, runner up to Elbot, imitates a non-native English speaking ten-year old boy from Odessa, Ukraine. The Times journalist was deceived again, one of five judges who felt Eugene was human [5]. Considered female once and male four times, Eugene was deemed a young adult on one occasion. Eugene established that ACE are no longer simple ELIZA keyword spotting systems. It demonstrated a "where am I now" ability, disclosed personal interests and recalled information from previous utterances during textual interaction :

Judge: so which kind of music do you like?

Eugene: Where do you came from, by the way? Could you tell me about the place where you live?

Judge: I come from France

Eugene: I like the young, but very talented Russian rap-singer Alla Pugatcheva.

Judge: I dont know him

Eugene: Could you invite me to France? I would be so grateful:-)

All results from the preliminary and finals phase of the 18th Loebner Prize are currently being evaluated. However, we can report here that, in 2008, without apparent 'human understanding' or academic backing two ACE each attained a deception rate of 20% in practical parallel-paired Turing tests. This is 10% short of Turing's success rate of 30% incorrect identification. We believe that the achieved deception rate is more than could be achieved by mere chance. Continued engineering progress could lead to achieving Turing level of success before 2052, predicted in the 1952 BBC radio broadcast [6].

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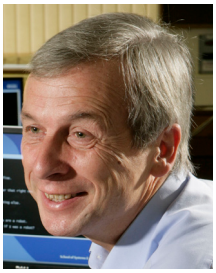

Report: Workshop on Matching and Meaning

The Workshop on Matching and Meaning was held in the Heriot-Watt University (Edinburgh, Scotland) on April 9, in the context of the annual AISB convention. The aim of the workshop was to bring together researchers interested in the problems of automated development, evolution and interpretation of ontologies in different domains, with the main goal of exchanging ideas and stimulating the debate around novel ideas and innovative research with particular emphasis to the problem of semantic heterogeneity between ontologies. The workshop has also seen the kind and precious participation of Aaron Sloman and Alan Bundy.

Several interesting papers have been presented in the workshop covering topics such as ontology languages, ontology evolution, matching and alignment, ontology matching representation, uncertainty in matching, multilingual ontology mapping, tools and applications. Here we provide a brief description of three of them.

The first paper, titled "Converting Classifications into OWL Ontologies", was presented by Feroz Farazi. It shows how to convert generic classification schemes into OWL ontologies. Classification schemes, such as the web directories, provide a convenient and intuitive way for humans to access classified contents. However, while being easy to be dealt with for humans, classification schemes remain hard to be reasoned about by automated software agents. Among other things, this hardness is conditioned by the ambiguous nature of the natural language used to describe classification categories. Therefore, it is fundamental to translate them into a format suitable for automatic reasoning, like OWL. The authors demonstrate the practical applicability of the proposed approach by showing how the results of reasoning on these OWL ontologies can help in improving the organization and use of web directories and how formal classifications can be used for building practical Semantic Web applications (for instance semantic matching).

The second paper, titled "Evaluation of Ontology Mapping Representations", was presented by Thomas Hendrik. It focuses on the problem of mapping representation. In particular, the main goal here is to investigate on the different representations used by current matching tools and how they can support the management of ontology mappings (sharing, re-use, alteration) as well as how suitable they are for different mapping tasks. In the conducted evaluation, the authors analyzed overall 13 different mapping and matching applications, using 22 different evaluation parameters. They conclude that we are still at the beginning of a long process. Further research is needed to develop a powerful mapping representation which is essential for the management, sharing and reuse of ontology mappings. Existing tools hardly scale, offer poor support to the users and are not properly designed for the reuse of the semantic correspondences.

The third paper was presented by Vincenzo Maltese. The paper, titled "Computing minimal and redundant mappings between lightweight ontologies", presents the notion of minimal, and dually redundant, mappings between two lightweight ontologies and an algorithm to compute them, which is an improved version of the S-Match state of the art matcher. Lightweight ontologies are formal classifications in which original natural language node labels are translated into propositional Description Logic (DL) formulas codifying the meaning of the node and where each node is subsumed by the formula of the node above. A logic approach is used to compute the minimal mapping between two lightweight ontologies, which is that minimal subset of semantic correspondences such that all the others can be efficiently computed from them (and are therefore called redundant), without running computational expensive reasoning tools, i.e. SAT. Minimal mappings have clear advantages in visualization, validation and maintenance since they are the minimal amount of information that needs to be dealt with. They make the work of the user much easier, faster and less error prone. Experiments on the proposed algorithm to compute them demonstrate a substantial improvement with respect to S-Match in the (much lower) computation time, in the (much lower) number of mapping elements which need to be stored and handled and in the (higher) total number of mappings which can be computed by propagation of the elements in the minimal set.

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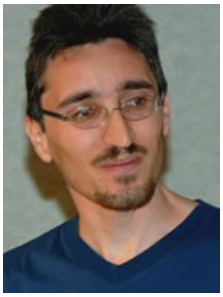

Conference Report: AISB'08

Three projects sharing a common thread stood out at the AISB Convention 2008. The theme I identify relates to questions of how AI technology is used, and focus is given particularly to the needs that these uses fulfil. The first project I discuss is from the plenary lecture given by Justine Cassell which detailed her research into 'Embodied Conversational Agents'—a multimodal interface designed (in this instance) to support the learning development of children with autism spectrum disorders (ASD). The second was a lecture by Luciano Floridi entitled 'Understanding the information turn: the fourth revolution' which examined the impact of ICT on our lives and potential uses for artificial companions. Finally I consider a paper presented by Jelle Saldien et al entitled 'On the design of an emotional interface for the huggable robot Probo'. Saldien et al discuss how the robot 'Probo' might assist hospitalised children.

A conference on artificial intelligence would be deficient without discussion on the needs met by such technology. Questions begged here include broader ethical concerns with the impact such technology has on our way of life. The three papers considered here offer some answers to questions of this nature, addressing both perceived needs and/or engaging with broader concerns in this topic. I suggest that conclusions drawn from these approaches point to differences in an understanding of the social context within which AI technology is applied. Furthermore they offer examples of both benefits and potential pitfalls inherent or associated with the expansion of AI technology designed to fulfil specific social functions.

Cassell's research looks at evidence that suggests children with ASD may suffer from 'social and communicative deficits' which in turn 'make it difficult for the children to learn through peer social interactions' (1). The development of a 'virtual peer' with whom these children can engage (at a pace conducive to their needs) is thus presented as a viable solution to some of the problems inherent in more traditional methods—and is fulfilling these needs with more (apparent) success. In addition to which, the child is involved in aspects of programming their virtual peer, all of which suggests this method pays close attention to each child's very particular needs.

Floridi's talk discussed the role 'artificial companions' (ACs) already occupy in our lives, and speculated on our increasing need for them (as service providers; social workers; memory keepers). Within this, ethical questions were addressed, particularly with regard to our engagement with, and classification of these ACs. In his presentation, he noted that ACs can 'address the human desire for emotional bonds and playful interactions, not unlike pets' (slide 13) and this recognition of their potential to fulfil a need unaddressed in other ways is somewhat in line with Cassell's approach. What this neglects however are the implications of this technology for already existent social structures. Floridi is right to say that befriending ACs is not in itself morally questionable, but—as Floridi notes elsewhere—where there is a question of choice the question becomes more complex.

It is for this reason that the final piece of research by Saldien et al troubles me. The researchers state that 'robots are being created to interact with human beings in order to satisfy certain social needs', and cite their objectives within this as one which offers 'some solutions to the problems and special needs of hospitalized children' (1). Yet, despite these claims, there is little evidence offered that the use of this technology addresses a need which could not in fact be filled by a human. The implications of this are not inconsequential, and I consider a few of them briefly here. In the article the authors note that hospitalisation has 'serious physical and mental influence' (1) on children, and go on to cite where the 'Probo' robot can be of assistance (entertainment, communication and medical assistance) (2). It is not clear from this, however, to whom we should attribute identification of these needs: the children, their families, the health professionals treating them, or hospital managers and administrators. While I take no issue with the robot as entertainment, I wonder under what pretext the robot as assistant is promoted. The bibliography cites articles that imply engagement with this research, yet none is offered within the paper as evidence for the basis of these assertions. It is difficult to assess therefore whether the gap filled by this technology is one inherent to the situation (of a child in hospital needing a robot specifically), or one created or aggravated by a framework of hospital policies, and are thus gaps that could otherwise be filled by different staffing policies or visiting procedures for children's wards.

The way in which we understand illness and the emotional and social needs of humans cannot be a closed book. Cassell's research on the one hand shows that by thoroughly engaging with the sphere within which the need for this technology is identified, we can arrive at technology with valid claims for meaningful application in the real world. The research by Saldien et al on the other hand seems to have neglected this aspect, and in so doing, fails to consider the deeper implications of the technology they develop. It is not that the technology itself is wrong, rather that responsibility in its development rests as much with those who write the programs as with those who identify which 'needs' they satisfy. In pinpointing problems for technology to solve, we should not neglect the reasons why and how these problems might occur. It need not be a given that hospital is in itself a daunting experience for children (though perhaps this may be true of illness itself); we misunderstand this at our own cost. If we do not consider the contingent nature of these problems, we are likely to address only the problems and

ignore the causes. Questions about what it is particularly about hospitalisation that so deeply affects children should never be far from our mind. It is by no means settled that a child would choose a robot over a human, and as Floridi explains, crucial to this decision is that there is choice. If technology is promoted as filling a gap it needs to do so responsibly and this includes clear research into the nature and origin of problems and gaps. My concern in these matters is not to say that robot technology is not useful in children wards, but to question whose 'need' they fulfil.

Yasemin Erden
University of Wolverhampton

Conference Report: Human-Robot Interaction

The fourth ACM/IEEE Conference on Human-Robot Interaction (HRI) was held in San Diego, California, USA on March 11-13, 2009. This annual conference showcases work from researchers across many disciplines, such as robotics, artificial intelligence, human-computer interaction, anthropology, design, and cognitive science. The theme of this year's conference was "Interacting Naturally with Robots". This is motivated by the notion that as robots enter domestic environments in increasing number, it is important people can interact with them in a way similar to how they interact with other people. Thus, natural interaction means working towards facilitating people being able to use both verbal and non-verbal methods to interact with robots.

Several papers explored non-verbal methods of interaction, such as gaze, facial expression, and body gesture. These methods were discussed from both a recognition perspective (what is the human doing) as well as a generation perspective (how can the robot communicate to the human what it is doing).

From a recognition perspective, noteworthy papers include: Jacobs et al. who built a system to recognize bordem in people, Zoghbi et al. who created an online-system to allow people to report affect in real-time during interaction, and Loper at al. who built a robot to recognize various hand and body gestures that allow a human to easily control it.

For generation, a few noteworthy papers include: Mutlu et al. who presented work looking at how a robot can signal to people what type of participatory role it is adopting by using various types of gazes, Cramer et al. who explored how the use of touch can affect interaction, and Bethel et al. who showed that just simple changes in motion can greatly affect how calmed or scared someone can be by a non-anthropomorphic robot.

Much work was also presented on people's attitudes toward robots on a variety of dimensions, including appearance, expressivity, playfulness, usefulness, and many others. Noteworthy papers include: Salter et al. who created an adaptive robot called Roball that aids children with various cognitive difficulties, Weiss et al. who presented work on a variety of projects examining HRI dimensions such as credibility and teamwork, and Mathur et al. who performed a study looking at how robot appearance affects perceived social trustworthiness.

The conference also featured three outstanding keynote speakers. The first keynote was by Akhil Madhani from Walt Disney Imagineering. Dr. Madhani has built a variety of imaginative robots for the Disney theme parks. He described two of his robots in detail, Lucky the Dinosaur and Wall-E.

The next keynote was Rosalind Picard from the MIT Media Lab. Dr. Picard discussed her work in affective computing, and presented a variety of interesting projects on affect recognition. She described the importance of robots having emotional intelligence, and suggested techniques for how HRI researchers might begin to tackle this problem.

Finally, Steven Squyres from Cornell University presented a keynote on the two NASA Mars Robot rovers he worked on, Spirit and Opportunity. Dr. Squyres described a number of engineering and social challenges faced with operating robots 36 million miles away, and how they overcame these challenges.

There were many other interesting papers, demos, and videos presented at HRI 09, and readers are encouraged to visit http://www.hri2009.org for additional information regarding this conference. Also, all the conference proceedings are available in the ACM Digital Library.

Laurel Riek
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Computing Laboratory

Conference Report: 18th International Conference on Inductive Logic Programming

The 18th International Conference on Inductive Logic Programming (ILP2008) was held in Prague, Czech Republic on September 10-12. Inductive Logic Programming (ILP) is a subfield of machine learning which uses logic programming as a uniform representation technique for examples, background knowledge and hypotheses. Due to its strong representation formalism based on first-order Horn Clause logic, ILP provides excellent means for multi-relational learning and data mining. This year the ILP conference has welcomed contributions to learning from multi-relational databases and otherwise non-trivially structured data, ranging from purely logic-based to alternative approaches, such as probabilistic or connectionist, including their viable combinations.

At this years conference it became clear that there are some obvious similarities between the fields of ILP and the Semantic Web and there is a potential for both fields to come closer together. The first indicator of this was the inspiring talk given by one of the invited speakers, Frank von Harmelen with the title: Semantic Web meets ILP: unconsummated love, or no love lost? [3] This talk was given from a semantic web perspective and gave several suggestions as to why and how ILP and the Semantic Web could come together in the close future. Both ILP and the Semantic Web are about large volumes of data, both make use of background knowledge, and both use computationally tractable forms of logic. However the intersection of both research areas is still very small. Ontologies, which are a crucial ingredient in the Semantic Web story, could be learned using ILP. However, this would pose some challenges to both communities. The biggest challenge is the fact that, due to the nature of Machine Learning, ontologies learned this way would not be fully correct and complete, therefore the Semantic Web community needs to learn how to deal with such partially incomplete and incorrect ontologies. Frank von Harmelen then presented some recent work in this direction, namely the efforts to build the Large Knowledge Collider (LarKC). LarKC is a platform for infinitely scalable distributed incomplete Semantic Web reasoning. He suggested that this could be the place where ILP and the Semantic Web finally meet.

On the same topic, Heiner Stuckenschmidt presented a paper entitled: Learning Complex Ontology Alignments - A Challenge for ILP research [2]. This paper proposes the task of learning complex logical mappings between ontologies as a challenge for ILP research. This problem is of great practical importance as ontology matching is the Achilles heel of important research areas with high potential impact to the Semantic Web and other application domains. Stuckenschmidt suggested that ILP researchers might find the generation of complex ontology mappings especially interesting for two reasons:

1): ILP seems to be the natural choice for addressing this problem as the definition of the learning problem perfectly matches the ideas of ILP, as the terminological part of aligned ontologies together with the initial (low level) mappings and the instances equivalences can take the form of background knowledge and the instance information can be used as training examples.

2) Some interesting challenges concerning scalability and accuracy come with this problem: a) While existing work on optimizing ILP mostly focuses on dealing with large instance sets, learning ontology mappings requires focus on dealing with very large background knowledge. Some ontologies contain tens of thousands of axioms. b) The approach considered in this paper relies on an initial mapping between predicates and instances in two ontologies. Most methods that can be used to determine these initial mappings would result in matchings containing a significant amount of noise, which the learning task will then have to deal with. A possibility could be to explicitly take this uncertainty into account and interpret it in the context of probabilistic ILP approaches. c) The consistency of the overall model poses an additional and unexpected challenge to the learning task as existing matching systems cannot guarantee that their result leads to a consistent model so there is still a lot of room for improvement to get an optimal basis to learn complex mappings.

Franceska A. Lisi presented a paper entitled: Foundations of Onto-Relational Learning [1]. This paper aims at extending Relational Learning to account for ontologies in a clear, well-founded and systematic way, analogous with what has been done in Statistical Relational Learning. This extension is called Onto-Relational Learning. This paper's contribution to Onto-Relational Learning adopts SHIQ+log, a very powerful decidable Knowledge Representation framework. This work stands out in several ways: it is getting closer to the current standard ontology languages by relying on a more expressive Description Logic (SHIQ). Furthermore, not only does it take ontology elements as input, but also outputs them, allowing induction of definitions of Description Logic concepts.

Further work proposed in [1] intends to strengthen the ability of the presented ILP framework to deal with incomplete knowledge by performing some commonsense reasoning. Such an ability could prove useful in domains that require reasoning with uncertainty and under inconsistency, like the Semantic Web.

Concluding this review, we can clearly observe that there is a trend emerging to combine some aspects of the semantic web and ILP. The foundations are being laid and we might see a lot more work in that direction in the future.

References

[1] F. A. Lisi and F. Esposito. Foundations of onto-relational learning. In 18th International Conference on ILP, Prague, 2008.

[2] H. Stuckenschmidt, L. Predoiu, and C. Meilicke. Learning complex ontology alignments - a challenge for ilp researchg. In 18th International Conference on ILP, Prague, Late Breaking Papers, 2008.

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Thierry Mamer
Robert Gordon University

Society News

AISB Convention 2010

The 2010 AISB Convention will be held from 29th March-1st April 2010 at De Montfort University in Leicester.

The society is pleased to call for symposium proposals for the 2010 annual convention on wide range of contemporary AI topics. There is no specific theme for the convention and multidisciplinary proposals would be most welcomed. Examples of possible topics include:

Emotions Modeling
AI and Games
Philosophical discourses on science, computing and AI
Social modeling and complex systems
Social and cognitive robots
Human-interaction, psychology, and aesthetics
Adaptive systems and theories of learning
Swarm intelligence in engineering and art

Organisers of a symposium would be responsible for organising the format of their symposium, putting together a call for papers, reviewing and choosing submissions, and ensuring that the final papers are available in time for the symposium.

All submissions by email to the convention chair: aisb10@aisb.org.uk Please use the symposium proposal form available on the AISB website.

Deadline for submitting proposals: 1 JULY 2009
Notifications: 20 JULY 2009.

De Montfort University (photo by Steve Cadman)

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The link above gives access to full guidelines for the submission of reviews and technical articles. Books available for AISB members to review are also listed.

The deadline for the next issue is:
7th August 2009

Dear Aloysius...

Cognitive Divinity
Programme
Institute of Applied
Epistemology

Fr. Hacker's Advice

Dear Aloysius,

I used to be a true believer in AI. Then I began to have Doubts. Now I don't Believe any more -- at least, I don't think I do. Can you help me?

Yours Doubter

Dear Doubter,

What a pity you don't work in my Institute, where the literally unbelievable achievements of our researchers would rapidly dispel any doubts about the reality of Artificial Intelligence. Take, for instance, our new robot **THOMAS?**™ (**T**hose **H**umans: **O**ther **M**inds or **A**rtificial **S**imulations?), which endlessly debates the nature of human intelligence. **THOMAS?**™ would make you doubt your own intelligence, rather than its.

Yours Aloysius

Dear Aloysius,

Our Department has become concerned that students are renting coders over the internet to do their programming exercises for them. My Head of Department has instructed me to develop a system to detect such plagiarism automatically, but I've no idea where to start. Can you help?

Yours Clueless

Dear Clueless,

The answer is staring you in the face! Take a lead from your students and rent a coder to develop the anti-plagiarism system and then take all the credit from your grateful Head.

Be warned, however, that no anti-plagiarism system is perfect. You must oblige the coder to specify the circumstances under which the system will fail to detect plagiarism. You can then hire your brightest students to provide a rent-a-coder service for your weakest students, producing code whose origins are guaranteed to remain undetected. Your profits should more than cover your expenses in commissioning the anti-plagiarism system, and your enterprise will demonstrate that spirit of entrepreneurship that academics are constantly being urged to adopt.

By the way, I can confirm your Department's suspicions that several of your students have been customers of our **CHEATS**™ (**C**oding by **H**acker of **E**xercise **A**nswers for **T**op **S**cores) system.

Yours Aloysius

Dear Aloysius,

Following poor RAE results, my department is being merged with the University Library as a new School of Information Sciences, and I'm one of twenty academic staff who are being made redundant. At 49 and in the current recession, I'm going to find it hard to get another job. My speciality is to apply neural nets to computer security. Can you help?

Yours Insecure

Dear Insecure,

You are lucky to be an expert in the biggest growth industry of the century, and one of the few industries still doing well in the recession. There is a huge investment into research and development in: spamming, identity theft, botnets, denial of service attacks and malware of all forms. Organised crime is estimated to be spending an order of magnitude more than the crime fighting agencies. So, you should have no trouble in finding work with one of these organisations or going into business on your own account. You may, however, find it difficult to make contact with some of the more lucrative and secretive organisations engaged in this area. This is where our **MAFIA**™ (**M**ulti-**A**gent, **F**urtive **I**ntroduction **A**ssistant) system may be able to help you make the right contacts: your agent negotiates with theirs in a secure and anonymous environment.

Yours Aloysius

Agony Uncle Aloysius, will answer your most intimate AI questions or hear your most embarrassing confessions. Please address your questions to fr.hacker@yahoo.co.uk. Note that we are unable to engage in email correspondence and reserve the right to select those questions to which we will respond. All correspondence will be anonymised before publication.