Technical Evaluation Report

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SUMMARY

The symposium 'Information Management/Exploitation' was held in Stockholm on the 19th and 20th October 2009. The technical committee selected 19 papers and invited two keynote speakers both with very good reputations. The papers and presentations were generally of a high standard and the authors, in the main, justified their comments in the papers and during their presentation with analysis and/or simulation results. It was shown that the rapidly expanding data repositories could be exploited within the military domain with an agreed ontology coupled with appropriate search engines and a mechanism for trusted data transfer. Further work is required to bring the research topics into schema for practical implementation.

INTRODUCTION

The topic of the symposium, in a Military context, was timely with the civilian community already exploiting the vast amount of data which is available particularly on the web. Many of the methods and techniques available in the civilian arena can be adopted but ad hoc methods may be necessary in a military context particularly with regard to security. The problem can be simply expressed as providing the right information to the right person in the right place at the right time. The practical implementation of this fact is complex as noted in the papers presented. The theme of the symposium was to expose the potential solutions in a system of system context with particular regard to the C4ISTAR domain.

A vast amount of data, in digital form, is readily accessible to the inclined reader. Google, as one example, processes 20 Petabytes of information daily, which to put in some context compares with an estimate of 50 Petabytes for all written texts. Humans can only absorb a very small amount at any given time; it is thus critical that technology is engaged to present relevant data in the correct context for the decision maker to establish knowledge. Time is also critical to establish an advantage over an adversary, but confidence must be maintained. The information repository continues to expand with the associated proliferation of false and spurious information, demanding development of techniques to handle uncertainty.

The disciplines in the call for papers was wide reaching, not all the topics identified attracted abstracts and in particular human system aspects were not covered. Of the abstracts received 19 were selected and allocated time in one of the five session. The sessions were scheduled as: Distributed Systems and Architectures, Interoperability and Information Exploitation, Autonomous Processing and Semantic Web Technologies, Information Fusion, Trust and Security and Artificial Intelligence. The technical committee were able to enhance the content by recommending changes of emphasis to the authors following a review of the abstracts. In addition to the papers selected, two keynote speeches were given entitled Ontology based Information Systems and Increasing Information Fluence in Knowledge Work.

Issues

In the Information Management domain the overriding issue is to have the necessary and sufficient information available to all personnel in a form that can be readily assimilated at the appropriate time.

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14. ABSTRACT

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Software tools are available to assist in approaching this aim but the rapid expansion of the data available forces improvements in efficiency. Information Management is intrinsically dynamic and any schema must be adaptive. To be more specific progress is required in the following areas:

- Establishing an ontology;
- Define a robust treatment for distributed agents;
- Improving trust between cooperating parties;
- Consistent handling of uncertainty;
- Improvement in presentation methods;
- Efficient search engines; and
- This list is not exhaustive but identifies those areas which are critical.

DISCUSSION

The organisation and structure of the programme was good with a balance obtained from the abstracts submitted. The auditorium in the form of a lecture theatre, with good acoustics, was appropriate, provision for note taking was weak. The subjects covered were topical and appropriate. The papers were available on the rto web page prior to the event, some of the sessions would have benefited if the session chair had provided a short synopsis of the aims during his introduction. In general the questions following the presentations contributed to the knowledge gained by the delegates, but in one or two instances the session chair could have prompted further discussion by exploiting his advantage of having read the paper prior to the symposium.

The following comments address the detail of the individual presentations.

Keynote 1

An appropriate speaker with an extremely good reputation and background. He presented an outline of the Web Ontology Language OWL and other general background material. I felt he was dumbing down and would recommend the inclined participant to follow up on his references which address the subject in much greater detail including Machine Accessible Semantics and Knowledge Representation. I understand that the brief to Horrocks was consistent with the level of presentation which, indeed, provided a good tutorial. It is clearly difficult to forecast the qualifications and capabilities of the audience, I would advise future committees to bias the level of the presentation somewhat higher.

Paper 1

The first paper was presented by a colleague of the author and addressed the analysis of text in natural language. The research had concentrated on English with a question raised as to the ease of application to other languages. The project is to be evaluated during a practical exercise in the near future. I look forward to reading the findings.

Paper 2

Paper 2 described the progress of ALADIN a five year collaborative project between Industry and Academia, within the UK, which has been worthwhile for both participants. The project considers the behaviour of multi agents in a decentralised information system under various schema. Improvements were presented to handle out of sequence data and a statement made that high confidence can be obtained with a reduced data set. Caution was expressed from the floor if anyone is to implement these algorithms with a limited data.

Paper 3

A potentially interesting paper on ‘Assessing Information Management within Staffs’ Unfortunately the finding are restricted which left the presenter in an embarrassing position of only able to describe the methods adopted in the ‘unclassified’ environment.

Paper 4

The paper describes a model based architecture for tactical system of systems focused on the necessary allocation/reallocation of resources following disruption. The presenter showed the benefits of operational independence in the allocation process and further the need for domain knowledge. The paper explores emergent behaviour in more detail and recognises that connected divergent systems could show inappropriate behaviour. Further work on this project has been proposed and an invitation was extended to participants (and other interested parties) to participate in a working group within The IST Panel.

Keynote 2

A complementary presentation to that given by Horrocks again from a well respected academic and again provided a useful background. Staab postulated that information flow is constrained by context. His view is that to join many disparate sources you need to ‘decontextualise’ the source information and make the compiled information relevant to the sink. He also explored the use of semantic desktops which in specific applications were shown to be superior to conventional desktops.

Paper 5

A raft of specifications are available for particular areas; this paper gives the findings of an EU initiative which provides the user with a choice of specifications which can be applied for the selected area. The paper describes the semantic mapping between the candidates in the area of modelling and simulation and provides a table for comparison.

Paper 6

An automatic conformance testing facility has been constructed in Germany to achieve interoperability. This paper describes the system . A large number of nations subscribe to the project with the facilities well used. The tool is formalised and validated. Understanding the display derived from third parties remain an issue.

Paper 7

The aim of the research presented in this paper was to reduce errors and improve the accuracy when combining C2IS with GIS The proposal is to introduce an additional layer between the thematic layer and the symbolic layer to position the so called V objects. Several questions were raised from the floor regarding the benefits of introducing a further layer with the increase in complexity to the structure. Universal acceptance was not gained.

Paper 8

The presentation focused on weather data with its inherent temporal variance. To search for this type of data with standard search engines is not very satisfactory and adaptive methods have been employed. Elemental methods are available but with the diversity of parameters to present, ranging from refractive index to wide scale transients of weather fronts no general solution was recommended.

Paper 9

The project was to use historical data to prevent future air accidents by establishing the background leading to the event. The prediction algorithms demand extensive data bases and rigorous maintained. A proposal to employ neural nets was tabled which could be of benefit .

Paper 10

The presentation provided an exposé of a publish/subscribe method coupled with Description Logic to perform inference in an Information Management System. The formal representation and the wide range of tools available is conducive to modelling and has shown practical applications for UAV missions. The use of Description Logic DL as the user interface was acknowledged as a weakness.

Paper 11

This paper was presented at short notice by the session chair and describes the continuing work at FKIE on natural language processing. Two synthesis methods were presented each with their own merit that of deep and shallow parsing as an approach to automatic analysis of intelligence reports. Examples were provided which showed that nuances in the report, to be analysed, could lead to differences in inference. The work is associated with GATE a General Architecture for Text Engineering.

Paper 12

Paper 12 describes a method to monitor open source sites and identify anomalous behaviour. A graph is constructed with the hyperlinks represented by the edges of the graph. The behaviour of the site is established from historical data and the normal dynamics of the information flow determined. Variations are automatically flagged to the analysts. The tool provides a means to monitor specialist sites particularly with social influence and alert analysts to areas which would benefit from enhanced observation.

Paper 13

The presenter advocated an extensive filter to manage the plethora of data but regrettably did not offer the necessary characteristics. The statements were not supported by evidence but the product appears to be commercially viable. The trends in signal intelligence processing showed extensive progress but were underpinned by a database which again was not discussed.

Paper 14

A second paper relating to the ALADIN project with the emphasis in this presentation on the treatment of unreliable data from untrustworthy sensors. Simulation results were presented which indicated that a Baysian approach could handle the adverse conditions provided the number of reliable sensors outweighed the others. The paper also compares decentralised and distributed systems under various conditions e.g. number of agents, communication range and latency. The embryonic techniques look promising.

Paper 15

The paper and presentation identified the challenges in sharing security information and culminated in a proof of concept trial. The project was co-funded by the EU with the aim of engendering trust between national groups, which is intrinsically subjective. Several pitfalls were identified e.g. cognitive bias, specious reinforcement and recipient’s implied metric. The group has written a standard ISO/IEC 27010 which is now published and open for peer review.

Paper 16

Provides a mechanism to enable the source to be identified when images are redistributed by unauthorised agents. A modified transform watermarking is proposed which is robust and has the added advantage of not imposing a severe burden on the communication bandwidth.

Paper 17

The aim of the project was to identify pertinent information to establish cooperation in a multi agent scenario. The paper provides a formal basis which is characterised in multi-modal logic. Interested parties are directed to the paper which contains the formal propositions.

Paper 18

'Emotional System for Military Target Identification' this paper was not presented but is available on the rto web page. The paper describes a method which uses the concept of anxiety and confidence to improve target identification and offers a neural net construct.

Paper 19

The final paper addresses the use of Dezert-Smarandache Theory which is an extension to Dempster Shaffer as an alternative to the Baysian approach. The results are encouraging but it is acknowledged that further research is required. Analysis of the Questionnaires

Replies were obtained from about half the audience which showed a skew towards describing the symposium as highly relevant and complemented a very good impression of the symposium. Specifically 60% gave a score in excess 80 for the value and 70% gave excellent or Very Good for the assessment. No adverse comments were received for the quality of the visual aids. The length of time for the presentations and questions was acceptable. The view of the best paper was consistent with that provided by the technical committee.

CONCLUSIONS

The papers presented were generally of a high standard and directed at topical disciplines. The presentations address some of the relevant issues and showed progress with pointers to where additional work is demanded to reach the goal of an appropriately informed community. I commend the chair and his technical committee on presenting a well balanced and worthwhile symposium.