OcelotI: Presentation	Theoretical Background	Adaptation to Trace Visualization	Implementation	Analysis 00	Conclusion 00

OcelotI: Time Aggregation Visualization for Trace Overview

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SoC-Trace Technical Meeting (July 2013)



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Schneiderman's analysis methodology

- Overview first
- Zoom and filter
- Details on demand

Overview

- Analysis tools lack entry points
- Need to provide synthetic view
- Show phases, hot spots
- Make the link with more precise representations



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Our prop	osition: Oce	elotl			

Principle

Trace is divided in time slices

- Variable parameter enables to aggregate consecutive slices
- Aggregates are related to phases, disruptions

Theoretical aspects

- Best-Cut partition algorithm (Lamarche-Perrin)
- Trace time-slicing (Schnorr)

Implementation

- C++ library (best partition algorithm)
- FrameSoC module/Java (GUI, database queries, time-slicing)

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Our proposition: Ocelotl

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Lamarche-Perrin Works: Multi-Agent Systems

How to Build a Meaningful Macroscopic Description?



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Example: Geomedia Project



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Example:	Viva				

Represent Hierarchical Structure according to Value Heterogeneity









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Informatio	onloss				



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Information Loss Measure

Kullback-Leibler Divergence

$$loss(A||e) = \sum_{e \in A} v(e) \times log_2\left(\frac{v(e)}{v(A)}\right)$$
 in bits/x

 Quantity of information than one loses by using an aggregated description instead of the microscopic description







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Complexity Reduction Measure

Shannon Entropy

$$H(v) = \sum (v(i) \times \log_2 v(i))$$
 in bits/x

Entropy Reduction

gain(A||e) = H(A) - H(e) in bits/x

Quantity of information than one saves by encoding the aggregated description instead of the microscopic description



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 Compromise Finding between Information Loss and
 Complexity Reduction
 Complexity Red

Parametrized Information Criterion

$$pIC(A) = p \times gain(A) - (1 - p) \times loss(A)$$



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Temporal Aggregation

Temporal Aggregation principle

Same principle but only consecutive data can be aggregated

Ex: Tunisia citation



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Need of a microscopic level description



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Time


Part number





Part number



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Quality Computation

Gain and loss formulas: originally for scalars

012345					
01234	12345				
0123	1234	2345			
012	123	234	345		
01	12	23	34	45	
0	1	2	3	4	5

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Adaptation for time-sliced description

- Vector (ex: activity time per process) quality(A) = $\sum_{i \in n}$ quality(A[i])
- Matrix (ex: activity time per state type) quality(A) = $\sum_{i \in n} (\sum_{j \in m} \text{quality}(A[i][j]))$

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Best-Cut Partition for a given p



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Implementation





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Other Interesting Tools

Pajé Trace Management

- Importer
- Exporter
- Cleaner (Pop/Push State -> Set State)

Filter

Filter EP by timestamps and generate results

Gantt with Pajé Semantics





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Overview a Trace



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Demonst	ration				



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Time Aggregation Visualization

- Able to represent application behavior over time
- Solves some time scalability issues
- First step of an analysis flow

But...

Unuusion

Lack of space dimension representation

Lack of interaction (details-on-demand)



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New features

- Discontinue parts similarity
- Hierarchical aggregation
- Aggregation metrics
- Visualization/parts representation improvement
- User interaction

Outside embedded system domain

What about HPC/Distributed Systems?



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Merci de votre attention!

http://moais.imag.fr/membres/damien.dosimont/

