CSCSI/SCEIO CMCCS/ACCHO CIPPRS

Vol. 1, Number 5 November 1982

## EDITORIAL

Well, here we are again, desperately hanging on by our fingernails, and hopefully serving a needed function. As the only means of mass communication among about five hundred members of three societies, there is a requirement. We will continue to publish at a frequency of twice a year, provided that there is enough material.

Probably the most significant lack that occurs is with regard to research reports. I am therefore making a special appeal for everyone to assemble what they can before the next issue goes to press in February 1983 so that it can be included. Any suggestions and assistance as to how this can be accomplished will be much appreciated.

It might also be appropriate to try a new format, a new cover, or even a new name, since the current version is not very distinctive. Are there any suggestions?

W. A. Davis
November 1, 1982

This newsletter is published by CSCSI/SCEIO, CMCCS/ACCHO and CIPPRS at The University of Alberta, Department of Computing Science, Edmonton, Alberta, T6G 2H1.

Editor-in-Chief:
Wayne A. Davis
University of Alberta

CSCSI Editor:
Gordon McCalla
Department of Computational Science
University of Saskatchewan
Saskatoon, Saskatchewan
S7N 0W0

CMCCS Editor:
Marceli Wein
Computer Graphics Section
National Reserch Council
Montreal Road
Ottawa, Ontario
K1A 0R8

CIPPRS Editor:
Ching Suen
Department of Computer Science
Concodia University
1455 de Maisonneuve Blvd. West
Montreal, Quebec
H3G 1M8

Richard Larratt and Associates Ltd.
RR 1 DEMORESTVILLE, ONTARIO, K0K 1W0 / PHONE 613 476-5309

Richard Larratt, M.A., P.Eng.
Kathleen Vowinckel, B.Sc., M.B.A.

W.A. Davis, Professor & Ph.D.
Dept. of Computer Science
University of Alberta
Edmonton, ALBERTA

30 May 1982

Dear Dr. Wayne

I could claim that I only know of A.G. Fowler as that guy who writes you letters and wants computing to be a profession ... as if this world really needs another professional body ... *P.Eng./P.Eng.*C.A./C.A.*M.D./M.D.* ... LL.B. & CONSTITUTION. BUT I CAN'T TELL ANY MORE LIES TODAY SO I'LL ADMIT I KNOW WHO'S WRITING YOU AND HE'S A DIFFERENT FLAVOR E.D.P. THAN YOU. In fact you should not be surprised that embedding an A.I. Society inside C.I.P.S. has denied it the necessary audience. What the C.I.P.S. members have in common is an INSTRUMENT, the computer, what the members do not have in common is a SINGLE UNIFYING IDEA. As the computer moves on into general application you may argue that you guys with the big mathemetical picture have got it taped ... but don't you remember that's what the math dept. said when they pushed out computer science as something a bit more vulger than applied math. So why not just be an A.I. Society? Take members, money and support from wherever ... even C.I.P.S. While you're at it move the comp. sci. dept. wherever the money/action is ... maybe that's in the medical school. It's not in mathemathics. As a popular movement ... mass understanding of algorithms and heuristics is moving too fast for us to stop & worship the ashes of Johnny von Neumann ... of course he was fantastic, Turing too, but leave that task for the jackasses who teach humanists the Philosophy of Science. Let's face it, so long as there are bugs to catch and systems to write, no one's got the time to whine. Get a Telidon grant. It could use some A.I.

Yours very truly

Richard

Richard Larratt

c.c. Al Fowler

Richard Larratt and Associates Ltd.
RR 1 DEMORESTVILLE, ONTARIO, K0K 1W0 PHONE 613 476-5309

Richard Larratt

Energy, Mines and Resources Canada — Énergie, Mines et Ressources Canada

Science and Technology — Science et Technologie

May 17, 1982

Your file Votre référence

Our file Notre référence

Professor Wayne A. Davis
Department of Computing Science
University of Alberta
Edmonton, Alberta
T6G 2H1

Dear Wayne:

Your correspondence with Murray Strome, concerning the applicability of the standard format family for your requirements, has been brought to my attention, and I am therefore enclosing a four page introduction to that family, which you may wish to consider publishing in your next newsletter.

I have emphasized the concepts involved in tailoring the standard format family to suit a specific need, and have shown how the construction is admirably suited to the design of general purpose software. One application of particular interest to you may be the general purpose tape-to-film product designed by CCRS and cited in the references as "Standard CIR Input CCT Format". Its function is to transfer one scene (of variable size) of raster scan data, which could contain imagery data OR annotation, to an imaging device, and as such, represents a very simple application for the transfer of imagery data.

Yours sincerely,

Jenny Murphy
Systems Section
Digital Methods Division

Attachment

cc: W.M. Strome

mm

Canada Centre for Remote Sensing
2464 Sheffield Road
Ottawa Canada
K1A 0Y7

Centre Canadien de Télédétection
2464, rue Sheffield
Ottawa Canada
K1A 0Y7

Canada

# AN INTRODUCTION TO THE STANDARD FAMILY OF TAPE FORMATS FOR DATA TRANSFER

In response to the article "Some Thoughts on Formats for Data Transfer" which appeared in the March 1982 Newsletter, the features of a very flexible family of tape formats, which is admirably suited to the transfer of images for image processing and graphics, are presented.

In order to satisfy the needs of users of many different kinds of remotely sensed data, and to facilitate the integration of data types such as those found in geographic data bases or other auxiliary information, a tape standards group was set up in 1978 by the Landsat Ground Station Operators' Working Group (LGSOWG) to investigate an open-ended family of Computer Compatible Tape (CCT) formats. A further imposition was that it should be possible to write general purpose software, for extracting data from the tapes, that is relatively simple, and easy to upgrade to accommodate new and varied data sources without major revisions. The LGSOWG Technical Working Group (LTWG) now maintains the standard format family which was successfully developed by the group, and in addition, retains copies of implementations of the standard format for specific applications. These can be made available for use by other agencies or organisations.

The key concept used in the standard format family is the use of a "superstructure" at the volume, file and record level, which serves to document, and hence provide a path through, the contents of the tape. Within the standard format family, data files are logically grouped on a tape or set of tapes, and this group is referred to as a logical volume. The individual tapes are the physical volumes. The family is sufficiently general to permit the storage of many concise logical volumes within one physical volume, or to split very large logical volumes across several separate physical volumes.

The superstructure concepts can be viewed from two distinct standpoints, the first relating to the design of a specific implementation of the format family, and the second being pertinent to the design of software required to step logically through the tape and to locate individual data fields.

Starting with the individual data records as the building blocks of the tape format, the standard format family requires the addition of record introductory information, in predefined locations, consisting of the record sequence number within the file, a set of record type codes and sub-type codes, and finally, the record length. Record codes are allocated, (to a maximum of one type code and three sub-type codes), to specify the type of data contained within the record and the record format.

The data records are grouped together in a data file, assigning a general category or class to which the data belongs, and the file is introduced by a file descriptor record. The file descriptor record is composed of two parts, a fixed segment and a variable segment. The fixed segment identifies the file by name and number, gives references to documentation, and also specifies how to read the record introductory information in the constituent data records. The construction of the second part, the variable segment, is unique to each class, but it usually contains two subsets of information, namely, the number and length of up to three different record types within the file, and locators specifying the precise location within the file and the format of certain key data fields. Other information concerning data organisation is often given, and is explained in more detail later.

When designing the construction of a new file, it is therefore advisable to check for the existence of an appropriate file class which is already in use and hence available from the LTWG. It should be stressed here that the utilisation of specific file classes and record type codes can permit varying degrees of flexibility in record construction and design, and hence in interpretation. For example, two agencies could use the same file class and record code to record imagery data from an identical source but using pixels of different resolution, or storing the scan line number and channel identification in quite different locations, at the convenience of the format designer who may be constrained by hardware considerations. On the other hand, a combination of a specific record code and three sub-type codes could be interpreted to define a unique record construction. (These two factors will also affect the software used for interpreting the data).

Having completed the process of constructing all the data files in the logical volume, it is necessary to introduce each physical volume (or logical volume) with a fixed format volume directory file, composed of one volume descriptor record, one file pointer record for EACH subsequent data file, and any number of text records. The volume descriptor record contains all the information which applies to the logical volume as a whole, such as data source information, physical volume identification, and the physical relationship of the logical volume to other logical volumes within the tape or tape set. Of equal importance is the specification of the number of file pointer records (and hence, of data files), and of the number of text records within the volume directory file. There is one file pointer record for each of the data files on the tape and it supplies the number and name of the associated data file, the number of records in the file, and the maximum record length. The file class is also recorded here, giving an indication of the content of the file in terms of the type and format of the data. The text record is simply an extra record stored in the volume directory file to provide information in the form of an alphanumeric string of characters. It is often used to specify the product type and processing performed, the location, date and time of product creation, the specific scene identification and the physical tape identification. It is therefore a convenient means of confirming that the correct CCT is being processed.

The logical volume has now been supplied with an indexing system in the fixed format volume directory file, each data file has been introduced by a file descriptor record classifying the type of data within the file and locating key elements within the file, and each record has been introduced by some sequencing and coding information categorizing, to the desired extent, the content and format of the individual fields. It remains only to terminate the set of logical volumes with a volume directory file containing only one record, the "null" volume descriptor record, distinguishable from the introductory volume descriptor record by a different value for one record sub-type code.

Current applications have required the definition of seven different file classes, and their names, codes and general content are shown in the accompanying table.

| CODE | NAME | DATA TYPE |
|---|---|---|
| LEAD | LEADER FILE | Header and ancillary |
| IMGY | IMAGERY FILE | Imagery |
| TRAI | TRAILER FILE | Quality summary and histograms |
| HEAD | HEADER FILE | Similar to LEAD - more extensive |
| PMHF | POLYGON CHAIN MASTER HEADER FILE | Polygon header |
| PCDF | POLYGON CHAIN DATA FILE | Polygon chains |
| SRVS | SAR580 VIDEO SIGNAL FILE | Raw video signal data from Synthetic Aperture Radar (SAR) |

Since file class IMAGERY FILE is the most extensively used, it is worthwhile at this point considering its specific features in some detail. Usually, only one type of record is found in IMAGERY FILEs. However, the imagery pixels may be augmented by ancillary information stored in two specific areas of the record, namely, the prefix area and the suffix area. Some common uses of the prefix area are to record the scan line number, channel number, the time the scan line was recorded, and a count of any zero-filled pixels immediately preceding or following the image data pixels. The suffix area may contain quality codes, radiometric calibration information and geographic referencing data. Locators are supplied for ALL these fields except the geographic reference. The organisation of the scan lines may be band-interleaved-by-line, band-interleaved-by-pixel or band-sequential. (However, when pixels from different bands are of differing resolution, they must either be adjusted to a common resolution, or else they must be stored in separate files). If record size is a constraint for a specific system, then scan lines of data can either be packed within records, or split across multiple physical records. Pixels may be stored in eight-bit bytes (with user-defined left and right fill bits, if required), or if not exactly eight bits in size, they may be packed efficiently within groups of bytes. Since all the above organisational information is readily accessible in the file descriptor record variable segment, file class IMAGERY FILE has already been used for a variety of remote sensing applications by agencies such as the Canada Centre for Remote Sensing (CCRS), NASA, USA, and the European Space Agency (ESA). They include Landsat Multispectral Scanner (MSS) data, Landsat Thematic Mapper (TM) data, airborne MSS, Seasat SAR and NOAA Advanced Very High Resolution

Radiometer (AVHRR) data. In addition, a general format for the transfer to an imaging device of one scene of variable size containing raster scan data consisting of either imagery data or graphics or a combination of both, is in use by CCRS. References to specific format documents are appended.

Turning now to the software required to process standard format tapes, it can be seen that a structured organisation of the tape format should lead to the develpoment of structured software. When designing software to process standard format tapes, it is convenient to remember that the four types of superstructure record (namely, the volume descriptor, the file pointer, the text record and the file descriptor) are written according to predefined formats. The software may then be driven by the contents of four COMMON blocks, which are set up as the superstructure records are read. Firstly, the physical volume parameters, such as how many tapes constitute a set, are generated from the contents of the volume descriptor record. Secondly, the logical volume parameters, such as the number of files in the logical volume are set up, also from the contents of the volume descriptor record. Thirdly, as each file pointer record is read, a COMMON block containing detailed file construction parameters for the referenced file is generated and appended to a temporary disk file. Finally, as each data file is accessed, the corresponding file construction COMMON block is retrieved from the temporary disk file. A further COMMON block is then set up containing data record construction parameters pertaining to the current data file and is used whenever a data record is to be accessed. Hence, using the contents of the superstructure records only, access to an individual record and to its type code and generic file class is possible, without any prior knowledge of the tape format.

By augmenting the software with routines based on file class codes and record type codes and sub-type codes, key data from the file can be located. More significantly, for imagery files, the data can be displayed regardless of pixel resolution, or the method of packing pixels within bytes, or the organisation of the data within the files or within the physical records, still without resorting to a format specification document.

Therefore, the overhead in terms of format definition and software recognition requires only four compact superstructure record types to be included, and only three fields to be included in each data record for conformance to the standard format family. Examples of the application of the standard format to specific remote sensing requirements have been given, together with a general indication of its applicability to other image data types. Thus it can be seen that the standard format family has met the main objectives, of facilitating the rigorous definition of processing software, yet supplying considerable flexibility in the definition of individual formats.

8.

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Murphy, J., "Standard AVHRR CCT Image Format Specifications", CCRS DPD-TM-81-236, Dec. 8, 1981 (Internal document)

EROS DATA CENTER, "Landsat MSS Computer Compatible Tape Product Version II", EROS DATA CENTER, July 1982

Murphy, J., Park, W. M., "Standard CIR Input CCT Format", CCRS DPD-TM-82-256, March 1982 (Internal document)

Following is a collection of abstracts received from Nick Cercone, Simon Fraser University, on September 24, 1982. The papers from this collection will appear as a Special Issue on Computational Linguistics in the International Journal of Computers and Mathematics from Pergamon Press early in 1983. Susbsequent to this a hard-bound edition based primarily on the Journal will become available from Pergamon Press. The hard-bound edition will include additional articles as well.

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### *ARGOT: A System Overview*

We are engaging in a long-term research project that has the ultimate aim of describing a mechanism that can partake in an extended English dialogue on some reasonably well specified range of topics. The fundamental assumption in this project is that conversants in a dialogue are constantly recognizing and monitoring the goals of the other participants. To do this, they must have a rich body of knowledge about the topic, about the goals and beliefs of the other participants, and about the structure of dialogues in general.

This paper describes progress made towards these goals and outlines the current research areas in which the project is focused. It describes the basic theory underlying our work and an initial system built according to this theory. It then considers some deficiencies in this system and describes the new system, called ARGOT, currently under development. Finally, various specific research efforts within the group are described.

James F. Allen, Computer Science Department, University of Rochester, Rochester, NY 14627

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### *Minimal and Almost Minimal Perfect Hash Function Search with Application to Natural Language Lexicon Design*

New Methods for computing perfect hash functions and applications of such functions to the problems of lexicon design are reported in this paper. After stating the problem and briefly discussing previous solutions, we present Cichelli's algorithm, which introduced the form of the solutions we have pursued in this research. An informal analysis of the problem is given, followed by a presentation of three algorithms which refine and generalise Cichelli's method in different ways. We next report the results of applying programmed versions of these algorithms to problem sets drawn from natural and artificial languages. A discussion of the conceptual designs for the application of perfect hash functions to small and large computer lexicons is followed by a summary of our research and suggestions for further work.

N. Cercone, M. Krause, and J. Boates, Computing Science Department, Simon Fraser University, Burnaby, B.C.

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### *Recognition Mechanisms for Schema-based Knowledge Representations*

This paper is concerned with generalizing formal recognition methods from parsing theory to schemata knowledge representations. Within Artificial Intelligence, recognition tasks include aspects of natural language understanding, computer vision, episode understanding, speech recognition, and others. The notion of schemata as a suitable knowledge representation for these tasks is discussed. A number of problems with current schemata-based recognition systems are presented. To gain insight into alternative approaches, the formal context-free parsing method of Earley is examined. It is shown to suggest a useful control structure model for integrating top-down and bottom-up search in schemata representations.

W. S. Havens, Department of Computer Science, University of British Columbia, Vancouver, B.C.

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*On Interpreting Network Formalisms*

In a recent paper, Reiter and Criscuolo [REITER&CRISCUOLO80] remark "that (semantic) networks are notational variants of logical formulae is by now a truism in Artificial Intelligence circles". Shamelessly exploiting the foregoing quote as a pretext, I attempt to sketch adequate semantic accounts for at least two (kinds of) semantic network formalisms; one, based on the notion of inheritance, one, not. A crucial condition of adequacy to be satisfied is fidelity to some of the intuitions of the creators of the formalism.

D. J. Israel, Bolt Beranek and Newman Inc., Cambridge, MA 02238

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*An Approach to the Organization of Knowledge and its Use in Natural Language Recall Tasks*

The viewpoint espoused in this paper is that natural language understanding and production is the action of a number of highly integrated domain-specific specialists. Described first is an object oriented representation scheme which allows these specialists to be built. Discussed next is the organization of these specialists into a four-level goal hierarchy that enables the modelling of natural language conversation. It is shown how the representation and natural language structures can be used to facilitate the recall of earlier natural language conversations. Six specific kinds of recall tasks are outlined in terms of these structures and their occurrence in several legal dialogues is examined. Finally, the need for intelligent garbage collection of old episodic information is pointed out.

G. I. McCalla, Dept. of Computational Science, University of Saskatchewan, Saskatoon, Sask.

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*Semantic Processing of Texts in Restricted Sublanguages*

Practical results in information retrival and automatic translation have recently been achieved for naturally-occurring texts in certain narrow technical areas. For each application, the processing system must exploit the distinctive linguistic properties of the appropriate sublanguage; in fact, a precise description of these properties, incorporated into a sublanguage grammar and lexicon, is what enables the system to build a representation of the information (meaning) conveyed by the text.

Sublanguages which appear insufficiently closed for semantic processing often carry an important component of information which is encoded in a linguistically well-behaved way and is hence computationally separable. By way of illustration, a procedure is outlined for processing stock market reports into a predicate-argument representation of their content, for that part of the report which refers to the stock exchange activity. The procedure may have applications beyond information retrieval, in particular to the synthesis of informative stock market reports in one or more languages.

R. I. Kittredge, University of Montreal, Montreal, Quebec

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*Abstract*

The understanding of a natural language text requires that a reader (human or computer program) be able to resolve ambiguities at the syntactic and lexical levels; it also requires that a reader be able to recover that part of its individual sentences which is over and above the collection of meanings of its individual sentences taken in isolation.

The satisfaction of this requirement involves complex inferencing from a large database of world-knowledge. While human readers seem able to perform this task easily, the designer of computer programs for natural language understanding faces the serious difficulty of algorithmically defining precisely the items of world-knowledge required at any point in the processing, i.e. the problems of <u>controlling</u> <u>inferencing</u>. This paper discusses the problems involved in such control of inferencing; an approach to their solution is presented, based on the

notion of determining where each successive sentence "fits" into the text as a whole.

A. Lockman, Computer Science Department, Rutgers University, New Brunswick, NJ

*Description Directed Control: Its implications for natural language generation*

We proposed a very specifically constrained virtual machine design for goal-directed natural language generation based on a refinement of the technique of data-directed control that we have termed "description-directed control". Important psycholinguistic properties of generation follow inescapably from the use of this control technique, including: efficient runtimes, bounded lookahead, indelible decisions, incremental production of the text, and inescapable adherence to grammaticality. The technique also provides a possible explanation for some well known universal constraints, though this cannot be confirmed without further empirical investigation.

In description-directed control the controlling data structure is the surface-level linguistic description of the very text being generated. This constituent structure tree is itself generated depth first by the incremental realization of a hierarchical description of the speaker's communicative goals (neutrally termed a "realization specification") organized according to the scope and importance of its components. The process of traversing the surface structure gates and constrains the realization process; all realizations are thus subject to the grammatical constraints that accrue to the surface structure at which they occur, as defined by the grammatical annotation of the surface structure tree.

D. D. McDonald, Dept. of Computer and Information Science, University of Massachusetts at Amherst

*Formal Semantics and Computer Text Processing*

Computer processing of large non-preedited natural language texts has often been limited either to managing and editing or to analysing basic levels of content (indexes, concordances, clusters, etc.). Few systems approach syntactic information, even less semantic information. Because of the complexity and the originality of the underlying semantic information of any text it is not possible to import the A.I. and computational semantic concepts directly. It is necessary to explore news paths. The research presented here is oriented toward the understanding of certain semantic aspects in computer text processing (words and meaning representation and inference patterns). The approach is done through a model theoretic approach embedded in an algebraic language. The hypothesis which governs the concepts and the distinctions is the following: discourse in a text constitutes a semantic space built of an ordered set of sentences which are of different logical types and which present a specific pattern of coherence expressible in a syntactic manner.

J. G. Meunier and F. Lepage, Universite du Quebec a Montreal

*Some Representational Issues in Default Reasoning*

Although most commonly occurring default rules are normal when viewed in isolation, they can interact with each other in ways that lead to the derivation of anomalous default assumptions. In order to deal with such anomalies it is necessary to re-represent these rules, in some cases by introducing non-normal defaults. The need to consider such potential interactions leads to a new concept of integrity, distinct from the conventional integrity issues of first order data bases.

The non-normal default rules required to deal with default interactions all have a common pattern. Default theories conforming to this pattern are considerably more complex than normal default theories. For example, they need not have extensions, and they lack the property of semi-monotonicity.

Current semantic network representations fail to reason correctly with defaults. However, when viewed as indexing schemes on logical formulae, networks can be seen to provide computationally feasible heuristics for the consistency checks required by default reasoning.

R. Reiter, Dept. of Computing Science, Rutgers University, New Brunswick, NJ and C. Criscuolo, Istituto di Fiscia Teorica, University of Naples, Naples, Italy.

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### *What the Speaker Means: The Recognition of Speakers' Plans in Discourse*

Human conversational participants depend upon the ability of their partners to recognize their intentions, so that those partners may respond appropriately. In such interactions, the speaker encodes his intentions about the hearer's response in a variety of sentence types. Instead of telling the hearer what to do, the speaker may just state his goals, and expect a response that meets these goals at least part way. This paper presents a new model for recognizing the speaker's intended meaning in determining a response. It shows that this recognition makes use of the speaker's plan, his beliefs about the domain and about the hearer's relevant capacities.

C. L. Snider, Bolt Beranek and Newman Inc., Cambridge, MA

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### *Generating Language from Conceptual Graphs*

Conceptual graphs are a semantic representation that has a direct mapping to natural language. This article presents a universal algorithm for scanning the graphs, together with a version of augmented phrase-structure grammar for specifying the syntax of particular languages. When combined with a specific grammar, the universal algorithm determines a mapping from graphs to language with several important properties: multiple surface structures may be generated from a common underlying structure, constraints on the mapping result from the connectivity of the graphs rather than <u>ad hoc</u> assumptions, and the graphs combined with phrase-structure rules enforce context-sensitive conditions.

J. F. Sowa, IBM Systems Research Institute, New York, NY

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### *Understanding Novel Language* (No Abstract Available)

G. F. DeJong and D. L. Waltz, Coordinated Science Laboratory and Electrical Engineering Department, University of Illinois, Urbana, IL

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### *Extended Natural Language Data Base Interactions*

An oft-heard argument for Natural Language interfaces is their promise of reducing the effort an infrequent user would have to exert in using a computer system. This viewpoint has led to a research concentration on removing "artificial" constraints on a user's freedom of expression, allowing it to move closer to everyday speech. This paper discusses two complementary directions for extending Natural Language interfaces to data bases, which can make them more useful systems. These extensions make Natural Language interfaces less simply "windows" through which data can be called into view, and more "articulate experts" on the data base system and what it represents. The two directions involve (1) broadening the range of <u>query types</u> that can be handled and (2) extending the range of <u>responses</u> that can be provided.

B. Webber, A. Joshi, E. Mays and Kathleen McKeown, Department of Computer and Information Science, University of Pennsylvania, Philadelphia, PA

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*A Computational Approach to Fuzzy Quantifiers in Natural Languages*

The generic term *fuzzy quantifier* is employed in this paper to denote the collection of quantifiers in natural languages whose representative elements are: *several, most, much, not many, very many, not very many, few, quite a few, large number, small number, close to five, approximately ten, frequently*, etc. In our approach, such quantifiers are treated as fuzzy numbers which may be manipulated through the use of fuzzy arithmetic and, more generally, fuzzy logic.

L. A. Zadeh, Division of Computer Science, Department of EECS, University of California, Berkeley, CA

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REVIEW OF 1982 ACL CONFERENCE — 

Robin Cohen
Dept. Computer Science
University of Toronto

The 20th annual meeting of the Association for Computational Linguistics (ACL) was held at the University of Toronto from June 16-18, with Ray Perrault as local arrangements chairman. The program committee, headed by Madeleine Bates of BBN, compiled an interesting selection of 16 individual papers and 3 panel discussions.

Two of the panels assembled researchers from different projects who discussed their particular approaches to NL problems - one on NL access to data bases, featuring Bob Moore, Barbara Grosz, Stan Petrick, Steven Schwartz, David Warren, Fred Thompson, and Remko Scha, and another on building non-normative systems, featuring Mitch Marcus, Rusty Bobrow, Tony Kroch, Richard Granger, Stan Kwasny and Lance Miller. The most interesting panel was less technical - a retrospect on 20 years of the ACL, which assembled many past presidents of the organization who reflected on unusual incidents during their terms of office, with an old high school reunion atmosphere.

One of the highlights of the conference occurred at the business meeting Thursday afternoon, where CSCSI member Graeme Hirst proposed that the name "American" be dropped from the title of AJCL, ACL's Journal. The suggestion was well received and Graeme found himself being complimented by hordes of admirers at the banquet that evening.

The local arrangements were superbly handled by a troop of U of T students (including yours truly), orchestrated by Ray Perrault, and helped immensely by Don and Betty Walker. The donuts in the morning were fresh and plentiful and featured some excellent sugar-coated crullers. They were out first thing in the morning along with coffee, to help everyone get their morning fix. The banquet, held at the U of T faculty club, provided an open bar with real hard liquour as well as wine and beer - it was open both before and after the meal (what more could a conference attendee ask?). Even the weather co-operated for the most part, except for the downpour at the opening night's registration.

Meanwhile, ACL is in need of new members (in order to get a grant from AFIPS), so here's a sales pitch. For only $15US for individuals, $30US for institutions you can become a member of the ACL for a year. You receive four glossy issues of the ACL Journal and reduced fees for conferences - quite a bargain. To join, send your money to:
ACL, c/o Don Walker, SRI International, Menlo Park, Ca. 94025, USA.

# PROCEEDINGS
# GRAPHICS INTERFACE '82 TECHNICAL PROGRAM

Constellation Hotel, Toronto
19, 20 and 21 May 1982

Copies of the proceedings can be obtained from:

Canadian Information Processing Society
5th floor, 243 College Street
Toronto, Ontario
M5T 2Y1

**1. Human/Computer Interaction**, Chairmen: Ronald Baecker, Human Computing Resources Corporation, University of Toronto; Kellogg Booth, University of Waterloo

*A Framework for the Design, Evaluation and Implementation of User-Computer Interfaces*, J. D. Foley, George Washington University

*Cognitive Schemata and the Design of Graphics Displays*, M. I. Mills, U. of Montreal

*From Task to Interaction: What the User Must Know*, T. P. Moran, XEROX Palo Alto Research Centre

*FLAIR: User Interface Design Tool*, P.C.S. Wong & E. R. Reid, TRW Defence and Space Research Group

*Software for Device-Independent Graphical Input*, G. Hamlin, Los Alamos Scientific Laboratory

*A Graphics Interchange Protocol and Format, Including System Tools*, K. Weiler, General Electric Co. & G. Glass, Carnegie-Mellon University

*Towards a User Interface Prototyping System*, M. Green, McMaster University

**2. Graphics Algorithms**, Chairman: John Beatty, University of Waterloo

*Trends in Algorithms for Realistic Imagery*, F. Crow, Ohio State University

*Hierarchical Approaches to Hidden Surface Intersection Testing*, N. Dadoun, D. G. Kirkpatrick, U.B.C. & J. P. Walsh, Barron and Associates Acoustical Consultants Ltd.

*Computational Techniques for Parametric Curves and Surfaces*, B. Barsky, UC Berkeley & A. Fournier, University of Toronto

*Efficient Polyhedron Intersection and Union*, W. R. Franklin, Renssellaer Polytechnic Institute.

**3. Speech Synthesis and Understanding**, Chairman: Martin Tuori, Defence and Civil Institute of Environmental Medicine

*Speech Synthesis*, J. Olive, Bell Labs, Murray Hill (presentation only)

*Speech Recognition by Computer: Past, Present and Future*, Ron Cole, Carnegie Mellon University (presentation only)

*Computer Recognition of Plosives in Running Speech*, B. Tang & C. Y. Suen, Concordia University

*A Computational Model of Music Listening*, M. Piszczalski & B. A. Galler, U. of Michigan

**4. Graphics Systems** Chairman: Mark Green, McMaster University

*Business Graphics*, D. Friend, Computer Pictures Corporation (presentation only)

*Graphical Display of the Structural Composition of Chemical Compounds*, W. M. Verbestel, Computer Systems Directorate, Revenue Canada and C. Y. Suen, Concordia U.

*New Techniques for Teaching Musical Performance Skills*, M. R. Lamb, University of Toronto

*SSA/AIDS: A Graphic Interactive System for Structured Systems Analysis*, R. Hoffman, L. N. Harris and B. W. Bickham, Exxon Corporation

*The Graphics Software Family*, M. G. Rawlins, Integrated Software Systems Corporation

**5. Pattern Recognition & Image Processing**, Chairman: John Tsotsos, University of Toronto

*Massively Parallel Computation for Image Processing*, J. Feldman, U. of Rochester (presentation only)

*Global Analysis and Description of the Observable Changes of a Moving Cell*, M. D. Levine & Y. M. Youssef, McGill University

*Linear Quad- and Oct-trees: Their use in Generating Simple Algorithms for Image Processing*, I. Gargantini & Z. Tabakman, U. of Western Ontario

*Curves for Modelling Chromosome Shapes*, C. M. Merritt, NRC, Ottawa.

**6. CAD/CAM**, Chairman: Rich MacKay, Data Plotting Services

*A Computer Aided System for Car Body Design*, Pierre Bezier, Regie Renault (ret.)

*CAD Education: Difficulties, Dangers and Dreams*, Donald Greenberg, Cornell University (presentation only)

*GRIMBI - A Combination of Interactive Graphics Methods and CAD Database Techniques for Functional Modelling*, K. Leinemann, Inst. fur Reaktorentwicklung, Karlsruhe, BRD.

*A Low-cost CAD System for Manufactured Housing*, C. M. Coupal, University of Saskatchewan

*Case Study: an Interactive Design Program for Modular Building Elevations Using A Microprocessor*, D. W. Collins, Concordia University

*DSG: A CAM-oriented Solid Modelling Interface*, F. Arbab, L. Lichten & M. A. Melkanoff, UCLA.

*The Computer Simulation of Meta-structures*, D. W. Collins, Concordia University

*MDM-1: A Computer-aided Mold Design and Manufacturing System*, A. Yajima, H. Jonishi, J. Tsuda & N. Osada, Hitachi Ltd.

**7. Animation & Modelling**, Chairmen: Marceli Wein, NRC; Peter Tanner, NRC

*Was Leonardo da Vinci the First Computer Artist? Computer Animation in the 80's*, J. Rosebush, Digital Effects Inc.

*An Advanced Data Generation System for Use in Complex Object Synthesis for Computer Display*, W. E. Carlson, Ohio State University

*Representation and Control of Complex Animation Figures*, D. Zeltzer, Ohio State

University

*Techniques for Frame Buffer Animation*, K. S. Booth & S. A. MacKay, University of Waterloo

*An Object Editor for a Real-time Animation Processor*, S. P. Ressler, Bell Labs, Murray Hill

*The Simulation of Human Movement*, T. W. Calvert, J. Chapman and A. Patla, Simon Fraser University

*Development of a Low-cost 3-dimensional Computer Graphics Training System*, L. S. Finegold, U.S.A.F. Human Resources Lab, and A. J. Asch, Anthony J. Asch Inc.

**8. Mapping and Spatial Information**, Chairman: John Osbourne, Ontario Ministry of Natural Resources

*Spatial Information Management - A Survey*, M. Tuori, DCIEM

*Microcomputer Based Spatial Information System*, G. Moon & T. Lehan, Collins and Moon Ltd.

*Some Problems Associated with the Use of Colour in Cartographic Displays*, M. W. Dobson, SPAD Systems Ltd.

*Automated Polygon Creation from Dime Network Files*, J.-M. Hynes, U. of Illinois at Chicago Circle.

*Research into an Interactive Spatial Information System*, G. Blair, Collins & Moon Ltd.

*A Graphics Interface to Large, Shared Databases*, M. Friedell, Computer Corp. of America and Case Western Reserve University, J. Barnett & D. Kramlich, Computer Corp. of America.

*A Videodisc-based Terrain Map Display System*, R. D. Rhode, The MITRE Corp.

*On the Use of Fractals for Efficient Map Generation*, F. S. Hill, Jr., & S. E. Walker, University of Mass., Amherst

**9. Human Factors**, Chairman: Martin Taylor, DCIEM

*Artistic Reflections on Man-Machine Interfaces*, D. M. Palyka, NYIT

*Constructing Graphic User Interfaces by Example*, H. Lieberman, MIT

*On the Graphic Design of Program Text*, A. Marcus. Lawrence Berkeley Laboratory, and R. Baecker, Human Computing Resources Corp.

*Colour Principles and Experience for Computer Graphics*, S. Goetz, J. Beatty, & D. J. Rasquinha, U. of Waterloo

*An Information Study of Selection Positioning Tasks*, W. Buxton, U. of Toronto

*Communicating with Computers in Human Terms*, G. Board and J. Scully, Polhemus Nagivation Sciences

*"Visual Thinking" Reconsidered: Some Implications for Computer Graphics*, M. I. Mills, University of Montreal

*Evaluation of Graphics on Videotex by Inexperienced Users*, J. W. Tombaugh, R. F. Dillon & N. Carboni, Carleton University

*The Use of Object Oriented Languages in Graphics Programming*, M. Green and P.

Philp, McMaster U.

**10. Graphics Hardware, Chairman: Dave Finley, NCGA**

*A High Performance Raster Display System*, R. Bates, J. Beck, T. Laskodi, E. Reuss and M. Wells, Tektronix Laboratories, J. Beatty, K. Booth and L. M. Matthies, University of Waterloo

*Dynamically Alterable Vieodisc Displays*, D. S. Backer and S. Gano, MIT

*A VLSI-Based Architecture for Real-time Raster Display of Shaded Polygons*, D. Fussell, U. of Texas at Austin

*Considerations in the Design of a Laster Graphics Systems*, K. Deaton, Innovative Systems Group

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## A Report On The Fourth National Conference Of The CSCSI/SCEIO

by

Gordon McCalla

The 1982 conference was held in Saskatoon, Saskatchewan from May 17-19, 1982. It was the fourth bi-annual conference to be hosted by the CSCSI/SCEIO. Previous conferences were held at the University of British Columbia in Vancouver in 1976, at the University of Toronto in 1978, and at the University of Victoria in 1980. All were very successful in bringing together a wide variety of AI researchers from Canada, the United States, and elsewhere to share ideas, listen to technical presentations and have fun.

Most of the 80 attendees would agree that the 1982 conference was one of the best ones yet. The conference was diversified both in the affiliations of its participants and in the content of its technical program. Further enhancing the conference were six outstanding invited speakers. On the social side there was a reception on Sunday evening, May 16; an excellent banquet at the University Faculty Club on Tuesday evening, May 18; and of course, many vigorous discussions and parties.

What follows is a list of the papers that appear in the Proceedings. Extra copies of the Proceedings are available for $25 (Canadian) prepaid from:

CIPS National Office,
5th Floor,
243 College Street,
Toronto, Ontario,
M5T 2Y1.

## Technical Program

### INVITED TALKS

| | |
|---|---|
| Ron Brachman (Fairchild R & D) | What "isa" Is and Isn't |
| B. Chandrasekaran (Ohio State U.) | MDX and Related Medical Decision-Making Systems |
| Scott Fahlman (Carnegie-Mellon) | Three Flavours of Parallelism |
| Roger Schank (Yale U.) | Looking at Learning |
| Bonnie Lynn Webber (U. of Pennsylvania) | Extended Natural Language Database Interaction (not in Proceedings) |
| Bob Woodham (U. of British Columbia) | Aspects of Computational Vision |

### PLANNING AND PROBLEM SOLVING I

| | |
|---|---|
| David Wilkins (SRI) | Parallelism in Planning and Problem Solving: Reasoning About Resources |
| Arthur Farley (U. of Oregon) | Incremental Planning in a Probabilistic Model for Uncertain Problem Solving |

### PLANNING AND PROBLEM SOLVING II

| | |
|---|---|
| N.S. Sridharan, J.L. Bresina (Rutgers U.) | Plan Formation in Large Realistic Domains |
| Henry Kautz (U. of Toronto) | Planning Within First Order Dynamic Logic |

### COMPUTER VISION AND IMAGE ANALYSIS I

| | |
|---|---|
| Roger Browse (U. of British Columbia) | Interpretation-Based Interaction Between Levels of Detail |
| Jay Glicksman (U. of British Columbia) | Schemata-Based System for Utilising Co-operative Knowledge Sources in Computer Vision |
| Richard Gordon, M.R. Rangaraj (U. of Manitoba) | Expert on Streak Prevention in Image Reconstruction From a Few Views |

COMPUTER VISION AND IMAGE ANALYSIS II

| | |
|---|---|
| Ed Bryant, Brian Funt (Simon Fraser U.) | Feature Constraints for Computer Interpretation of CAT Scan Images of Logs |
| A. Nazek, M.D. Levine (McGill U.) | Segmenting Images of Natural Scenes Using a Rule-Based Low Level Model |
| John Gilmore (Martin Marietta Aerospace) | Syntactic Pattern Analysis as a Means of Scene Matching |

EXPERT SYSTEMS I

| | |
|---|---|
| Rajjan Shinghal (Concordia U.) | An Error Correcting Contextual Algorithm for Text Recognition |
| T. Shibahara, J. Mylopoulos, H.D. Covvey, J. Tsotsos (U. of Toronto) | CAA-A Knowledge Based System with Casual Knowledge to Diagnose Rhythm Disorders in the Heart |
| James Korein (U. of Pennsylvania) | Using Reach Descriptions to Position Kinematic Chains |

EXPERT SYSTEMS II

| | |
|---|---|
| Gordon McCalla, Darwyn Peachey, Blake Ward (U. of Saskatchewan) | An Architecture for the Design of Large Scale Intelligent Teaching Systems |
| Robert Douglass, Stephen Hegner (Los Alamos Labs) | An Expert Consultant for the UNIX Operating System |

REPRESENTATION I

| | |
|---|---|
| L.K. Schubert, M.A. Papalaskaris (U. of Alberta) | Inference, Incompatible Predicates and Colours |
| Robert Mercer (U. of British Columbia) Ray Reiter (Rutgers U.) | The Representation of Presuppositions Using Defaults |
| P. Patel-Schneider, A. Gullen, B. Kramer, Y. Lesperance, H. Meyers, J. Mylopolous (U. of Toronto) | The Procedural Semantic Network: An Extensible Knowledge Representation Scheme |

REPRESENTATION II

| | |
|---|---|
| L.A. Zadeh (Berkeley) | A Computational Approach to Fuzzy Quantifiers in Natural Language |

## THEOREM PROVING AND LOGIC PROGRAMMING

| | |
|---|---|
| E.W. Elcock (U. of Western Ontario) | Goal Selection Strategies in Horn Clause Programming |
| Neil Murray (Le Moyne College) | An Experimental Theorem Prover Using Fast Unification and Vertical Path Graphs |

## LEARNING AND PSYCHOLOGY I

| | |
|---|---|
| Dionysios Kountanis (Western Michigan U.) | A Learning Automaton that Infers Structure from Behaviour |
| Pat Langley, Gary Bradshaw, Herbert A. Simon (Carnegie-Mellon) | Data-Driven and Expectation-Driven Discovery of Empirical Laws |
| Paul Robertson (U. of Texas at Arlington) | Non-temporal Prediction: A Distribution System for Concept Acquisition |

## LEARNING AND PSYCHOLOGY II

| | |
|---|---|
| Larry Rendell (U. of Guelph) | State Space Learning Systems Using Regionalised Penetrance |
| D. Julian M. Davies (U. of Western Ontario) | Emotional Robots will be Almost Human |

## DATA BASES

| | |
|---|---|
| Sanjay Mittal (Ohio State U.) | Event Based Organisation of Temporal Databases |
| Nick Cercone (Simon Fraser U.) Randy Goebel (U. of Waterloo) | Knowledge Representation and Data Bases: Science or Engineering |
| Gian Zarri (CNRS-LISH, Paris) | Differences and Similarities Between Two Inference Modes of the RESEDA System, the "Hypothesis" Mode and the "Transformation" Mode |

## NATURAL LANGUAGE

| | |
|---|---|
| L.K. Schubert (U. of Alberta) | An Approach to the Syntax and Semantics of Affixes in Phrase Structure Grammars |
| {David Maier, Sharon Salvéter (SUNY Stonybrook) | Verbs in Data Bases |
| Jim Davidson (Stanford U.) | Natural Language Access to Data Bases: User Modelling and Focus |

Officials of the Fourth CSCSI/SCEIO Conference:

| | |
|---|---|
| General Chairman: | Gordon McCalla<br>Dept. of Computational Science<br>University of Saskatchewan<br>Saskatoon, Saskatchewan, S7N 0W0. |
| Program Chairman: | Nick Cercone<br>Computing Science Department<br>Simon Fraser University<br>Burnaby, British Columbia, V5A 1S6. |
| Proceedings Editor: | Brian Funt<br>Computing Science Department<br>Simon Fraser University<br>Burnaby, British Columbia, V5A 1S6. |
| Program Committee: | James Allen, (U. of Rochester), Norm Badler (U. of Penn.), Mike Bauer (U. of Western Ont.), Wayne Davis (U. of Alta.), Mark Fox (Carnegie-Mellon U.), Bill Havens (U. of B.C.), Hector Levesque (Fairchild R&D), Charles Morgan (U. of Victoria), John Mylopoulos (U. of Toronto), Zenon Pylyshyn (U. of Western Ont.), Reid Smith (Schlumberger-Doll Res.), Doug Skuce (U. of Ottawa). |

# Graphics Interface '83

**WESTIN HOTEL**
**Edmonton, Alberta**
**May 9-13, 1983**

Contributions are solicited describing research results and applications experience relating to the following areas:

- Man-Computer Interation
- Human Factors
- Graphics Hardware
- Graphics Languages
- Animation
- Graphics Algorithms
- Image Processing
- Speech Processing
- CAD/CAM
- Computer Assisted Engineering
- Videotex
- Business Graphics
- Office Automation
- Mapping and Cartography
- Medical Graphics
- Robotics

500-1000 word summary due before 16 November 1982. Authors will be notifed by 15 January 1983. Full paper due 15 March 1983.

**Send Summaries To:**

Dr. Wayne A. Davis
Graphics Interface '83
Computing Science Department
University of Alberta
Edmonton, Alberta
T6G 2H1
Tel: (403) 432-3976

**Conference and Exhibition Information:**

Graphics Interface '83
CIPS Edmonton
P.O. Box 1881
Edmonton, Alberta
T5J 2P3

Tel: (403) 427-9416

Authors are reminded that if it is desirable to publish the material elsewhere, a summary is sufficient for inclusion in the proceedings. This conference is being held in association with the Canadian Image Processing and Pattern Recognition Society, Edmonton Section CIPS, and other professional societies.

NCGA
National Computer Graphics Association of Canada

Canadian Man-Computer Communications Society

*Canadian Information Processing Society*
*L'Association Canadienne de l'Informatique*

# Seventh International Conference on Pattern Recognition

Montreal, Canada
July 30 - August 2, 1984

## First Announcement

The Seventh International Conference on Pattern Recognition will be held in Montreal, Canada from Monday, July 30 to Thursday, August 2, 1984. The Conference will be of interest to anyone involved in the field of pattern recognition. Tutorials on relevant topics will precede the conference.

**Program**

The Program will consist of poster presentations and poster sessions. Subjects to be discussed include:

Image Understanding and Recognition
Speech Understanding and Recognition
Computer Vision
Image Processing
Robotics
Pattern Analysis
Pattern Classification
Modelling of Human Perception
Specialized Architectures
VLSI Applications
Interactive Systems
Industrial Applications
Biomedical Applications
Remote Sensing Applications

The official language of the Conference is English.

**Call for Papers**

Papers are invited on the above or other subjects of interest, as well as abstracts for poster sessions. Prospective authors should submit four copies of a draft of a full-length paper, or a 250-word abstract for poster sessions, to the address below. Submissions should be made in English. Deadline: November 15, 1983.

The Conference will be held in cooperation with:

International Association for Pattern Recognition (IAPR)
Canadian Information Processing Society (CIPS)
Canadian Image Processing and Pattern Recognition Society (CIPPRS)
Government and Industrial Sponsors

To receive further information, please return the coupon below to:

ICPR Secretariat
3450 University Street
Montreal, Quebec, Canada
H3A 2A7

Telephone: (514) 392-6744
Telex: 05-268510

I am interested in attending the Seventh International Conference on Pattern Recognition. Please keep my name on the mailing list for further information.

**Please print**

Last name

First name

Telephone (area code)

Mailing address

☐ I am interested in submitting a paper / abstract

☐ I will be accompanied

## CANADIAN SOCIETY FOR COMPUTATIONAL STUDIES OF INTELLIGENCE
## SOCIETE CANADIENNE DES ETUDÉS D'INTELLIGENCE PAR ORDINATEUR

CSCSCI/SCEIO is the Canadian society for the promotion of interest and activity in computational studies of intelligence (artificial intelligence). It conducts workshops and national conferences with fully refereed proceedings, publishes a periodic newsletter and coordinates activities with related societies, government and industry.

Researchers are urged to join and participate enthusiastically in the society's activities.

The society is affiliated with the Canadian Information Processing Society and the International Joint Council on Artificial Intelligence.

The officers for 1980-82 are:

**Chairman:**

Nick Cercone
Computer Science Department
Simon Fraser University
Vancouver, B.C. V5A 1S6

**Vice-Chairman:**

Gordon McCalla
Dept. of Computational Science
Univ. of Saskatchewan
Saskatoon, Sask. S7N 0W0

Telephone (306) 343-5503

**Treasurer:**

Wayne A. Davis
Department of Computing Science
University of Alberta
Edmonton, Alberta T6G 2H1

Telephone (403) 432-3976

**Secretary:**

J. Tsotsos
Department of Computer Science
University of Toronto
Toronto, Ontario

Telephone (416) 978-3619

# CSCSI FINANCIAL STATEMENT
## 31 March 1982

| | | |
|---|---|---|
| Balance 31 March 1980 | | $2,606.05 |
| **INCOME** | | |
| 1980 Conference | 379.98 | |
| Proc. Sales | 74.65 | |
| Interest | 508.34 | |
| CIPS, Memb. & Proc. | 1,314.74 | |
| Total Income | | 2,277.71 |
| **EXPENSES** | | |
| March 81 Newsletter | 51.00 | |
| November 81 Newsletter | 225.00 | |
| Sask. Conf. Adv. | 2,000.00 | |
| Total Expenses | | 2,276.00 |
| Balance 31 March 1982 | | $2,607.76 |

| | |
|---|---|
| Bank | $1,567.09 |
| CIPS | 1,040.67 |

W. A. Davis
Treasurer, CSCSI

# CANADIAN MAN-COMPUTER COMMUNICATIONS SOCIETY

# L'ASSOCIATION CANADIENNE DES COMMUNICATIONS ENTRE L'HOMME ET L'ORDINATEUR

CMCCS/ACCHO is the Canadian society for the promotion of interest and activity in man-computer communications and includes: computer graphics, image processing, display systems, raster graphics, computer-aided design, speech processing, interactive techniques, and related fields. It conducts workshops, tutorials and national conferences with fully refereed proceedings, publishes a periodic newsletter and coordinates activities with related societies, government and industry.

Researchers are urged to join and participate enthusiastically in the society's activities.

The society is affiliated with the Canadian Information Processing Society.

The officers for 1981-83 are:

**President:**

Wayne A. Davis
Department of Computing Science
University of Alberta
Edmonton, Alberta T6G 2H1

Telephone (403) 432-3976

**Secretary/Treasurer:**

Fred G. Peet
Pacific Forest Research Centre
506 West Burnside Road
Victoria, B.C. V8Z 1M5

Telephone (604) 388-3811

**First Vice-President:**

Peter P. Tanner
Computer Graphics Section
National Research Council
Ottawa, Ontario K1A 0R8

Telephone (613) 993-2629

**Editor:**

Marceli Wein
Computer Graphics Section
National Research Council
Ottawa, Ontario K1A 0R8

Telephone (613) 993-2629

**Directors:**

Ron Baecker, Human Computing Resources, Toronto
Donald Collins, Concordia University, Montreal
Ugo Lama, Department of Envrionment, Ottawa
T. Rossi, SHAPE Technical Centre, The Hague
Daniel Thalmann, University of Montreal, Montreal
Gordon B. Thompson, Bell-Northern Research, Ottawa

1 Nov 82/WAD
CMCCS.M.FORM

# CMCCS Financial Statement for the Period June 4, 1981 to May 27, 1982

| | | |
|---|---|---|
| Bank Balance June 3, 1981 | | $1,452.27 |
| **Revenue:** | | |
| Refund Cheque from NRC | $ 16.66 | |
| 1981 Conference Cheque from J. Beatty | 5,675.22 | |
| Cheque from CIPS (CMCCS Balance at CIPS as of Sept. 30, 1981) | 2,407.95 | |
| Interest (chequing) | 2.23 | |
| Interest (savings) | 637.84 | |
| 1980 Conference cheque from NRC | 43.91 | |
| | $8,783.81 | |
| **Expenditures:** | | |
| U. of A. Printing Charges | $ 727.50 | |
| Wayne Davis (Travel Expenses) | 79.98 | |
| Bank Service Charges | 0.46 | |
| John Osborne (1982 Conference) | 2500.00 | |
| | $3,307.94 | |

Total CMCCS funds May 27, 1982:
$1,452.27 + 8,783.81 - 3,307.94 = $6,928.14

| | |
|---|---|
| Bank Balance May 27, 1982 | $6,928.14 |

CIPS Account:

The balance of the CMCCS account at CIPS as of September 30, 1981, was transferred to CMCCS. It totaled $2407.95 and included the $1609.95 as of June 3, 1981, in the account given in last year's CMCCS financial statement.

No financial statement has been received from CIPS to cover the period October 1981 to May 27, 1982. Any balance should be positive.

Respectfully submitted,
F. G. Peet,
Treasurer, CMCCS.

## Membership Application

Name________________________________________

Organization____________________________________

Address______________________________________

City__________________Province________________

Postal Code______________Telephone_______________

| | Student | Non-Student |
|---|---|---|
| CIPS member | $3 | $5 |
| Non-CIPS Member | $5 | $8 |

*Please check the correct box above and make a cheque for the correct amount payable to* **CIPS**. *Send this form and cheque to:*

CIPS Membership
CIPS National Office
243 College Street, 5th Fl.
Toronto, Ontario M5T 2Y1
Canada

*Your membership will be valid for one year from the date it is it is received by CIPS.*

*If you are not currently a member of CIPS and would like to join, pay the CIPS member rate and include a request for a CIPS membership form with your cheque.*

*CSCSI/SCEIO* ☐ *CMCCS* ☐