



Research plan for 2014

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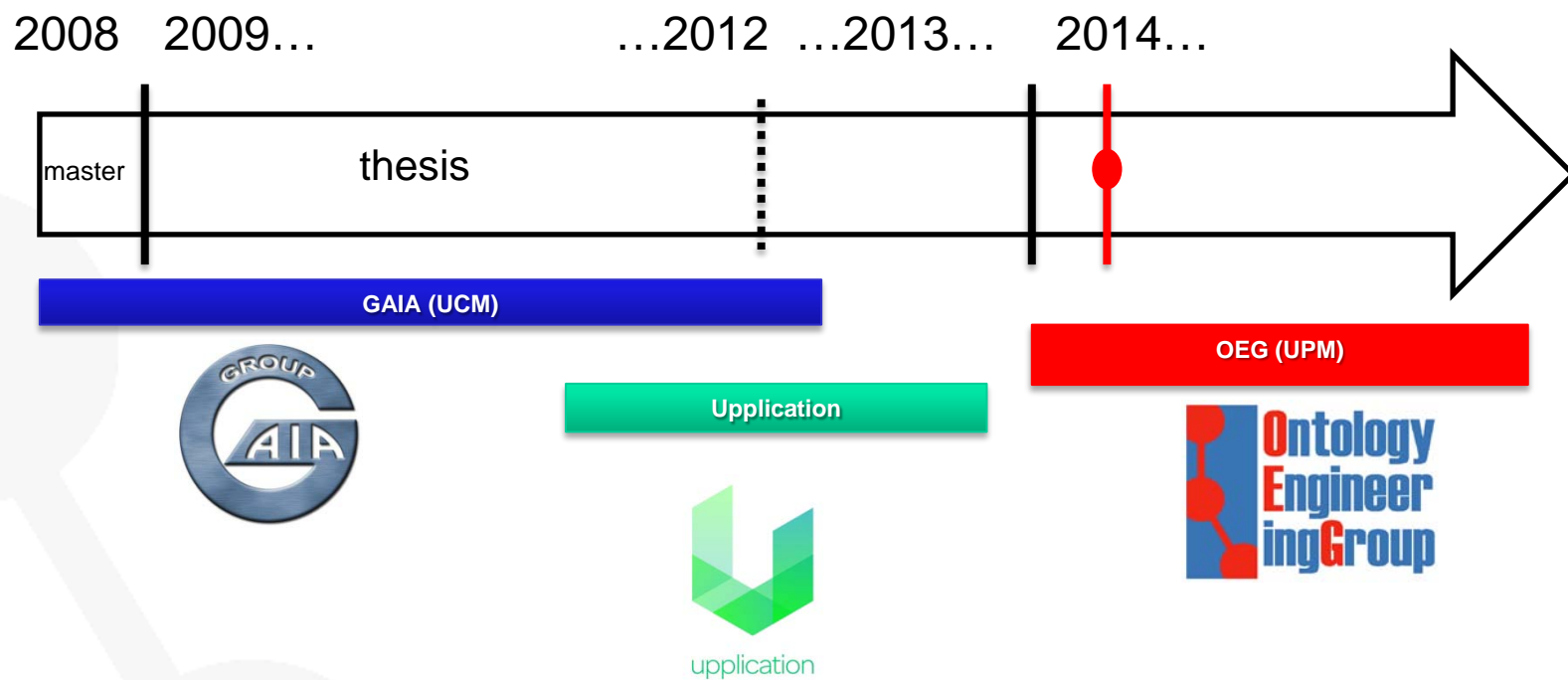
Ontology Engineering Group
Artificial Intelligence Department
Universidad Politécnica de Madrid (UPM)

- Background
 - The PhD
- My current activities
 - What have I done so far?
 - Next steps



The PhD...

Background



“Estrategias de recomendación basadas en conocimiento para la localización personalizada de recursos en repositorios educativos”

- Supervisors

Mercedes Gómez Albarrán & Guillermo Jiménez Díaz

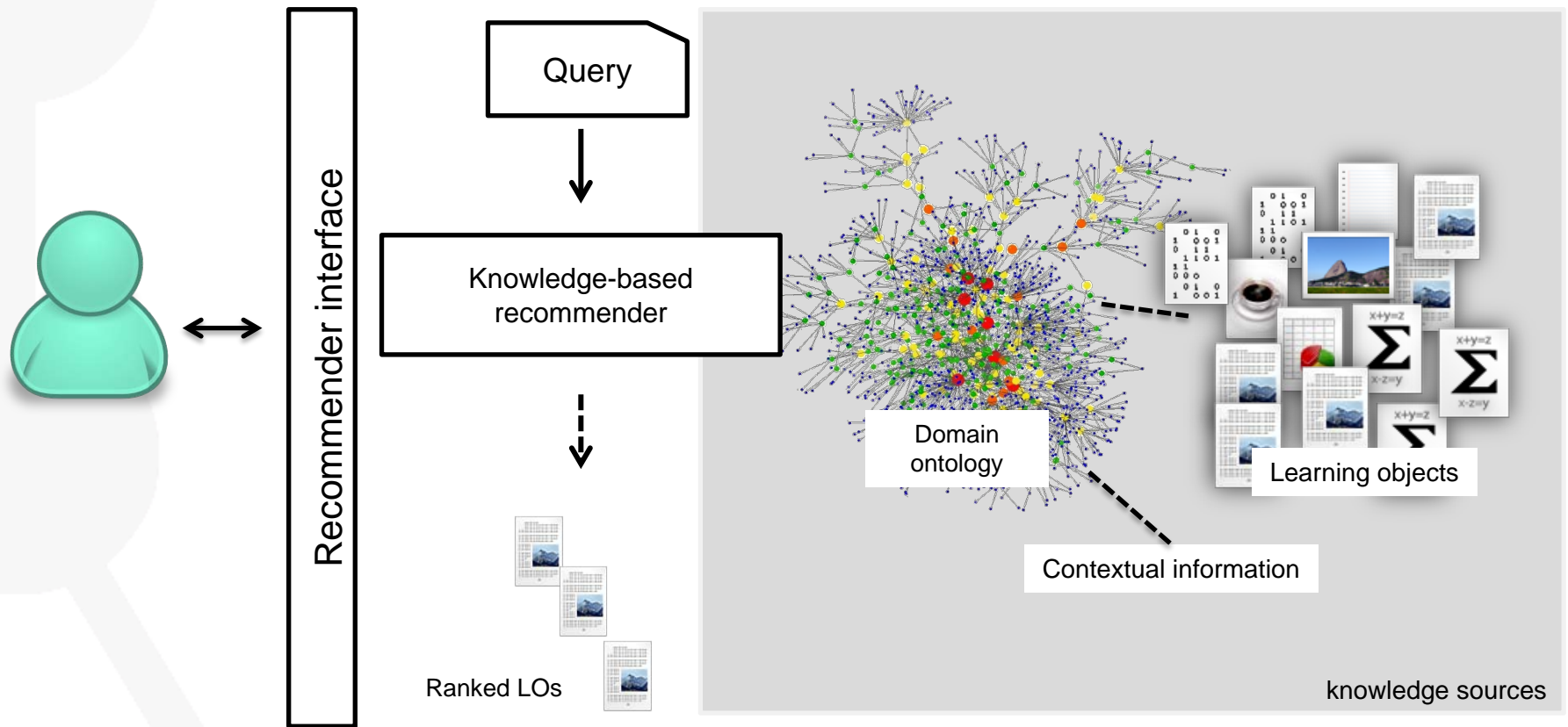
📄 PDF <http://bit.ly/1pyKmaH>

📄 slides <http://slidesha.re/1mLldrP>

- Open Educational Repositories (OERs)
 - Information overload
 - Educational resources adapted to the student's learning needs
 - A restricted number of Learning Objects (LOs) and diversity in the proposals
 - Reduce the amount of effort
- Challenge
 - Provide smart support for accessing to the LOs that are in repositories

- A knowledge-based recommendation strategy that enhances a user's OER repository search experience
 - Context-aware
 - Diversity in the recommendation
 - Proactive interaction

- Three alternative knowledge-based strategies
 - a) Personalization
 - b) Overspecialization (or lack of diversity)
 - c) Facilities in the user interaction



- Framework for the rapid prototyping of knowledge-based recommender systems



<http://bit.ly/1dRfoZs>

- Recommendation scheme of five stages
- Configure and adapt each stage to build different recommenders



The Post-doc

My current activities

- Dr Inventor Project

- <http://drinventor.eu/>



- Promote scientific creativity by utilising web-based research objects
 - A personal research assistant will provide hints to researchers
 - Applied to the Computer Graphics domain

Name	Country
UNIVERSITY OF BEDFORDSHIRE (Coordinator)	United Kingdom
UNIVERSITAT POMPEU FABRA	Spain
UNIVERSIDAD POLITECNICA DE MADRID	Spain
NATIONAL UNIVERSITY OF IRELAND MAYNOOTH	Ireland
BOURNEMOUTH UNIVERSITY	United Kingdom
ANSMART LTD	United Kingdom
IMAGEMETRY S.R.O.	Czech Republic
INTELLIXIR SARL	France

- Semantic Technologies for Exploring Research Objects
 - Build a repository for indexed ROSs
 - Provide techniques for ontology learning
 - Provide techniques for ontology matching
 - Provide mechanisms for personalised recommendation of research objects

- Provide support on the final selection of the scientific discourse ontologies to be used for annotation
- 📄 “A review of ontologies for describing scholarly and scientific documents”, submitted to SePublica 2014
- A first version of the ontology for describing the scientific discourse
 - <http://purl.org/drinventor/sci-doc>

- Document structure
- Rhetorical elements
 - Scientific discourse
- Bibliographies and citations

Towards an annotation schema for Dr Inventor

Document Structure

<http://purl.org/spar/doco>

title

list of authors

figure

section

bibliography

table

D.Garjio, et al., Common motifs in scientific workflows: An empirical analysis, Future Generation Computer Systems (2013), In press.

Common motifs in scientific workflows: An empirical analysis

Daniel Garjio, Pinar Alper, Khalid Belhajjame, Oscar Corcho, Yolanda Gil, Carole Goble

Ontology Engineering Group, Universidad Politécnica de Madrid, Spain
School of Computer Science, University of Manchester, United Kingdom
Information Sciences Institute, Department of Computer Science, University of Southern California, United States

Abstract. Workflow technology continues to play an important role as a means for specifying and enacting computational experiments in modern science.....

Keywords. Workflow motif, Workflow pattern, Taverna, Wings...

1 Introduction

A scientific workflow is a template defining the set of tasks needed to carry out a computational experiment [1].....

In this paper we present the result of an empirical analysis performed over 280 workflow descriptions from Taverna [2], Wings [3], Galaxy [4] and Vistrails [5]. Based on this analysis, we propose a catalog of domain independent conceptual abstractions for workflow steps that we call scientific motifs.....

The new contributions reported on in this paper are an extension of the related work in Section 2, the addition and extension of scientific domains from Wings and Taverna workflows (Social Network Analysis, Astronomy and Domain Independent) in Sections 3 and 5; and the analysis of workflows from the Galaxy and Vistrails systems among different domains (Genomics, Text Mining, Domain Independent and Medical Informatics). Finally, we have also revisited the motif catalog (Section 4), our previous results (Section 5) and conclusions (Section 7) according to our new findings. This paper extends our previous work [12], which performed an analysis of 177 workflows from Wings and Taverna

2 Related work

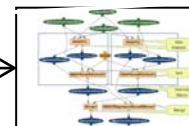
3 Analysis setup

3.2 Approach for workflow analysis

Our analysis has been performed based on the documentation, metadata and traces available for each of the workflows within the cohort studied.....

Workflow	Tasks	Inputs	Outputs	Size
Galaxy	10	10	10	10
Wings	10	10	10	10
Taverna	10	10	10	10
Vistrails	10	10	10	10

4. Scientific workflow motif catalog for abstracting workflows



7 Conclusions

In doing so, we have defined a catalog of motifs distinguishing Data-Operation motifs, which describe the tasks carried out by the workflow steps, from Workflow-Oriented motifs, which describe the way those tasks are implemented within the workflow.....

As part of our future work, we envisage deriving best practices that can be used in workflow design and providing tools that assist users in automatic workflow annotation using our Motif Ontology.....

Acknowledgments

This research was supported by the...

References

- [1] Ewa Deelman, Dennis Gannon, Matthew Shields, Ian Taylor.....
- [2] Katherine Wolstencroft, Robert Haines, Donal Fellows, Alan Williams, ...
- [3] Yolanda Gil, Varun Ratnakar, Jihie Kim, Pedro A. González-Cabrero, Paul T. Groth.....
- [4] Jeremy Goecks, Anton Nekrutenko, James Taylor, Galaxy: a comprehensive.....
- [5] Carlos E. Scheidegger, Huy T. Vo, David Koop, Juliana Freire, Claudio T. Silva.....
- [6] Bertram Ludäscher, Ilkay Altintas, Chad Berkley, Dan Higgins, Elrat Jaeger, Matthew Jones, Edward A. Lee, Jing Tao, Yang ...
- [7] Thomas Fahringer, Radu Prodan, Rubing Duan, Jürgen Hofer, Farrukh Nadeem.....
- [8] Jia Zhang, Wei Tan, J. Alexander, I. Foster, R. Madduri, Recommend-as-yougo.....
- [12] Daniel Garjio, Pinar Alper, Khalid Belhajjame, Oscar Corcho, Yolanda Gil, Carole Goble, Common motifs in scientific workflows: an empirical analysis, in: 8th IEEE International Conference on eScience 2012, Chicago, IEEE Computer Society Press, USA, 2012.

Towards an annotation schema for Dr Inventor

Scientific Discourse

Scientific Documents

<http://purl.org/drinventor/sci-doc>

hypothesis

goal

Discourse Elements Ontology

<http://purl.org/spar/deo>

background

contribution

conclusion

future work

Common motifs in scientific workflows: An empirical analysis

D.Garijo, et al., Common motifs in scientific workflows: An empirical analysis, *Future Generation Computer Systems* (2013). In press.

Daniel Garijo, Pinar Alper, Khalid Belhajjame, Oscar Corcho, Yolanda Gil, Carole Goble

Ontology Engineering Group, Universidad Politécnica de Madrid, Spain
School of Computer Science, University of Manchester, United Kingdom
Information Sciences Institute, Department of Computer Science, University of Southern California, United States

Abstract. Workflow technology continues to play an important role as a means for specifying and enacting computational experiments in modern science.....

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1 Introduction

A scientific workflow is a template defining the set of tasks needed to carry out a computational experiment [1]

..in this paper we present the result of an empirical analysis performed over 260 workflow descriptions from Taverna [2], Wings [3], Galaxy [4] and Vistrails [5]. Based on this analysis, we propose a catalog of domain independent conceptual abstractions for workflow steps that we call scientific workflow motifs.

As new contributions reported on in this paper are an extension of the related work in Section 2, the addition and extension of scientific domains from Wings and Tavera workflows (Social Network Analysis, Astronomy and Domain Independent) in Sections 3 and 5; and the analysis of the related work in Galaxy and Astralis systems among different domains (Genomics, Mining, Domain Independent and Medical Informatics). Finally, we have also visited the motif catalog (Section 4), our previous results (Section 5) and conclusions (Section 7).

According to our new findings:

- This paper extends our previous work [12], which performed an analysis of 11 workflows from Wings and Tavera

2 Related work

3 Analysis setup

3.2 Approach for workflow analysis

Our analysis has been performed based on the documentation, metadata and traces available for each of the workflows within the cohort study.

Workflow	Max. size	Min. size	Avg. size
Drug discovery	10	1	7
Annotation	10	1	7
Recombination	12	1	7
Chemoinformatics	20	1	6
Genetics	11	1	6
Cell information	14	1	6
Text analysis	15	1	6
Total network analysis	7	2	5
Medical informatics	20	1	5
Security information	20	1	5

4. Scientific workflow motif catalog for abstracting workflows

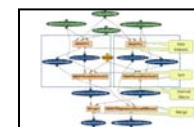


Fig. 1. Sample motifs in a Wings workflow fragment for drug discovery. A comparison analysis is performed on two different input datasets (SMAPV2). The results are then sorted (SMAPResultSorter) and finally merged (Merger, SMAPAlignmentResultMerger).

7 Conclusions

In doing so, we have defined a catalog of motifs distinguishing Data-Operation motifs, which describe the tasks carried out by the workflow steps, from Workflow-Oriented motifs, which describe the way those tasks are implemented within the workflow.

As part of our future work, we envisage deriving best practices that can be used in workflow design and providing tools that assist users in automatic workflow annotation using our Motif Ontology.

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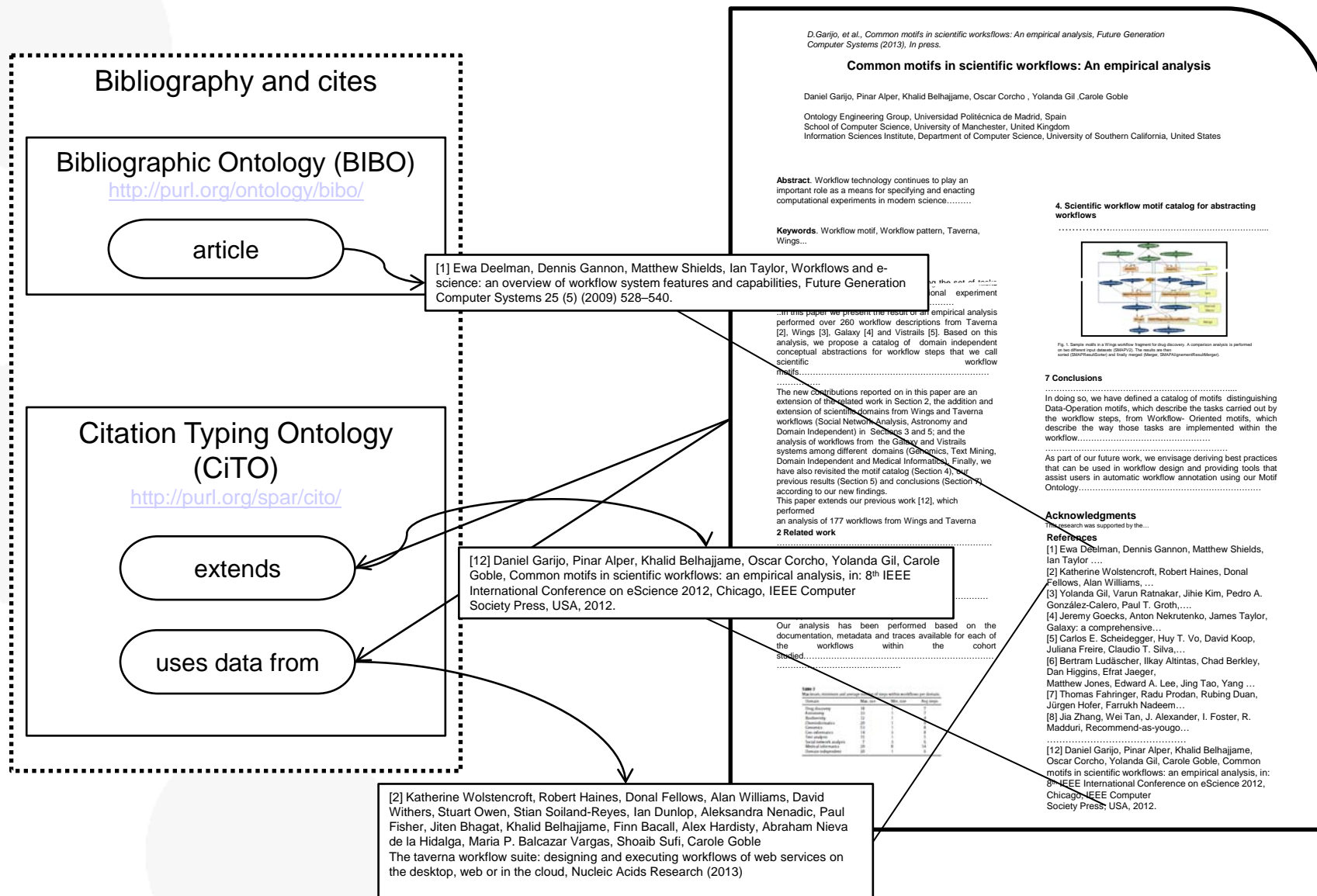
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- [1] Ewa Deelman, Dennis Gannon, Matthew Shields, Ian Taylor ...
- [2] Katherine Wolstencroft, Robert Haines, Donal Fellows, Alan Williams, ...
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- [4] Jeremy Godes, Anur Nektuneko, James Taylor, Galaxy: a comprehensive ...
- [5] Carlos E. Scheidegger, Huy T. Vo, David Kopp, Juliana Freire, Claudio T. Silva, ...
- [6] Michael Fischer, Ilkay Altintas, Chad Berkley, Dan Higgins, Eder Isseger, ...
- [7] Matthew Jones, Edward A. Lee, Jing Tao, Yang ...
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- [9] Ja Zhang, Wei Tan, J. Alexander, I. Foster, R. Madduri, Recommended-ay-yogo ...
- [10] ...
- [11] ...
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Towards an annotation schema for Dr Inventor



3D Morphable Model Construction for Robust Ear and Face Recognition

Method (sci-doc) /// FutureWork (deo) /// Results (deo) /// Contribution (sro) /// Background (sro) /// Discussion (sro) /// Motivation (sro) /// Conclusion (sro)

3D Morphable Model Construction for Robust Ear and Face Recognition

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Abstract

Recent work suggests that the human ear varies significantly between different subjects and can be used for identification. The paper describes work that investigates this hypothesis using an approach based on the construction of a 3D morphable model of the head and ear. One issue with creating a model that includes the ear is that existing training datasets contain noise and partial occlusion. Rather than exclude these regions manually, a classifier has been developed which automates this process. When combined with a robust registration algorithm the resulting system enables full head morphable models to be constructed efficiently using less constrained datasets. The algorithm has been evaluated using registration consistency, model coverage and minimal-ism metrics, which together demonstrate the accuracy of the approach. To make it easier to build on this work, the source code has been made available online.

1. Introduction

In the field of face recognition, morphable modelling has been used very effectively to identify people under relatively unconstrained settings [6]. However, evaluations of these techniques show that there is still significant scope for improvement [18]. One possibility is to include additional recognition features. The ear is particularly suitable for this purpose as it has a wide variation in appearance between individuals and, like the face, is recognisable at a distance. It also has some advantages over the face in that its appearance does not alter with expressions, is rarely disguised by makeup or cosmetic surgery, and is believed to remain similar in appearance with age.

Earlier work has confirmed the ear as a viable feature for recognition using two dimensional techniques [10] [11] [1] [13]. However, results are sensitive to large pose or lighting changes so an alternative approach based on the construction of a morphable model of the face and ear is now being investigated.

Existing morphable models of the head have focused on the face and implicitly or explicitly avoided accurate ear reconstruction [5] [2]. As a result, range scan data of the ear is generally of lower quality and less complete than that available for the face [21]. This neglect of the ear is partly due to the challenge of modelling its more detailed and self occluding structure. In addition, ears have not been a priority in existing work as they are not generally used by humans for recognition.

The main contribution of the work described here is a novel technique for the morphable model construction of a face profile and ear using noisy, partial and occluded data. The resulting system is the first developed for modelling the three dimensional space of ear shapes. The model is constructed by registering a generic head mesh with 160 range scans of face and ear profiles. Occluders and noise are identified within the scans using an automated classifier. The remaining valid regions are then used to register the mesh using a robust non-linear optimisation algorithm. Once registered, the scan orientations are normalised and then used to construct a linear model of all head shapes.

The next section summarises relevant existing work on morphable model construction and the representation of ears in those models. This is followed by a discussion of how the fitting problem can be formalised and the technique is then described in detail. Particular attention is given to the automated process for removing noise and occlusions in the training data. Finally, an evaluation section describes how three model metrics are measured and summarises the experimental results obtained. The paper concludes with proposals for future work. The algorithms used in this paper are available through the project website [9].

2. Related work

In 1999, Blanz and Vetter created the first 3D morphable model [7]. It was constructed from over 200 cylindrical range and colour scans of male and female heads, registered with each other using an optical flow algorithm. The model was constructed using the mean of these values and their first 90 eigenvectors calculated using PCA (principal component analysis).

Figure 1. This image is of the base mesh, cleaned scan and fitted model for the technique used by Amberg et al. [3] It shows that the ear is not affected by the range scan and retains the shape

- Improve the ontology for describing the scientific discourse
- Build a semantic repository of indexed ROSs
 - Computer Graphics
- Personalised Recommendations of ROSs

Thank you!





Research plan for 2014

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