

A Domain Ontology for CoRoT Data Analysis

Lucélia de Souza (UNICENTRO, UFPR) Dra. Maria Salete Marcon Gomes Vaz (UEPG, UFPR) Dr. Marcelo Emílio (UEPG) Dr. José Carlos Ferreira da Rocha (UEPG)

24 de outubro de 2012

São Paulo Semantics Session IVOA Meeting



Summary

1 INTRODUCTION

2 OBJECTIVE

3 ONTOLOGIES AND SEMANTIC PROVENANCE

4 DEVELOPMENT OF A DOMAIN ONTOLOGY

5 USE OF A PROVENANCE MODEL

6 CONCLUSIONS AND FUTURE WORKS



CoRoT Data Analysis - Exoplanet Field

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMEN OF A DOMAIN ONTOLOGY

USE OF A PROVENANC MODEL

CONCLUSIONS AND FUTURE WORKS In CoRoT data analysis process, some exoplanet search algorithms requires detrend algorithms as a pre-processing before running. Different detrend and transits detect algorithms can be applied to the same database.



Fig. 1: Corot Data Analysis [The Authors].

▲ロト ▲冊 ▶ ▲ ヨ ▶ ▲ ヨ ▶ ● の Q @



CoRoT Data Analysis - Exoplanet Field

Flexible Image Tranport System (FITS)

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMEN OF A DOMAIN ONTOLOGY

USE OF A PROVENANC MODEL

CONCLUSIONS AND FUTURE WORKS

	MAN	IDATORY FI	TS KEYWO	RDS	
ALL HDUs	Array HDUs *	Conforming Extension	ASCII Table Extension	Binary Table Extension	Random Groups Records
DATE ORIGIN BLOCKED ** AUTHOR REFERENC COMMENT HISTORY DATE-OBS TELESCOP INSTRUME OBSERVER OBJECT	BSCALE BZERO BUNIT BLANK CTYPEn CRPIXn CRVIXn CROTAN CRVALn CDELTn DATAMAX DATMIN	EXT EXTVER EXTLEVEL	TSCALn TZEROn TNULLn TTYPEn TUNITn	TSCAKn TZEROn TNULLn TTYPEn TUNITn TUNITn TDISPn TDIMn THEAP	PTYPEn PSCALn PZEROn
EQUINOX EPOCH * Primary HDI ** Deprecated	U	HISTORY	f keyword	(Hanisch	ct char] et al, 2001)

Fig. 2: Mandatory FITS Keywords.

Metadata storing in images header or in the databases is insufficient, semantically, to generate provenance. This information is useful for local researchers, but not enough to share, reuse and reprocessing by scientific community.



Corot Data Analysis - Exoplanet Field

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIO PROVENANCE

DEVELOPMEN OF A DOMAIN ONTOLOGY

USE OF A PROVENANC MODEL

CONCLUSION AND FUTURE WORKS

PreProcessing Phase

Data obtained from satellites need corrections, such as jumps and trends (detrend).



Fig. 3: Trends and jumps in light curves [Mislis et al 2010].

Analysis Phase

The analysis is dependent of context. In exoplanets search, is

done the transits analysis.



Fig. 4: Transits Analysis [Kovács et al 2002].

▲ロト ▲帰ト ▲ヨト ▲ヨト 三日 - の々ぐ



Objective

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMEN OF A DOMAIN ONTOLOGY

USE OF A PROVENANCI MODEL

CONCLUSIONS AND FUTURE WORKS In CoRoT data analysis, tracking the origin of information and how the data were derived in each level in the data analysis process is essential to allowing sharing, reuse, reprocessing and further analysis.

The objective of this work is the development of a formalized and codified knowledge model by means of domain ontology as a way of ensuring semantic provenance information for retrieval later by humans or software components.



Ontologies and Semantic Provenance

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMEN OF A DOMAIN ONTOLOGY

USE OF A PROVENANCI MODEL

CONCLUSIONS AND FUTURE WORKS An Ontology is a explicit specification of a conceptualization [Gruber 1993].

Borst (1997) redefines it for *Ontology is a formal specification of a shared conceptualization*.

An ontology is a relationship of four elements [Kiryakov 2006]:

 $O = \{\textbf{C} | asses, \textbf{R} e | ations, \textbf{Instances and } \textbf{A} xioms \}$

Provenance means origin or source. The semantic provenance [Sahoo et al 2008] relates with the Semantic Web [Berners-Lee 2001] and can be obtained by means of ontologies, which allow to represent the knowledge, structuring the informations of organized form and generate semantics in the data.

▲□▼▲□▼▲□▼▲□▼ □ ● ●



Development of a Domain Ontology

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMENT OF A DOMAIN ONTOLOGY

USE OF A PROVENANC

CONCLUSIONS AND FUTURE WORKS

CoRoT Data Analysis Ontology

Methodological Approach

Methodology

Ontology Development 101 [Noy and McGuinness 2001]

Tool

Protégé 4.1 Tool [Knublauch 2004]

Reasoner

- Pellet 2.2 free Reasoner [Sirin et al 2007]
 Plugin
- Ontograf Plugin [Falconer 2010]

Languages

- Ontology Web Language [Hitzler et al 2009] based on Description Logic [Baader 2003] (OWL-DL 2.0)
- SPARQL 1.1 Query Language [DuCharme 2011]
- Semantic Web Rule Language SWRL (DL-Safe Rules)

[Horrocks et al 2005]

Reuse

Reuse of parts VSTO and SWEET Ontologies http://escience.rpi.edu/ontology/vsto/2/0/vsto.owl and http://sweet.jpl.nasa.gov/2.3/sweetAll.owl

< □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > <



Conventions of Nomenclature of Proposed Ontology

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMENT OF A DOMAIN ONTOLOGY

USE OF A PROVENANCE MODEL

CONCLUSIONS AND FUTURE WORKS The nomenclature used is obtained from a review of literature as the concepts used envolving the context related. The mostly nomenclature conventions are based on [Cambrésy et al 2010] with some adaptations and extensions.

- Classes are defined begin with uppercase without spaces, e.g. *Algorithm*.
- Instantiation is defined using underscore when necessary, e.g. trends_long_term.
- Properties are defined begin with lowercase letter following by uppercase initial letters, e.g. *isDetrendOf*.

Acronyms are used carefully, e.g. CDA.



Competence Questions

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMENT OF A DOMAIN ONTOLOGY

USE OF A PROVENANC MODEL

CONCLUSIONS AND FUTURE WORKS

- Which detrend algorithms are Polynomials?
- What are the statistical techniques (Linear, Polynomial, among others) used by detrend algorithms?
- The CoRoT Detrend Algorithm treats which systematic effect?
- What transit algorithm apply the Least-Squares method?
- Which shape is used by transit detection algorithms to model the periodic signal (Box, Fourier Series, Wavelet Transformations, among others)
- The light curves generated were developed from which detrend algorithm and by which statistical technique?



Corot Data Analysis Ontology

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMENT OF A DOMAIN ONTOLOGY

USE OF A PROVENANC MODEL

CONCLUSIONS AND FUTURE WORKS



Fig. 5: Corot Data Analysis Ontology - Classes Diagram.

▲ロト ▲冊 ▶ ▲ ヨ ▶ ▲ ヨ ▶ ● の Q @



SPARQL-DL Query Language

INTRODUCTIO

OBJECTIVE

ONTOLOGIES AND SEMANTI PROVENANCE

DEVELOPMENT OF A DOMAIN ONTOLOGY

USE OF A PROVENANC MODEL

CONCLUSIONS AND FUTURE WORKS

Detrend Algorithms

What are the names and acronyms of the detrend algorithms and

their respective authors?

A.Y.			
SELECT PhasName Pacronym Pha	sAsthor		
MIERE(
2) off hose ordered about the	mDehund		
On addise intelligent Open	Average of the second se		
TA CILLED TELEVISION IN THESE			
VX CROBO ACTORYTE VACTOR	ilea -		
7x crideo hasAulhor 7has	Author		
NE Y ROMANA IN IN			
10 m l			
CO FILM			
Presta			
Trashane	2econm	These after	
ottec Photometric Cethanding Adorithm	707 7982 80 9 9	ontex Dee-Hote Kim	
ottec Photometric Oxfranding Algorithm	"PCC"" and at the	other Federica D. Bienca	
ottes Photometric, Oxfranding, Algorithm	"PCC""red strip	orther Charles Alcock	
otter Perionetric Detranding Algorithm	TCC-mediatric	onter Yong-R. Drun	
orbias Photometric Detranding Algorithm	TCC-"ved shing	oridae Paulos, Pedepapas	
roldes Trend, Film, Algorithm	TFA ¹¹⁴ and siring	critics G_A_Raise	
orbies Trend, Filer, Algorithm	"PA" and siring	orbine R. M. Jacons	
o Max Trand Filler, Agorithm	"PA" and string	online d_ Keywon	
O'SBAC SARS_ASSORTIN	"EARS"" had abling	offac et al	
ortal SARS_Algorithm	"SARS"" had abling	offact Avv. Off	
ottec SysRen_Detwideg_Algorithm	"SYS-RDF" bad string	ottec 0_Temuz	
ottec SysRen_Detwodeg_Algorithm	SrS-RDF**xetating	other5 Zider	
ottec Sysilen, Detrending, Algorithm	"SrS4D#"Netwing	orther T_Napeh	
or take Datil_Algorithm	print beam, 1723	orther J_Bridgy	
or Max Cable_Algorithm	print hex ¹⁰ , 22(2)	orblac 0 _Maia	
orbies Codd, Algorithm	"DST.""and along	orbine S. Modgile	
orbites Corol, Delivered, Algorithm	"COA"" wait shirts	orbies D. Mala	
orbac Cost, Delaved, Algorithm	CDA***AEABY9	ontext _Public	
orbac Cost, Oxford, Algorithm	"CDA""NEEKENP	offact_Carore	
ontec Cost_Outrant_Algorithm	"COA""NEEMING	otteci. K. H. H. Schnitt	
ontec Cont_Outrant_Algorithm	COA***Xed strike	orthec E. W. Quenther	

Fig. 6: Query on Detrend Algorithms

Transit Algorithms

What is the format of the periodic signal of transit algorithms?

SELECT ?algorithmtransit ?periodicsign	aishape	
AMERE		
2algorithmtransit rdf type crtdao Alg	orthmTransit .	
?algorithmfransit crtdao hasPerioda	SignalShape ?periodicsignalsh	ape)
Q(Z, Y, X) :-PV(?y, ?X, ?Z)		
A.Y		
(*) Run		
Rests		
7algorithmbranait		7periodicalgnalshape
ortdeo:Trutes_Algorithm	ordea:wave_shape	
and the second sec		

Fig. 7: Query on Transit Algorithms

< □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > <



SPARQL-DL Query Language - Cont.

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMENT OF A DOMAIN ONTOLOGY

USE OF A PROVENANC MODEL

CONCLUSIONS AND FUTURE WORKS

Detrend Algorithms

What detrend algorithm is polynomial type?

SELECT ?algorithm	
WHERE {	
Palgorithm rdf:type crtdad	AlgorithmDetrendPolynomial.}
0(z, y, x) -PV(?y, ?x, ?z).	
. .	
🕑 Run	
Results	
	Taluarithm

Fig. 8: Query on Detrend Algorithms type

Transit and Detrend Software

What detrend software was applied to transit software?

occept insumaleuralism risonnaleuer	uciu
WHERE (
?softwaretransit rdf.type crtdar	o.SoftwareTransit.
2softwaredetrend rdf type crtd	tao SoftwareDetrend
OceBeprotraneit addae basDol	(mod findbandstand)
routivarenanisk struautriasper	uena roviniareaeuena J
0(7 x x) (2022 2x 2r)	
A.Y.	
0 Put	
O Rus	
Results	Automation of the second second
Pue Results 750Twaretransi	?softwaredotrend

Fig. 9: Query on Transit and Detrend Software



Use of Rules

INTRODUCTIC

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMENT OF A DOMAIN ONTOLOGY

USE OF A PROVENANC MODEL

CONCLUSIONS AND FUTURE WORKS

Rule for Detrend Algorithms

What detrend algorithm type use a polynomial function?



Fig. 10: Rule used for AlgorithmDetrendPolynomial

Rule for Transit Algorithms

What transit algorithm type have the periodic signal as

box_shape?



Fig. 11: Rule used for AlgorithmTransitBoxShape



Provenance Model

PROOF MARKUP LANGUAGE - PML 2.0



Fig. 12: Provenance and Justification Ontology [McGuinness 2007]

▲□▶ ▲□▶ ▲□▶ ▲□▶ □ のQ@

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMEN OF A DOMAIN ONTOLOGY

USE OF A PROVENANCE MODEL

CONCLUSION AND FUTURE WORKS



Domain Ontology and Model Provenance

Which the periodic signal shape of Box Fitting Least Square Algorithm? 📮 🗖 🖓 Onan 🕷 SPARG. 🗍 🖉 ' Pperiodicsignalshape rdf type cridao PeriodicSignalShape critiao/Bax Fitting Least Square Algorithm critian hasPeriodicSquarthape *periodicsquarshape Fig. 13: Query on Domain Ontology

perprint and and a second and a	SELECT *periodic vHERE(*periodic critiao Bo Triodeset	signalshape fitodeset filan signalshape rot type citilao signalshape rot type projoin , filting Load, Square, Ai prograssConclusion Typeto projo tasil.anguage filangu	puage 7x8ring Periodicitigna dormation porthen critilao Incorginationape age :	Strape . han Periodic Signal Shape Tperiodic signalahape . 1	
Color C	60.				
Reads Terrisfinianshiar Terrison Terrison	() Ruh				
Nerisdanianabhant Nederal Nerissant Network	Reads				
		Transformed	Theorem 1	Tables	

Fig. 14: Query on Domain and Provenance

Ontologies

Box Ce	an and an	(1 2	en freise Sand Zean
		58	¢°
	o tion had woods (grad) age		
			- 22X
perodicsignalshape, nod eric-web onybrologies0 x, Piting_Level, Sourre, in fermiciser, Spenodicsign V V Rus esails	exet, skitng, language (- J-PA/Http Of 59/CorstDataAnayek/ontoine Algorithms, ToenioCasignabhage de/2005/05/peri.gablingabin.swii Jabhage (T)-Mp. Twww.semat	: /inferenceweb.a y.e.vilihas/ketodic (JPV) ohtp./infere RhasConclusion, Jouweb.arg/antidep	antot a Audio Galdigene privatana a velka alive diritty in totaka in himity (h) right himity and a second second encount and second sec
Tyendosiyabhaje	Toodesel	Talguage	Tebleg

Fig. 15: Graph using the Domain and Provenance Ontologies

USE OF A PROVENANCE

MODEL



Conclusions and Future Works

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMEN OF A DOMAIN ONTOLOGY

USE OF A PROVENANCE MODEL

CONCLUSIONS AND FUTURE WORKS

- It is presented that is possible to generate semantic provenance in scientific images analysis.
- The semantic provenance information obtained will be integrated in a web framework for analysis.
- Despite the scope of this work, results can be expanded to fields of e-Science where the scientific images analysis requires preprocessing, adding semantic knowledge and allowing interoperability.
- How future works, the ontology will be expanded for modelling more algorithms related with the CoRoT data analysis (among others telescopes), being validated continuously.
- Examine the possibility of reuse of ontology for astronomical objects to verify which methods were used to detect exoplanets in stars of a certain type.



References

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMEN OF A DOMAIN ONTOLOGY

USE OF A PROVENANC MODEL

CONCLUSIONS AND FUTURE WORKS

Baader, Franz and Calvanese, Diego and McGuinness, Deborah L. and Nardi, Daniele and Patel-Schneider, Peter F. The Description Logic Handbook: Theory, Implementation, and Applications. Cambridge University Press. New York, NY, USA. 2003. Berners-Lee T., Hendler, J. and Lassila, Ora. The semantic web. Scientific American, 284(5):34-43, maio de 2001. Borst, W. N. Construction of Engineering Ontologies for Knowledge Sharing and Reuse. Doctoral Thesis. University of Tweenty, Centre for Telematica and Information Technology, Enschede, The Netherlands, 1997, (227 pp). Cambrésy, L. and Derriere, S. and Padovani, P. and Preite Martinez A. and Richard, A. Ontology of Astronomical Object Types. IVOA Technical Note. Version 1.3, Jan de 2010. De Souza, L. and Vaz, M. S. M. G. and Emílio, M. and da Rocha, J. C. F. and Boufleur, R. (2011). Data Analysis Provenance: Use Case for Exoplanet Search in CoRoT Database. Presented In: Proceedings of the Astronomical Data Analysis Software and Systems (ADASS XXI). (Vol. TBD). San Francisco: ASP Conference Series 2012. DuCharme, B. Learning SPARQL. Oreilly and Associate Series. O'Reilly Media, 2011. Falconer, Sean, Plugin Ontograf, 2010, URL http://protegewiki.stanford.edu/wiki/OntoGraf, Gruber, Thomas R. A Translation Approach to Portable Ontology Specifications, Knowledge Acquisition, 5(2):199-220, 1993. Hanisch, R. J. and Farris, A. and Greisen, E. W. and Pence, W. D. and Schlesinger, B. M. and Teuben, P. J. and Thompson, R. W. and Warnock III. A. Definition of the Flexible Image Transport System (FITS), A & A. Vol. 376, 2001. (pp. 359-380).

Hitzler, P. and Krtzsch, M. and Rudolph, S. Semantic Web Modelling Languages (Part 2). Tutorial. IJCAI. 2009.

Horrocks, I. and Patel-Schneider, P. F. and Bechhofer, S. OWL Rules: A Proposal and Prototype Implementation. Journal of Web

Semantics, V. 3, N. 1. 2005.

▲□▶ ▲□▶ ▲豆▶ ▲豆▶ 三豆 - のへで



References - Cont.

Kiryakov, A. Semantic Web Technologies: trends and research in ontology-based systems. Ontologies for knowledge management. Davies, J. et al. (Eds), 2006. (pp 115-138).

Knublauch, H. and Fergerson, R. W. and Noy, N. F. and Musen, M. A. The Protégé OWL Plugin: An open development environment for semantic web applications. 3rd ISWC 2004, Hiroshima, Japan. (pp. 229–243).

Kovács, G., Zucker, S. and Mazeh, T. A Box-Fitting Algorithm in the Search for Periodic Transits. A&A 391:369-377, 2002.
McGuinness, D. L. and Ding, L. and da Silva, P. P. and Chang, C. (2007). PML 2: A Modular Explanation Interlingua. in
Proceedings of the AAAI 2007 Workshop on Explanation-aware Computing (pp. 22–23).

Mislis, D. and Schmitt, J. H. M. M. and Carone, L. and Guenther, E. W. and Patzold, M. An Algorithm for Correcting CoRoT raw light curves. arXiv/1008.0300. 2010.

Noy, N. F. and McGuinness, D. L. Ontology Development 101: A Guide to Creating Your First Ontology. Stanford Knowledge Systems Laboratory Technical Report KSL-01-05 and Stanford Medical Informatics Technical Report SMI-2001- 0880. (25 pp.). Boufleur, R. C. A Busca de Exoplanetas com as curvas de luz do CoRoT. Observatório Nacional. Departamento de Pós-Graduação. Curso de Pós-graduação em Astronomia. Dissertação de Mestrado. Rio de Janeiro, 2012. Sahoo, S. S. and Sheth, A. and Henson, C. Semantic Provenance for eScience. IEEE Computer Society, 2008, (pp. 46-54). Sirin, E. and Parsia, B. and Grau, B. C. and Kalyanpur, A. and Katz, Y. Pellet: A practical OWL-DL Reasoner. Web Semant. Volume 5. Number 2. Elsevier Science Publishers B. V. The Netherlands, June, 2007.

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTI PROVENANCE

DEVELOPMEN OF A DOMAIN ONTOLOGY

USE OF A PROVENANC MODEL

CONCLUSIONS AND FUTURE WORKS



Questions?

INTRODUCTION

OBJECTIVE

ONTOLOGIES AND SEMANTIC PROVENANCE

DEVELOPMEN OF A DOMAIN ONTOLOGY

USE OF A PROVENANC MODEL

CONCLUSIONS AND FUTURE WORKS Thanks by oportunity of participate of Semantics Session IVOA Meeting!

◆□▶ ◆□▶ ◆臣▶ ◆臣▶ 臣 のへぐ