Travel Report

Project Quixote

16 February, 2011

Travel Details

Destination

Universidade do Minho (UM),
Portugal

Date

03-16 February, 2011

Visitors

Mario Marcelo Berón, Universidade Nacional de San Luis (Argentina)

Travel Purpose

The purpose for this visit was to follow up the project "Quixote - Desenvolvimento de Modelos do Domínio do Problema para inter-relacionar as Vistas Comportamental e Operacional em Sistemas de Software".

Financial Support / Grant

This visit was supported by:

- FCT – Departamento das Relações Europeias, Bilaterais e Multilaterais

- MinCyT – under contract PO/09/38.

Travel Report synthesis

Aims & Objectives

The specific objectives for this travel were:

- to discuss all the basic readings done by both partners about ontologies and their role for program comprehension (PC) ;

- to follow up the work on PC tools under development by Argentina partner;

- to follow up other projects undergoing in both labs;

- to create the project webpage;

- to continue the writing of the joint paper started during last visit (to submit to ICPC2011 as a poster, and as full paper to somewhere else);

- to participate in the workshop about ontologies Ontulia;

- to setup the future research directions.

Achievements

The objectives above were fulfilled:

- Quixote webpage was created and published at `www.di.uminho.pt/~gepl/QUIXOTE`.
  Moreover, BORS/SVS project webpage, and Mario's homepage were also created and published; see at `www.di.uminho.pt/~gepl/BORS-SVS` and `www.di.uminho.pt/~gepl/mmb`.

- We listened to Mario that reported the work done by two Argentinean M.Sc. students:

  - José Albanes, del Instituto Universitario de San Martín (provincia de Mendoza), that is working on *El Análisis Comportamental como una Estrategia para Mejorar la Comprensión de Programas.* The main goal is to instrument Java source code to extract dynamic information—runtime traces corresponding to different use-cases—to compare these traces looking for similarities between them in order to recognize super use-cases that abstract the commonalities between the cases analyzed.
    this work is in the start phase (state-of-the-art research);

- Martín Aristarain, del Instituto Universitario de San Martín (provincia de Mendoza), that is starting the work on *Incrementando la Semántica de la Herencia en Lenguajes Orientados a Objetos.*
  The main goal is to analyze the source code in order to improve *multiple-inheritance* mechanisms, detecting possible optimizations like *removing useless multiple definitions* of methods and attributes.
  The student wrote an article with his ideas and the actual project status; based on that material he sent us, we could assess and approve the work he did so far.
  Assessment: the student is doing a very good work; he revealed a good knowledge in the area and a great enthusiasm concerning the topic he chose.
  Recommendations: to carry on working in this project, starting with a deep and large research on the actual implementation of multiple-inheritance in current OO-languages.

- We listened to Mario that reported the work done by three Argentinean undergraduate students:

  - Ignacio El Kadre, working on (graduation project) *Symbol Table Visualization and Ontological Navigation for Java programs.*
    The original proposal is to extract a complete identifier table from Java programs to create a user friendly visualization to display it then identifiers should be mapped to the concepts and relations defined by the language ontology. A navigation feature over that mapping should be provided in order to improve the program comprehension process.
    Assessment: the student is doing a good work.
    Recommendations: downsize the work in order to deal only with a subset of Java; use the graphical library ZGR.

  - Enrique Miranda, working on (graduation project) *Evaluación de Funcionalidades de Visualización de Software provistas por Librerías Gráficas.*
    Assessment: the student has proposed three criteria to assess visualization systems (the support to cognitive models, views, and requirements); actually he has worked hardly and attained valuable results.
    Recommendation: to read Stasko's famous book; apply his criteria to 3 case-studies (IdTab, Language Ontology, and IdTab-

Onto Mapping, according to Ignacio project) and 4 Visualization Systems in order to build a Comparative Table.

– Hernán Bernardis, working on (graduation project) *Extracción de Información Dinámica en Programación Orientada a Objetos.*
The project aims at porting PICS instrumentation strategy from C to Java. The goal is to provide a tool to extract by inspection dynamic information from object-oriented (Java) source code. This information will be used to build relations between program and problem domains.
Assessment: the student chose AnTLR to work with a Java grammar and until now he defined instrumentation schemas over that grammar; he is doing a good/promising work.
Recommendations: the next suggested step should be the complete documentation (maybe using JavaDoc) all the work (schema definitions) so far done.

– Mariano Luzza, working on (graduation project) *Lenguajes Específicos del Dominio Visuales.*
The project started with a study about the domain specific languages and visual languages. The objective is to create a visual tool for teaching programming concepts to young students.
Assessment: the worked reported by the student just describes the state-of-the-art research done; although not demonstrated, it is supposed to have developed a tool prototype; he is doing a promising work.
Recommendations: we suggest a target change; instead of looking for a pedagogical language, it would be very convenient if the student define a DSL to describe the navigation over Quixote Ontologies.

- Three other proposals were sketched and assigned:

  – to **Cláudio Baieli**, we suggested the M.Sc. project: *Análisis de Técnicas de Resumen de Trazas de Ejecución.*
  The main idea is to collect several execution traces in order to detect software components.

  – to **Javier Azcurra**, we suggested the graduation project: *Identifier Analysis to abstract problem domain concepts.*
  Given a domain ontology and an identifier, the objective is to find ontology concepts that can be associated with that identifier

according to a similarity function. This function is not based just on lexical analysis but also on contextual information.

- – to **Maria Matkovic**, we suggested the graduation project: *Program Domain Specification using Ontologies, an exercise to explore* Protégè.

  The objective of this project is two fold: on one hand, we aim at building an ontology to describe a programming language, Java in this case, the underlying concepts and its constructors; on the other hand, we need to install Protégé and explore as much as possible the tool and OWL (as it is Quixote's elected notation to write ontologies), as well as Description Logic, DL, the logical language chosen to write the properties and reason about the universe described by the ontology.

- We listened to three Portuguese M.Sc. students:

  - – Márcio Coelho, working on *Program Verification and Verification Conditions Generator*.

    This topic raised up a fruitful and interesting discussion on Programa Verification and design-by-contracts.

  - – José Luís Freitas, working on *Comment Analysis for Program Comprehension*.

    Many ideas and suggestions in the context of Quixote were proposed and discussed; the next step for this project is to collect all the comments; then comments will be associated with program locations and related to identifiers in the IdTab.

  - – Miguel Regedor, working on *Analysing and Measuring Open Source Projects, state-of-the-art*.

    This topic raised up, again, a intensive and fruitful discussion on: the systematic use of open source software for systems development; and on software metrics and quality assessment.

- We also discussed with Nuno Carvalho (a MAPi student) his Ph.D. thesis proposal that will be co-supervised by Maria João, and has Mario Berón as external-advisor. The proposed work is concerned with the use of an Ontology tool-box for the Problem-Domain specification under Program Comprehension environment, and his of course closely related with Quixote aims.

  After discussing basic ideas and approaches (as sketched in Nuno's working plan), we decided to invite Nuno to join us writing a poster proposal to submit to ICPC'2011.

- We reviewed the last English version of Mario's Ph.D. thesis, and printed it to apply for a Portuguese doctoral degree at UM.

- We discussed and settle down a proposal to apply for a post-doc position for Mario Berón, with the title *Desarollo de Métodos, Técnicas e Herramientas basados en Ontologias para Facilitar a Comprensión de Programas*; this task was implemented in the form of a paper to submit to WICC'2011.

- We finished the poster to submit to ICPC'2011.

Besides this, the Quixote team attend a Workshop on Ontologies, Ontúlia'2011, where three of us (namely, Pedro Rangel Henriques, Mario Berón, and Nuno Oliveira) presented different talks concerned with applications of Ontologies to the fields of Sites Generation, Program Comprehension, and Grammar Engineering.
The title and slides of those talks can be found on the Ontúlia's webpage at `http://eremita.di.uminho.pt/~nrc/ontulia/doku.php`.

Future Research Steps

As an immediate consequence of all the work done and decision taken, above listed, the team members will supervise all the work under-development, looking to the specific task of each student, but without forget the main goal: to improve program comprehension.
The interface between under-graduate and graduate projects should be carefully planned in order to build an integrated system that actually contributes to improve PC according to Quixote approach; in this way we will attain at the end of the project its objectives.

Next meetings

We planned a visit to Argentina (2 team member, 8days) between September and November; and a visit to Portugal (Mario Berón, 15days) during January.