POSI Overview

Andrew Dougherty
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Motivation for FRDCSA

Zero Marginal Cost (ZMC) enables free software to deliver benefits to large numbers of users, only cost is development

How do we maximize the benefits?

General Problem Solving

Computers as theorem provers

How do we maximize solution space?

- Turns out no program can solve all mathematical problems
- But we can find a sequence of programs, each more complete than the next
- This sequence has to eventually increase in size, otherwise, cannot fit the information required

This is the goal of the FRDCSA

Maximizing Software Capabilities

Creating more sophisticated, capable software

- Write it ourselves
- Or, gather and index existing software

FRDCSA takes both approaches

Indexing Existing Software

RADAR/Packager/Architect (the Cluster/Study/Apply (CSA) of FRDCSA)

Make packages of all software

Create a comprehensive ontology (a database of facts) about all free software

Writing Our Own Software

Indexing is necessary, however insufficient

Must write our own software

Many areas (especially “humanitarian”) that needed software

- Doctor software (Akahige)
- Meal planner

Bus planner, Task Manager (Verber/PSE), etc

In all, > 90 internal, > 50 minor codebases

Solve Problems That Affect People

How can we be of the most assistance

- Help people achieve their goals
  - Index their goals
  - Find out what skills they want to learn
- Help them to work collaboratively to complete their goals

Started new meta-project to address these issues

- POSI (POSI Open Source Initiative)

POSI Collaboration Group, Software and Services

POSI is a group that wants to help members achieve their goals through improved collaboration on shared goals and projects

Map out many of the goals of POSI members, their abilities, and their interests, and connect members with others who have the interest and ability to complete shared goals

Mainly meet online

Hanging Out

IRC

VOIP Conferencing

Web UIs

Shared servers

Screen "kibitzing"

Daily IRC meetings

Ad-hoc team assembly

Occasional productivity "competitions" or POSIthons

Simple Example of Goals, Interests and Abilities

Person A

Goals:

- Learn Java
- Purchase new laptop

Abilities:

- Python
- Shell scripting

Interests:

- Biology

Person B

Goals:

- Develop for Android

Abilities:

- Acting
- Java

Interests:

- Teaching: Java

Simple Example of Goals, Interests and Abilities (GIAs)

In reality user probably asserts hundreds or thousands of goals, same for interests and abilities

The software looks at the constraints and helps to start ad-hoc teams to solve problems that are critical to the entire group and also problems that are critical to individual members

How GIAs are Added Example: IRC Interface

User enters:

- "Goal: install gnewsense on a VM"
- "Learn: RDF, OWL-S, Android Development"

Other possible key words (so far):

- done assert skills suggestion feature poll policy goal skill learn project master interests note question study

Flows naturally in conversations:

18:09:54 aindilis what time?
18:10:25 aindilis hmm I don't have all your contact information...
18:10:50 aindilis Goal: periodically upload the contact info of new contacts to all different sites like Facebook, Icedove, etc.

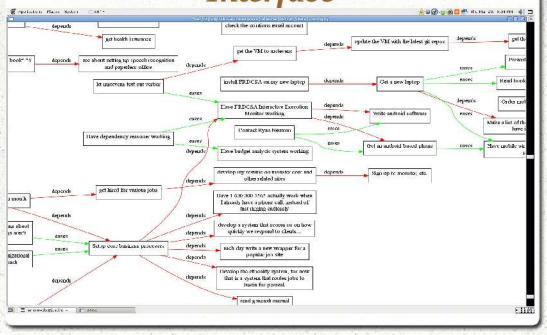
GIAs are Stored in a Knowledge Based System (KBS)

andrewdo@justin:/var/lib/myfrdcsa/codebases/internal$ corpus --senders PSE-X -s . -d 100 -k pse-x
Starting ModManager...
'Get a new laptop'
("eases" "107405" "107420")
("depends" "107407" "107405")
("eases" "107405" "107408")
("depends" "107405" "107409")
("eases" "107405" "107410")
("costs" "107405" "\$400")
("goal" "107405")
("prefer same" "107405" "107408")
'install FRDCSA on my new laptop'
("depends" "107407" "107405")
'Present at Flourish'
("eases" "107405" "107408")
("goal" "107408")
("prefer same" "107405" "107408")
("ethicality-concern" "107408" "evangelism")
'Make a list of the features we want to have in a laptop'
("depends" "107405" "107409")
'Have mobile wireless access through phone'
("eases" "107405" "107410")
("eases" "107411" "107410")
("costs" "107410" "\$60 / mo")
("provides" "107410" "107415")
'Get an android based phone'
("eases" "107411" "107410")
("costs" "107411" "\$200")
("depends" "107412" "107411")
("eases" "107414" "107411")
'Have FRDCSA Interactive Execution Monitor working'
("depends" "107412" "107411")
("depends" "107412" "107413")
("goal" "107412")
("prefer same" "107412" "107416")

POSI Web Interface

- Web-based semantic web like knowledge editor for POSI knowledge
- Additional social networks under development

Priority System Editor Sample Interface



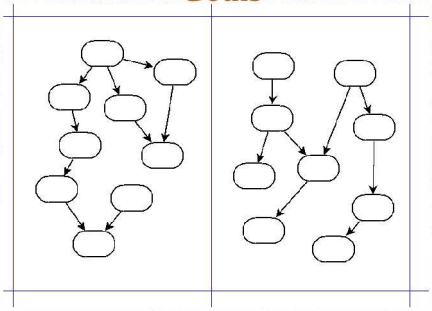
Have a Priority System GUI Editor

- Show completed goals as darkened out
- Enable full text search
- Drop down menus on right click
- Allow persons to lodge disputes about the utility or purpose of a goal
- Real time updating across multiple clients
- Enforce goals as being subgoals of larger goals
- Enable linking goals with various predicates

Goal of Collaboration

- Identify shared goals, both automatically and by the user
- Calculate the relative importance of each goal to the group as a whole, calculated by how much it enables the group to satisfy other goals
- Calculate the relative importance of each goal to each member
- Still need to work out the exact logic

Illustration of Identifying Shared Goals



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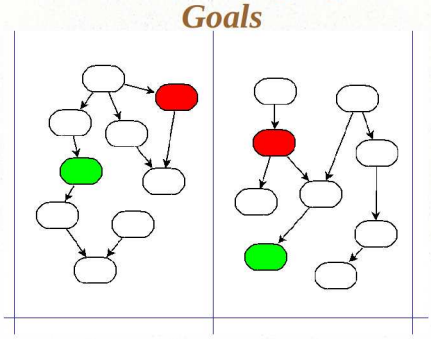

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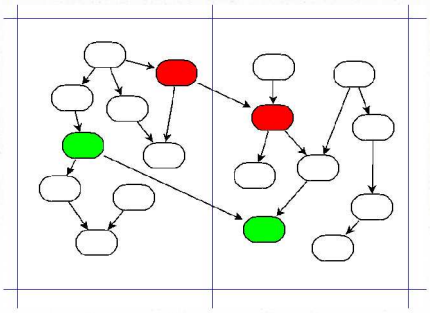

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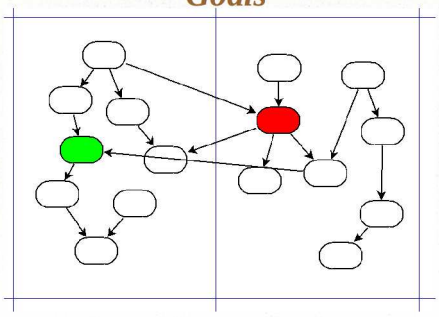

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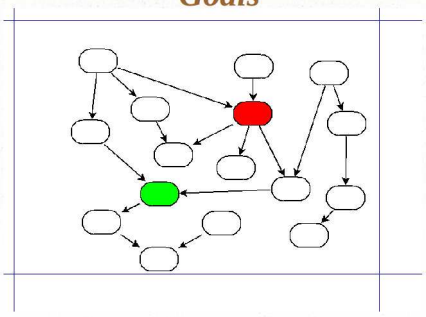

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Identifying Shared (or Repeated) Goals

Goals are expressed in a Natural Language (NL) eg. English: “Install FRDCSA on my new laptop”

Can be translated into logic (not very well yet):

“aindilis: we can mine the projects of members by scraping those sites”

we (x1)', 'mine (e5, x1, x2)', 'project (x2)', 'of (x2, x3)', 'member (x3)', 'by (e5, e6)', 'scrap (e6, x1, x4)', 'site (x4)”

Recognizing Textual Entailment (RTE) identifies goals with the same meaning

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Recognizing Textual Entailment

RTE asks, given two texts, if we assume the first one is true, must the second one also be true?

Example sentence pair:

a) Some plants grow really well in a hydroponic environment, but others do not.

b) Plants are grown in water or in substances other than soil.

In this case, the answer is YES - a entails b

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Determine Who Can Solve Which Goals

We need to:

- Figure out who is competent in what skills
- Who is interested in what subjects
- Who works well with whom

Turns out all of this can be done with Social Network Analysis (SNA)

SNA involves looking at organizations or groups and measuring their characteristics

Experience Modeling System (EMS)

Need to figure out members' abilities

- Directly ask members (web forms, chat bots)
- Have members actively assert them
  - On IRC:
- Determine abilities from available data

EMS Gathers Information About Member's Abilities

Pre-formatted or extracted ability data

- Resumes and cover letters
- Online skill profiles

Inferred ability data

- Automatically analyze text (emails, status updates (tweets/facebook), IM/IRC chats, web pages, documents, deliverables, etc)
- Other methods (please suggest)

Ability Extraction from Text

Use Wikipedia, Library of Congress subject hierarchy, subject ontologies, resume and position datasets, skills inventories, etc, to develop a model of what terms are used in which area

Use Bayesian inference or other techniques to figure out which skills the user is probably familiar with based on which terminology they use

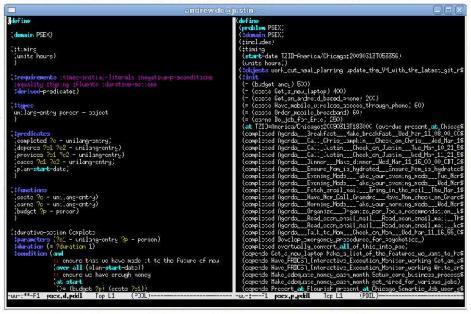
Planning for Collaboration

POSI has an advanced Project Management system

Based on the FRDCSA systems Verber/PSE

All these constraints on who knows what, who is interested in what, who has what goals, deadlines, duration of events, members calendars are fed into a temporal planner, and the resulting possible choices are returned

Verber Domain and Problem Specs



Verber/PSE vs. Bug Tracker

Similarities

- Due dates
- Task status
- Assignees
- Project

Differences

- Verber has
  - Temporal planner
  - Logic and rules
- Verber will have
  - Translation of goal text into logic
  - Interactive Execution Monitor
  - GUI editor for task dependencies

Verber

More information is available from:

http://frdcsa.org/~andrewdo/writings/semweb.odp

http://frdcsa.org/~andrewdo/writings/semweb.pdf

Concerns with POSI in General

HUGE privacy concerns

All this information can and will be used against members, if they do not secure the information

Solution:

- distribute the POSI code to each user, anonymize it, set up privacy controls, and so on
- put users themselves in control of the data (on their local machines) and use peer to peer, encrypted, deidentified etc techniques

Conflict Resolution

Develop sophisticated techniques for resolving resource conflicts, identifying false conflicts

Allow people to dispute goals (i.e. that marginalize them for instance)

FRDCSA Revisited

FRDCSA is the middleware that runs POSI

Consists of over 90 internal (relatively major) codebases and maybe 50 minor, along with hundreds of external codebases (acquired from the web)

10 year old project with lots of cumulative development

More info:

http://frdcsa.org

http://frdcsa.onshore.net/frdcsa

Job-Search

One of the FRDCSA internal codebases

Helps free software developers be financially stable and thus able to work on free software

Spidered Craigslist, resumeXML generation

Will use Experience Modeling System when that's complete

Developed a resume matcher that matches users with jobs they can perform, also will suggest in-demand skills they can learn

POSIC

Job-search was a popular software/service, decided to turn it into a consultancy

Hence POSI Consultancy = POSIC

POSIC is therefore a business which supports POSI and free software in general

POSI is free software, hence POSIC and others can use it

Help developers find projects that pay them to extend their projects

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Intelligent Tutoring Systems

Long tradition of research in developing automated tutors for subjects

Develop fine-granularity models of exactly what the person knows

Based on what they know and what they want to know, compute a lesson plan

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System-X Intelligent Tutor

POSI helps connect learners with teachers, or if none exist, teach the subject with System-X

Develops a large library (mainly using text summarization of existing online learning resources) of learning materials

Uses CLEAR to read learners the texts

Assesses understanding through tests

Records results in Experience Modeling System

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Conclusion

FRDCSA is a 10 year old project developing Friendly Artificial Intelligence

POSI is a group that tries to identify and satisfy fine-grained goals of it members through collaboration and ad-hoc team creation

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Availability

POSI uses FRDCSA as the middleware

Unfortunately, FRDCSA has not been released

Need to clean it up (license compliance, personal information removal) before release

Is available to checkout on GIT for people interested in using it/helping to clean it up

Very capable system

10 GB without datasets, 100 GB with

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Ways to Succeed with POSI

Get an account on posithon.org (has copy of FRDCSA)

Visit website (http://posithon.org) and read up

Join #posi channel (on irc.freenode.net) and record statements about what you'd like to learn, your skills, goals, and interests

Join mailinglist (link on website)

Record intentions about how to improve POSI to meet your needs and talk to existing members

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Ways to Succeed with POSI

If you are a developer, consider:

- Work on few remaining bugs with IRC bot
- Developing software for extraction of skills from text
- Develop Java or otherwise (perhaps Processing?) GUI for Shared Task Manager / Priority System Editor
- Figure out how to use POSI software to meet your own software development needs
- Suggest new development projects

POSI-Chicago Meeting (Immediately following this talk)

We will be meeting at the POSI/FRDCSA booth after this talk (10:50 am)

Come see what's going on and/or sign up to the mailing list

The End - Questions?

More information is available online at:

- http://posithon.org
- http://frdcsa.org

Thank you !!!