

Annotation and Mining of Cultural and Educational Media

Talk at
Faculty of Informatics and Information Technologies
Slovak University of Technology
Bratislava, Slovakia

by
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Outline of the talk

- Part-I: Semantic annotation, authoring(MPEG-7 and XML) and retrieval of Cultural and Educational Media
- Part II: Feedback and Opinion Mining of Educational Media
- Part-III: eTour of India

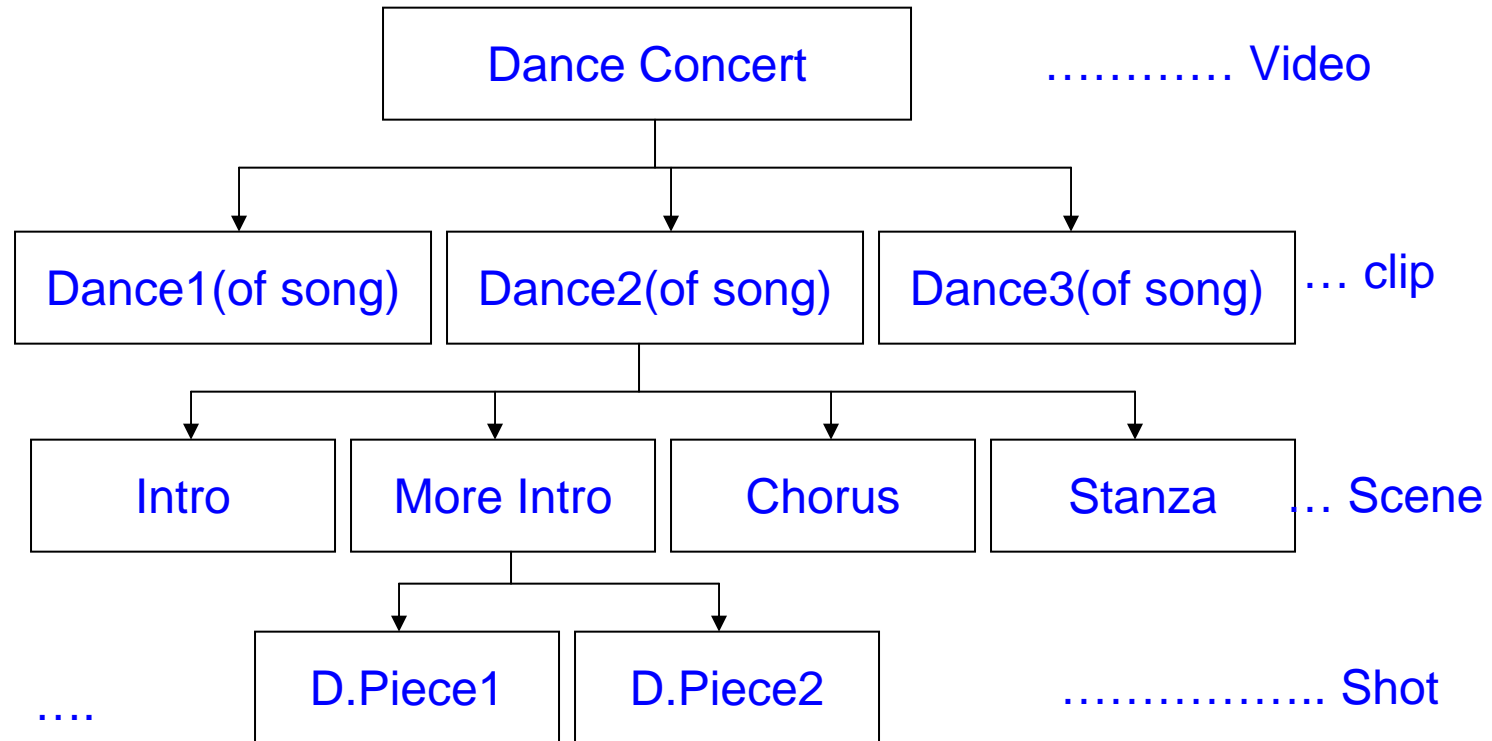
Part-I: Motivation

- Content based video retrieval (video modeling, annotation, indexing and querying) is an important area of research for more than a decade
- Many fruitful researches explored different videos (news, sports and movies), NOT Dance Videos (DV)
- But, DV: *interesting, semantics-intensive, complex in structure*

Background

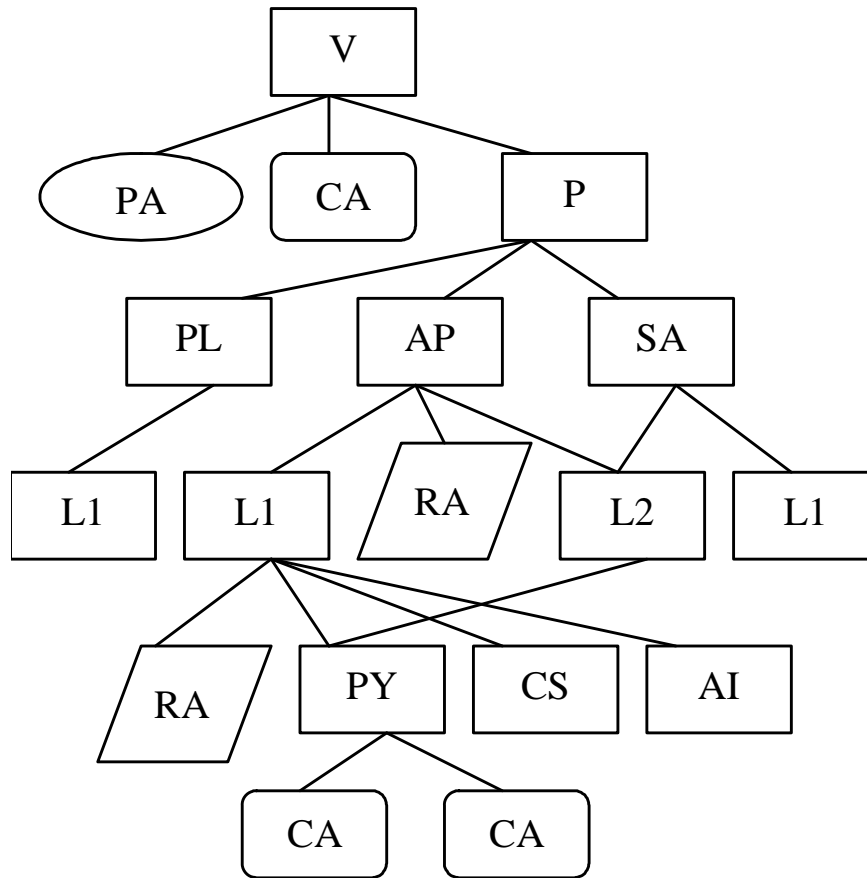
- Types of Dance Archival
 - Human memory (from generations to generations verbally)
 - Using notations (Labanotation, Banesh)
 - Recording mediums (CD, VCD, DVD etc)
- Problems:
 - Limited human memory
 - Complex notation symbols and limited Laban experts
 - Searching difficult, because of huge volume of data
- Solution: Build DV Information System with annotation and semantic retrieval facilities

Dance Video Granularity



Regular Tree Grammar for Dance Videos in XML Schema

Models for Dance Media



V- Dance video

PA-Primitive Attribute

CA-Composite Attribute

P-Song

PL-Pallavi

AP-Anu Pallavi

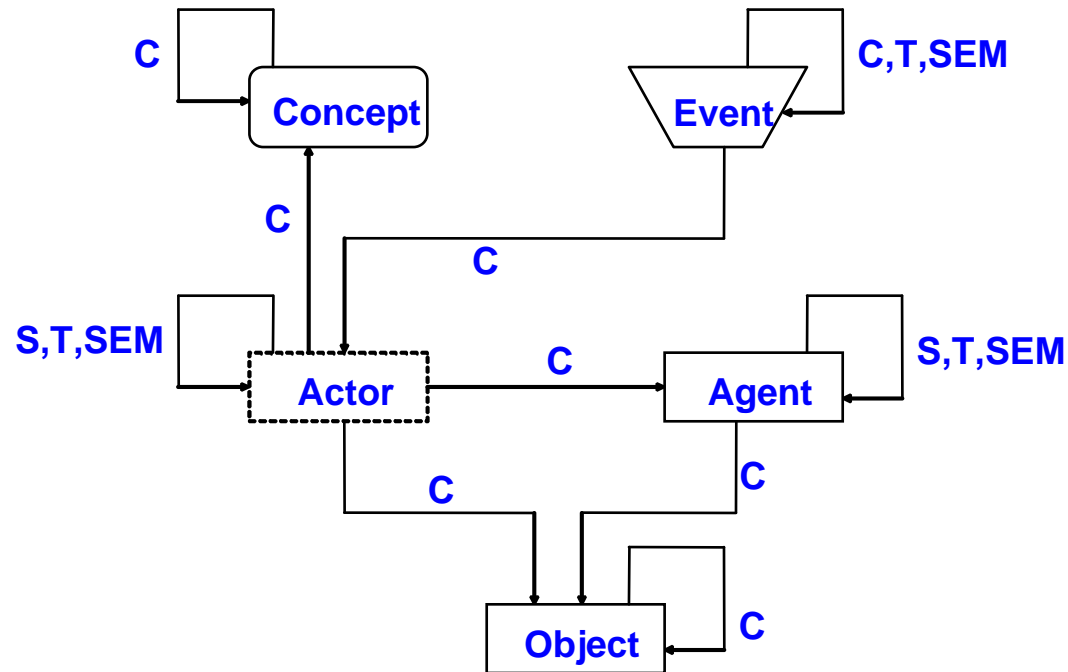
SA-Saranam

L-Line of lyrics

RA-Reference Attribute

Video Semantic Directed Acyclic Graph Model for Indian Dance videos

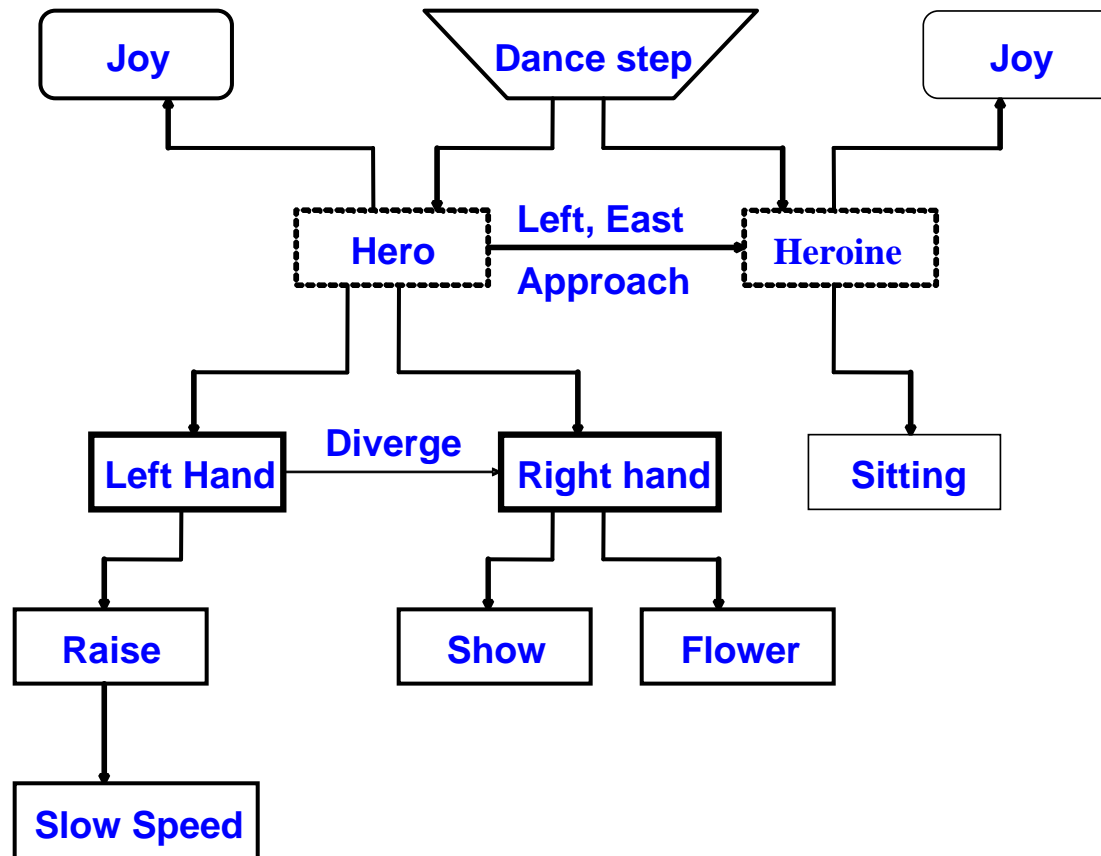
DVSM: Agent oriented DV model



Event – trapezoid; Actor – dotted rectangle; Agent – Thick rectangle; Concept – Round rectangle

Relationship – Containment (C), spatial(S), Temporal (T), Spatio-temporal(ST); Attribute - oval

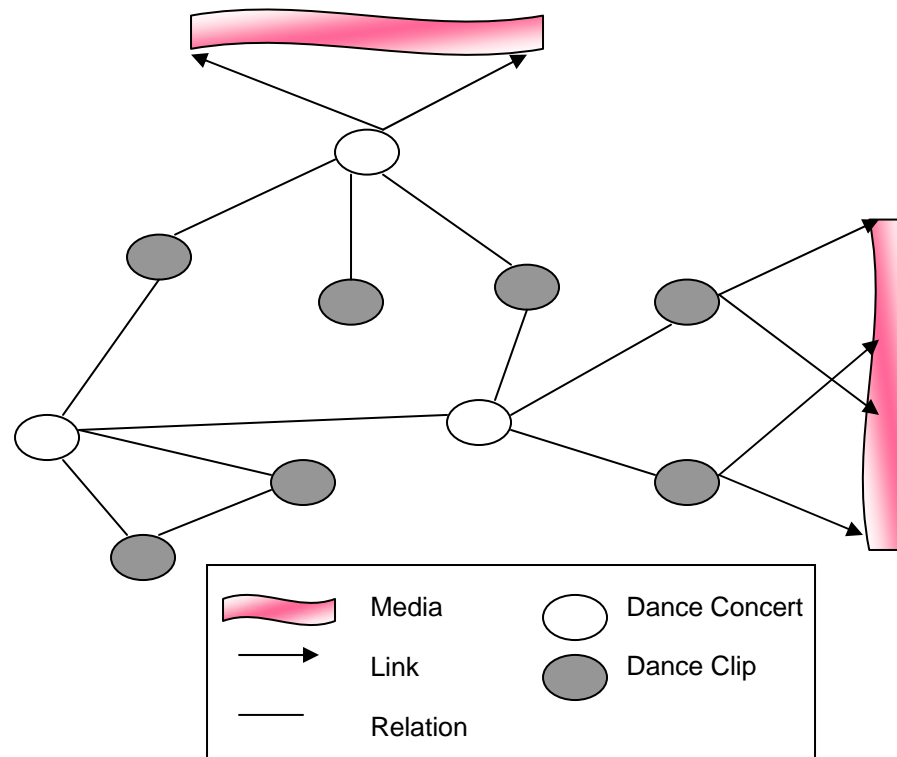
Graph instance of a dance step



Event based Semantic net Model

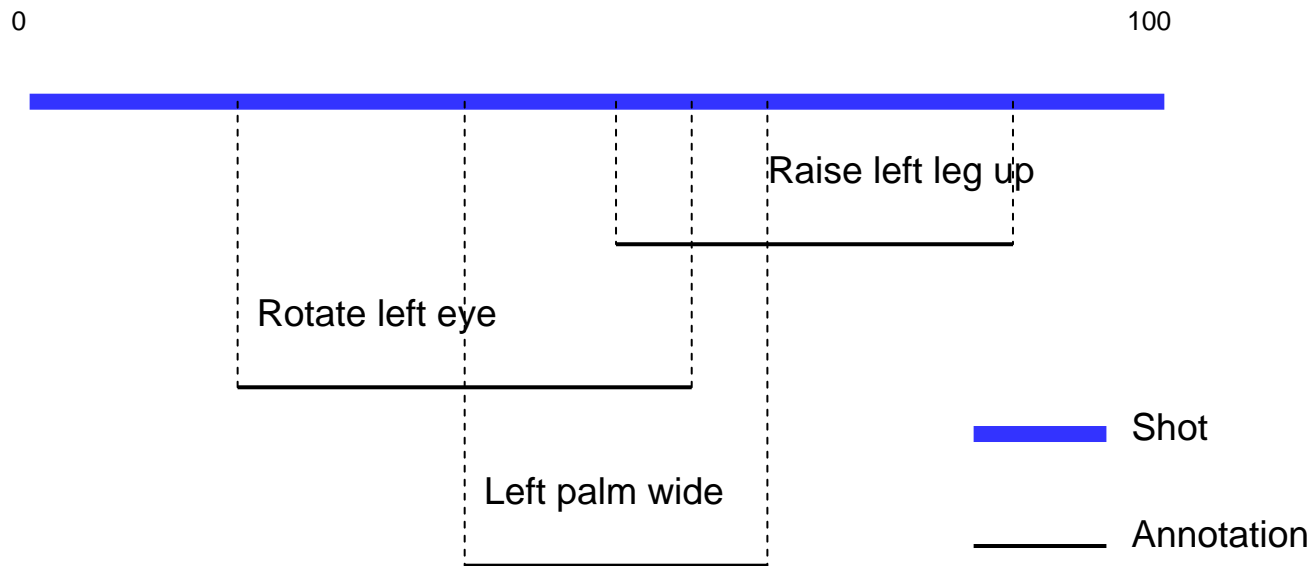
All annotations of dance media are organized as a semantic net.

Semantic net connects instances of DS defined previously



Strata-oriented Event Modeling

Annotations are represented as layers. The connection between layers is realized with the time interval

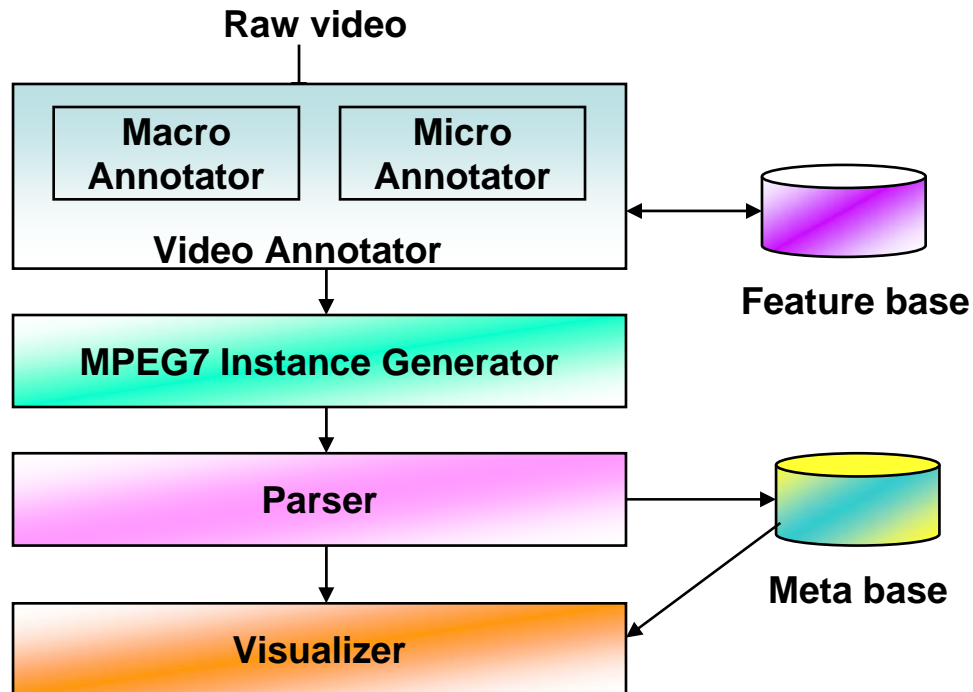


Description schemes for Dance Media

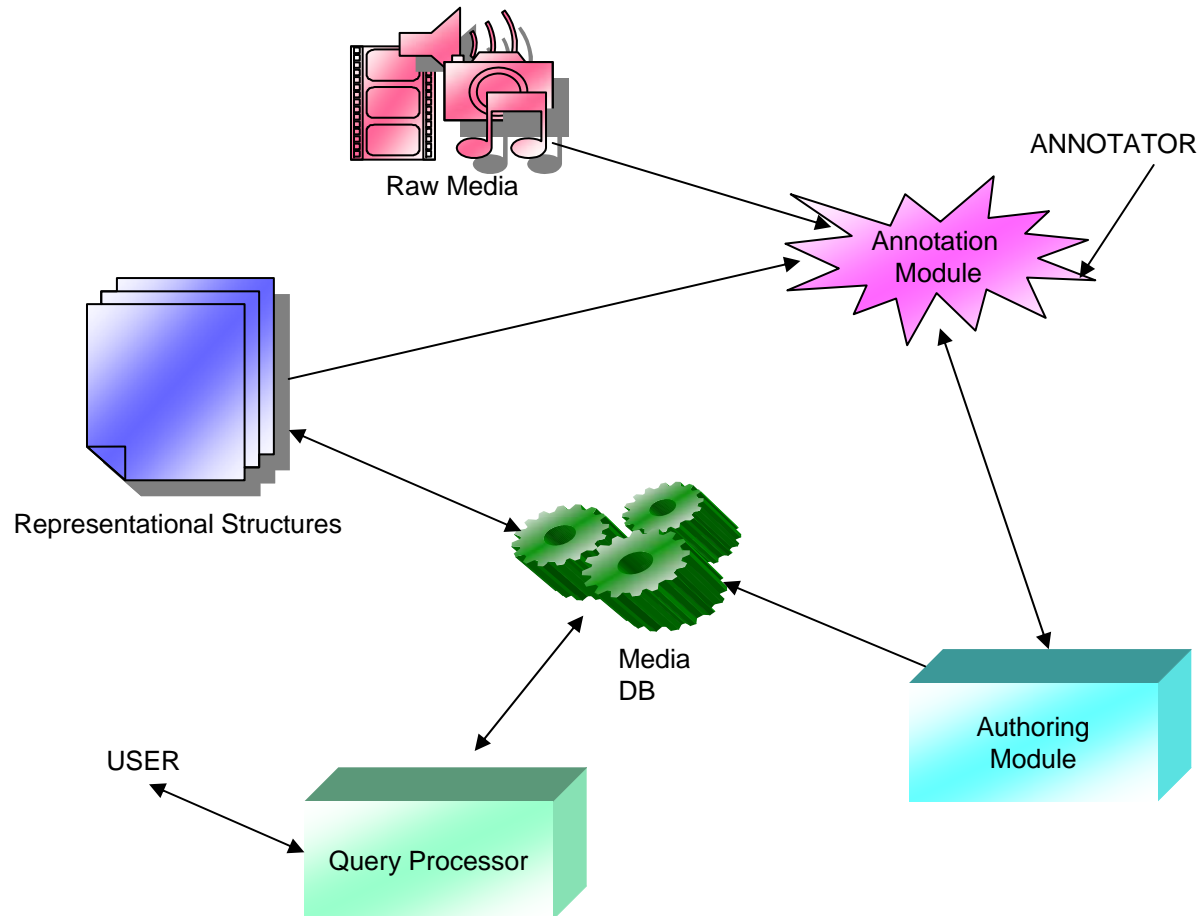
- DanceConcertDS
- DanceClipDS
- RelationDS
- LinkDS
- LifeSpanDS
- ResourceDs
- PersonDS
- CharacterDS
- SongDs
- DancePieceDS
- MovementDS
- STRDS
- EventDS
- ObjectDS
- SemioticsDS
- BasicInfoDS

XML Schema

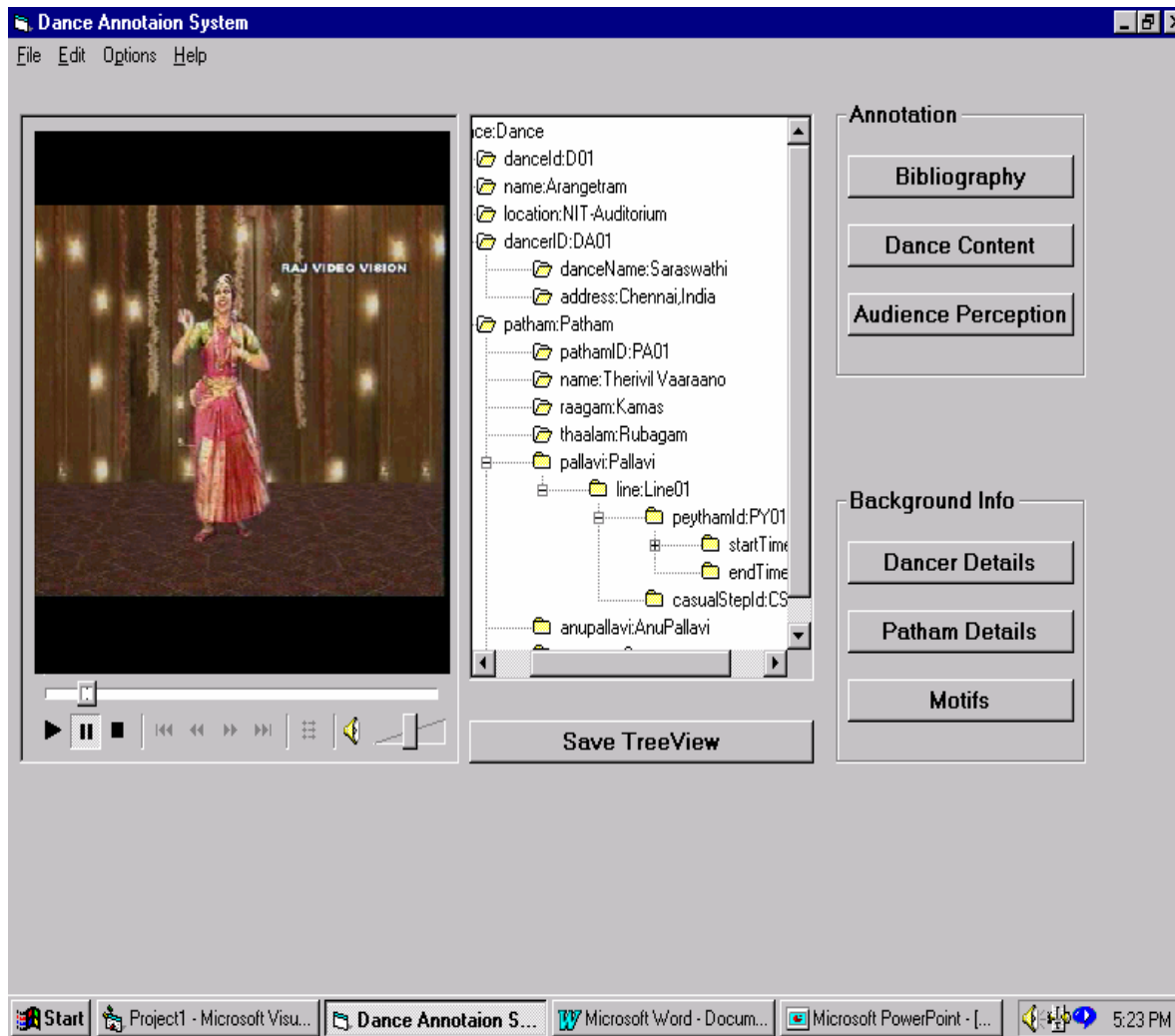
Dance Video System Architecture



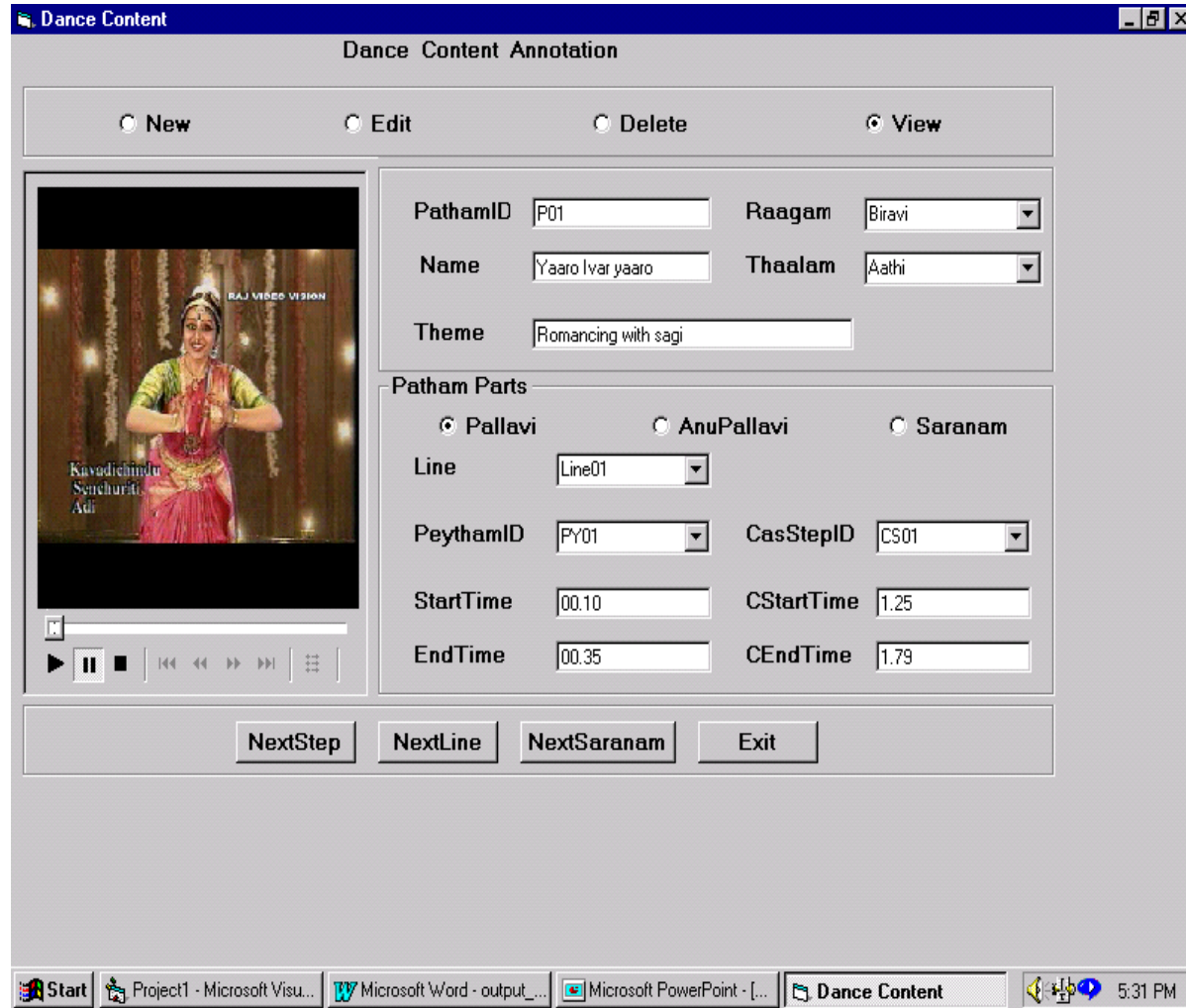
DMAR System Architecture



Semantic Annotation – Semi automatic



Screen shots of VSDAG




Screen shot of macro annotation

DVSM v1.0

Video Macro Annotation Micro Annotation Help

Dance Video Semantics Model v1.0



www.aishwarya-forever.com

Dance Details

DanceID	Dance01	Dance Type	Movie
Context	Professional	Background	Scenary
Tempo	Mediam	VenueType	Mysore
Origin	Indian	Date	30/10/2005
Time	9.00		

Add Edit

Dancer/Musician

ID	D01
Dancer/Musician ...	Rajkumar
EMail ID	rk@nitt.edu
Address	Trichy
Phone	2770136

Add Object Edit Object

Music Info

Song ID	S100
Song Name	Nee varuvai enna
Musician ID	M101
Accompaniment	Guitar
Lyrics	Pa.Vijay

Add Music Info

Exit

Screen shot of micro annotation

DVSM v1.0

Video Macro Annotation Micro Annotation Help

Dance Video Semantics Model v1.0



Events

ID: EV01

Description: Samathristy

No. of Dancers: 2

Media Locator: d:\dvsm\

Add Event Edit Event

Actors

ID: A01

Event ID: EV01

Role: hero

Time Span: 5-10

Posture: Straight

Add Actor Edit Actor

Agents

ID: AG01

Actor ID: A01

Event ID: EV01

Action: Raise hand

Speed: slow

Instrument: Keyboard

Add Agent Edit Agent

Concept

ID: C01

Actor ID: A01

Event ID: EV01

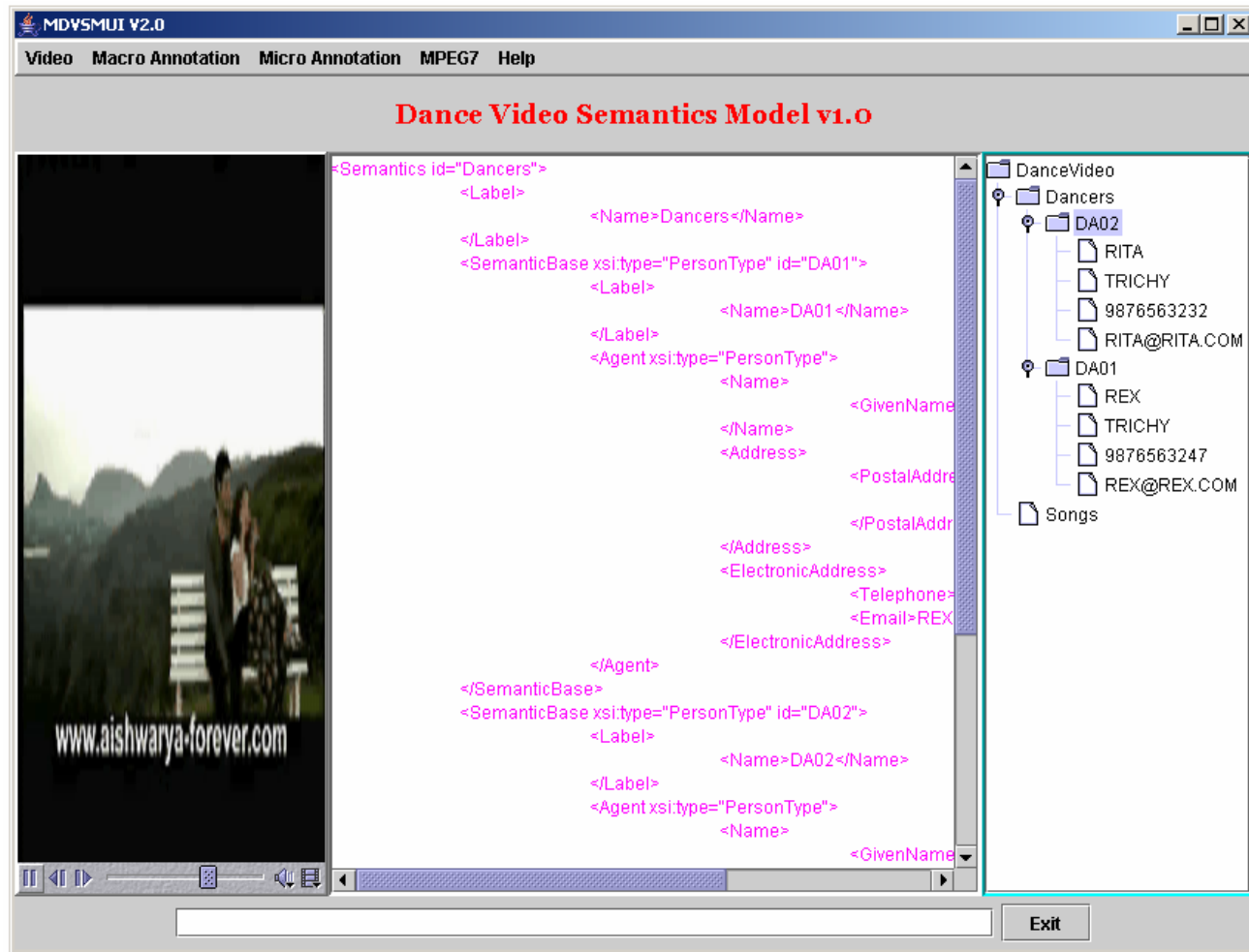
Type: Emotion

Description: joy

Add Concept Edit Concept

Exit

MPEG-7 Generator



Dance Video Queries

- Containment queries
 - queries on dance steps, body part usage, mood, instruments used etc
 - Ex: “Give me all video shots in which dancer a , performs step s “
- Temporal queries
 - Allen’s 13 temporal relationships: before, after etc
 - “Give me all video shots in which a step s done by dancer a , is repeated by dancer b

DV Queries ...cond

- Spatial queries
 - To know the spatial arrangements between dancers and their body parts
 - Ex: “Find all video shots in which dancer a , is to the *left* of dancer b performing steps”
- Spatio-temporal queries
 - Ex: “Give me all video shots in which dancer a *observe* dancer b who performs step s and b is to the *left* of a “

Advanced DV Query examples

- show me all *solo* dance pieces
- show me all *furious* dance pieces
- tell me all dance pieces where dancerA *praying*
- find dance pieces representing a *snake*
- show me dance pieces of a *king*
- find a dance piece denoting *moon*

Indexing - Inverted files

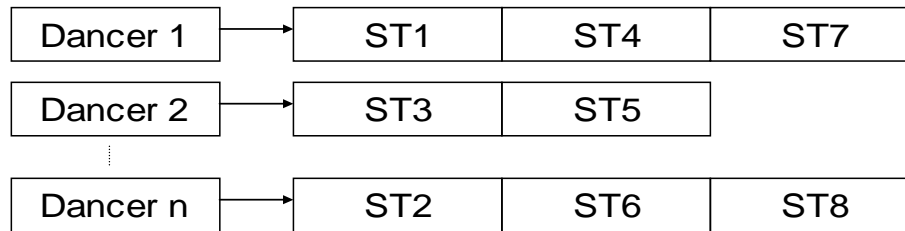


Figure.1: The inverted file DA_IF

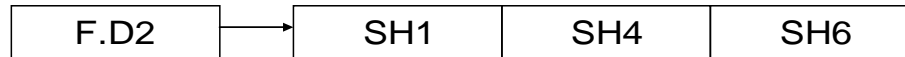


Figure.2: Inverted list of D1

Query Processing Engine

Backus Naur Form (BNF) Query Syntax

DVRS v1.0

Dance Video Retrieval System v1.0

Select	
Dancer	Rajkumar
Peytham	samathristy
Adavu	thattadavu
ASHashtam	logitham
SHashtam	mathimam
CasualStep	cs1
Agent	eye
Posture	leftSide
Mood	sad
Background	garden
Instrument	kite
Costume	shervani
TempOPR	F
SpatialOPR	L
CDOPR	AND
ContainmentType	DA
TemporalType	DTD
SpatialType	DPD
SpatioTempType	DTDPD
UserShots	1sh1

Your Query
Select Query...

Retrieved Result

Start Time: 1138177048812 End Time: 1138177048812
Execution time: 0 ms

Reset Shot Scene ComScene Preci-Recall Select Video Exit

Metrics

- Precision – Retrieved all relevant
- Recall – All relevant retrieved
- Running Time
- Fidelity (our own metric)

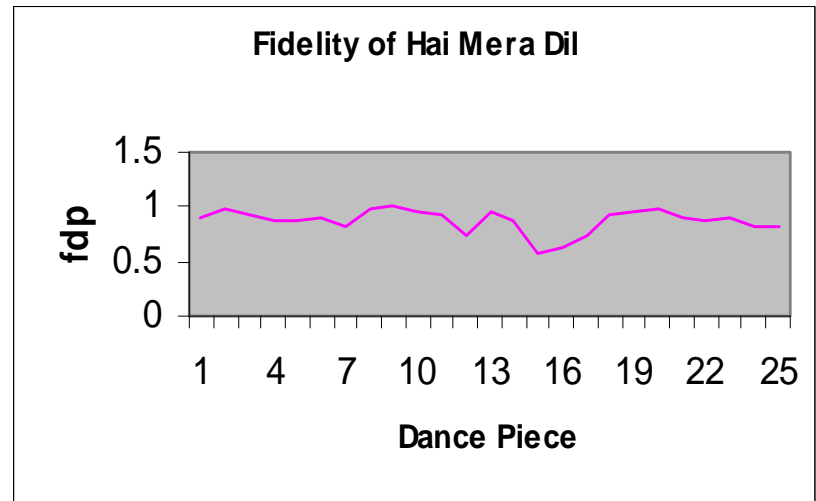
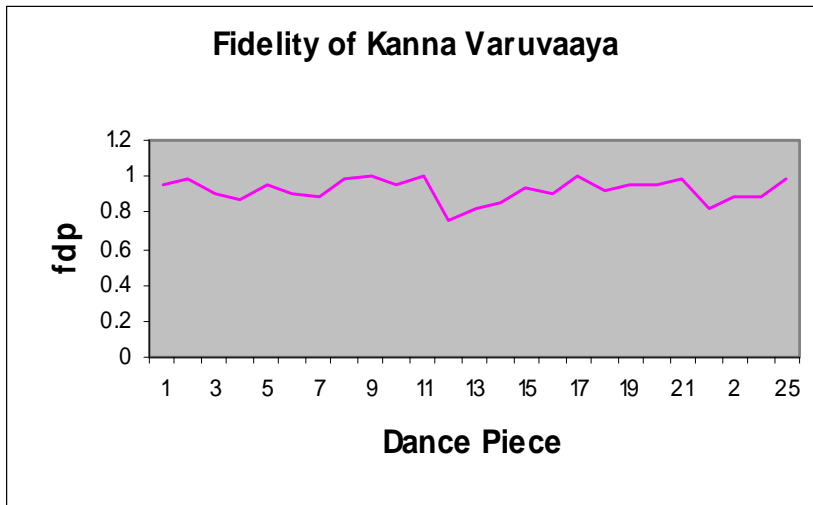
Fidelity of DancePiece(*fdp*) and Dance(*fdance*)

Ability to resurrect the original dance sequence by following the annotations

$$fdp_i = \frac{\# \text{ dm correctly resurrected}}{\# \text{ dm of } dp_i}$$

$$fdance_i = \frac{\sum fdp_i}{n}$$

where n - total # dp of dance*i*



Applications

- Dance Movements Learning
- Contemporary Dance Learning
- Self-paced Dance Learning
- Annotated Dance Media – cultural wealth and heritage
- ???

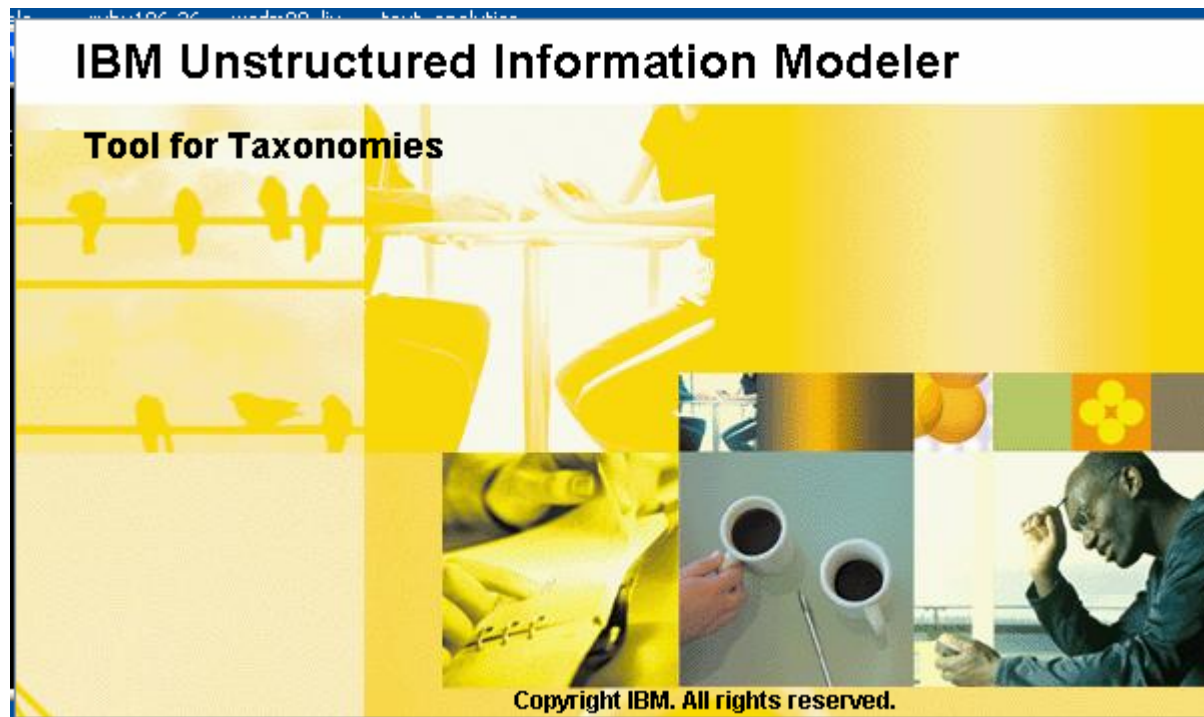
Part-II: Feedback and Opinion Mining(FOM)

- What are the most common issues that our students have?
- What are the most common issues that our faculty and employees have?
- Where are the areas of dissatisfaction of our students?
- Where are the areas of dissatisfaction of our faculty and employees?
- Who are the faculty doing good job?
- What are the areas where the cost can be reduced?
- What are the expectations of parents of students from the institution?


Phases in FOM

- Feature Selection
- Clustering
- Taxonomy Editing-fine tuning categories
- Visualization – plots, scatter diagrams etc
- Pattern Discovery – trends, correlations

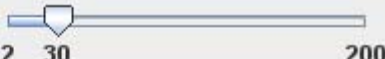
IBM Unstructured Information Modeler



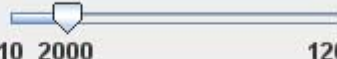
Download from IBM AlphaWorks freely



Generate classes

☒ automatically with classes. 


☐ from keyword queries.

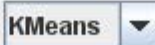
Number of Dictionary Terms 






☒ Adjust # of Classes after Clustering ☒ Uses Phrases in Dictionary

Number of Sentences to analyze in each Example ☒ All ☐ 1 ☐ 2 ☐ 3

File Size (lines) 6684

Data input file C:\uimodeler\text.dat 

Clustering Algorithm 

IBM Unstructured Information Modeler: C:\uimodeler\.\text.dat

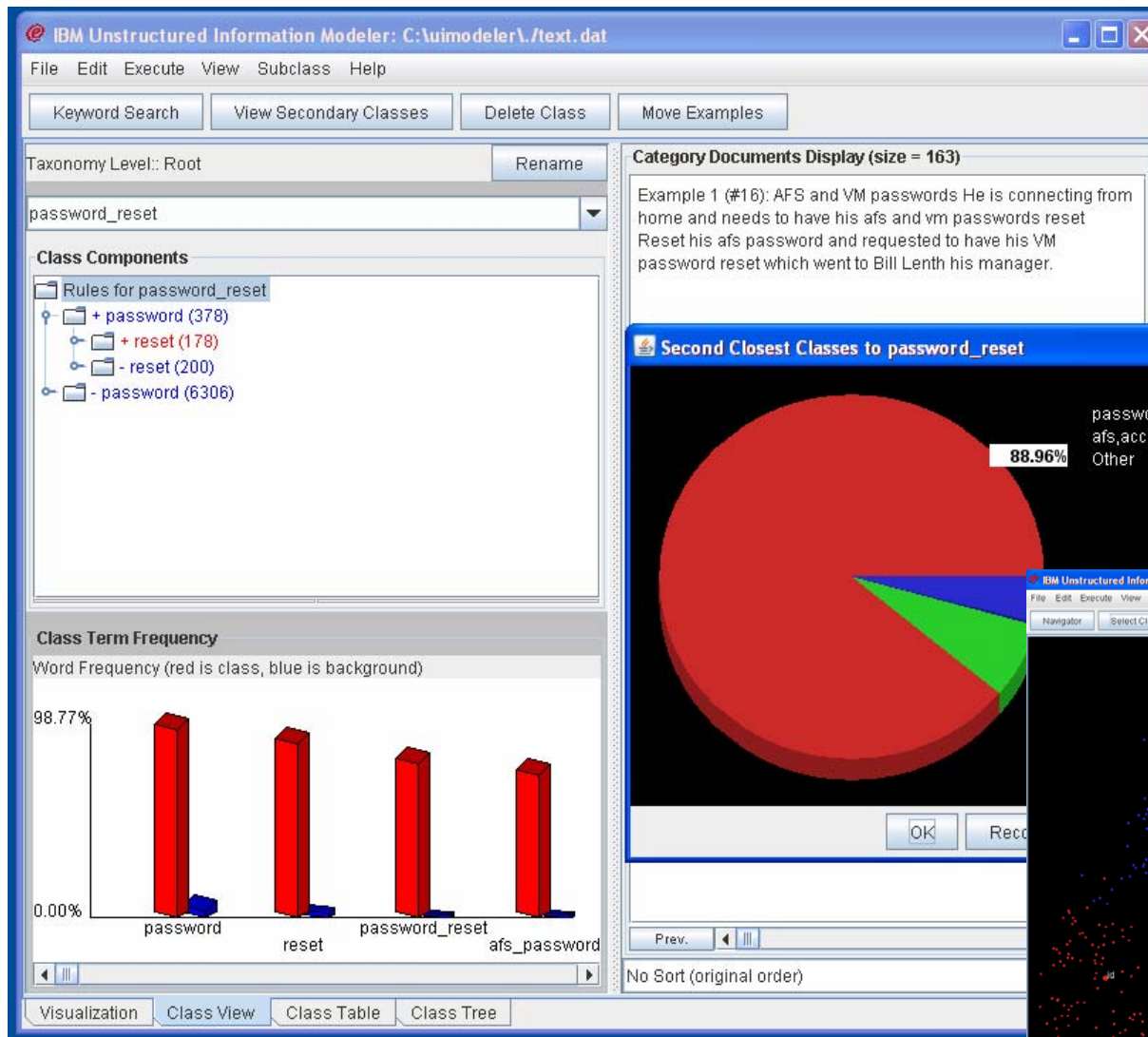
File Edit Execute View Subclass Help

Dictionary Tool View Selected Class Subclass Merge Classes

Taxonomy Level: Root

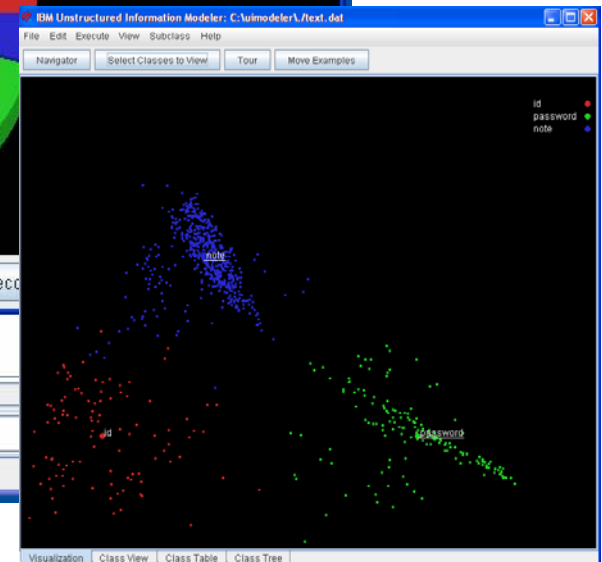
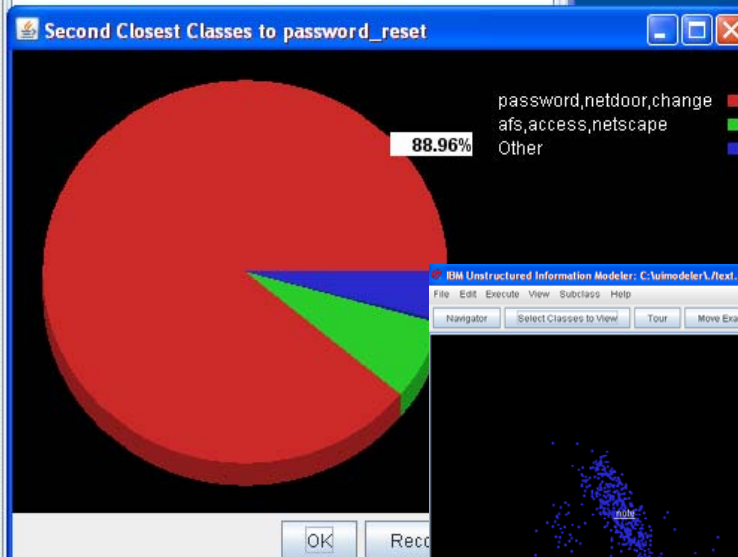
	Class Name	Size	Cohesion	Distinctness
1	password_reset	163 (2.44%)	75.49%	39.13%
2	print	1087 (16.26%)	59.91%	64.29%
3	server	206 (3.08%)	57.36%	64.29%
4	afs,page	136 (2.03%)	56.72%	66.53%
5	adsm	113 (1.69%)	56.70%	67.74%
6	network	189 (2.83%)	55.90%	55.46%
7	address_book	214 (3.20%)	55.72%	66.40%
8	calendar	128 (1.92%)	55.43%	65.21%
9	quick_fix	387 (5.79%)	54.44%	80.35%
10	install	537 (8.03%)	52.96%	49.35%
11	connect	209 (3.13%)	52.80%	55.46%
12	ip	91 (1.36%)	52.42%	66.40%
13	configure & needed	105 (1.57%)	51.62%	49.35%
14	email	372 (5.57%)	51.46%	54.56%
15	ibm	180 (2.69%)	50.00%	71.01%
16	file	314 (4.70%)	46.80%	75.07%
17	note	673 (10.07%)	45.61%	57.09%
18	drive	156 (2.33%)	45.23%	76.86%
19	database	211 (3.16%)	44.45%	54.56%
20	vm	171 (2.56%)	43.73%	72.93%
21	password,netdoor,change	137 (2.05%)	42.47%	39.13%
22	problem	169 (2.53%)	39.38%	72.09%
23	set	132 (1.97%)	39.35%	64.77%
24	aix,help	147 (2.20%)	38.91%	57.89%
25	afs,access,netscape	175 (2.62%)	37.02%	63.51%
26	system,work	282 (4.22%)	31.34%	72.09%
	TOTAL / AVERAGE	6684	50.84%	62.35%

Visualization Class View Class Table Class Tree



Category Documents Display (size = 163)

Example 1 (#16): AFS and VM passwords He is connecting from home and needs to have his afs and vm passwords reset
Reset his afs password and requested to have his VM password reset which went to Bill Lenth his manager.



Publications

- K.Rajkumar, B.Ramados (2007). Semi-automated annotation and retrieval of dance media objects. *Cybernetics and Systems*, Taylor and Francis, 38(4):349-379, PA, USA.
- K.Rajkumar, B.Ramados (2007). Semantic modeling and retrieval of dance video annotations. *INFOCOMP Journal of Computer Science*, 6(1):9-17, Brazil.
- K.Rajkumar, B.Ramados (2006). Modeling and annotating the expressive semantics of dance videos. *International Journal of IT and Knowledge*, 1(2):137-146, Sofia, Bulgaria.
- K. Rajkumar, B. Ramados (2006), Modeling the Dance Video Semantics using Regular Tree Automata, *Fundamenta Informaticae (FI)*, IOS Press, Amsterdam, The Netherlands
- K. Rajkumar, B. Ramados (2006), Modeling and Querying the Expressive Semantics of Dance Videos, *Journal of Information and Knowledge Management (JIKM)*, World Scientific, Singapore
- K. Rajkumar, B. Ramados (2004), An approach to Conceptual Modeling and Extracting Expressive Semantics of Dance Videos, *Lecture Notes in Computer Science (LNCS)*, 3356:1-10, Springer Verlag, Heidelberg, Germany

Publications..cond

- K.Rajkumar (2007). Modeling and annotation of the dance media semantics. *Informer*, 23:11-12, British Computer Society-IRSG, UK
- K. Rajkumar, B. Ramadoss (2006), Semi-automatic Annotation and MPEG-7 Authoring of Dance Videos, *ACM 15th International Conference on Information and Knowledge Management (CIKM'06)*, Nov 6-11, 2006, Arlington, VA, USA
- K. Rajkumar, B. Ramadoss (2006), Generic Modeling of the Dance Video Semantics, *IEEE Conference on Information Technology (CIT'06)*, Sep 20-22, 2006, Seoul, Korea
- K. Rajkumar, B. Ramadoss (2006), Modeling and Annotating the Expressive Semantics of Dance Videos, *4th International Conference on Information Research and Applications (iTECH'06)*, 94-104, June 20-25, 2006, Varna, Bulgaria
- K. Rajkumar, B. Ramadoss (2006), Modeling the Dance Video Annotations, *IEEE International Conference on Digital Information Management (ICDIM'06)*, Dec 6-8, 2006, Bangalore, India
- K. Rajkumar, Christian Gutl, B. Ramadoss (2008). Discovering knowledge from multimodal lecture recordings, *Intl. Conference on Data Engineering and Management 2008*, Feb 9, 1-3, India

How to access me

The screenshot shows a Microsoft Internet Explorer window titled "DBLP: Kannan Rajkumar - Microsoft Internet Explorer". The address bar shows the URL: <http://www.informatik.uni-trier.de/~ley/db/indices/a-tree/r/Rajkumar.Kannan.html>. The page header includes the logos for "uni-trier.de", "Computer Science Bibliography", and "Universität Trier". The main heading is "Kannan Rajkumar". Below this, there is a link to "List of publications from the DBLP Bibliography Server - FAQ" and a search bar with the text "author:kannanrajkumar:". The page displays a list of publications, with the following entries visible:

- 2007**
 - 5 **EE** Balakrishnan Ramadoss, Kannan Rajkumar: Semi-automated Annotation and Retrieval of Dance Media Objects. *Cybernetics and Systems* 38(4): 349-379 (2007)
- 2006**
 - 4 **EE** Balakrishnan Ramadoss, Kannan Rajkumar: Semi-automatic annotation and MPEG-7 authoring of dance videos. *CIKM* 2006: 878-879
 - 3 **EE** Balakrishnan Ramadoss, Kannan Rajkumar: Generic Modeling and Annotation of the Dance Video Semantics. *CIT* 2006: 123
 - 2 **EE** Balakrishnan Ramadoss, Kannan Rajkumar: Modeling the Dance Video Annotations. *ICDIM* 2006: 145-150
- 2004**
 - 1 **EE** Kannan Rajkumar, Balakrishnan Ramadoss, Krishnamurthi Ilango: An Approach for Conceptual Modeling and Extracting Expressive Semantics from Dance Videos. *CIT* 2004: 1-10

On the right side, there are filters for "Refine by AUTHOR" (Balakrishnan Ramadoss (5), Krishnamurthi Ilango (1)), "Refine by VENUE" (CIT (2), CIKM (1), Cybernetics and Systems (CAS) (1), ICDIM (1)), and "Refine by YEAR" (2006 (3), 2004 (1), 2007 (1)).

Google string: kannan rajkumar
or rajkumar kannan

The screenshot shows a Microsoft Internet Explorer window titled "Kannan Rajkumar - ACM author profile page - Microsoft Internet Explorer". The address bar shows the URL: http://portal.acm.org/author_page.cfm?d=81319499613&coll=GUIDE&dl=GUIDE&trk=08&CFID=296193798&CFTOKEN=16589926. The page header includes the "PORTAL" logo and the text "Slovakia Consortium". The main heading is "Kannan Rajkumar". Below this, there is a photo of Kannan Rajkumar and a link to "homepage". The page displays a list of publications, with the following entry visible:

- 2006**
 - 1 **EE** Balakrishnan Ramadoss, Kannan Rajkumar: November 2006 *CIKM '06*: Proceedings of the 15th ACM international conference on Information and knowledge management

On the right side, there is a section for "Bibliometrics" showing publication history and counts. The table below summarizes the data:

Bibliometrics: publication history	
Publication years	2006-2006
Publication count	2
Citation Count	0
Available for download	1
Downloads (6 Weeks)	11
Downloads (12 Months)	85

Below the table, there is a section for "SEARCH" with a search bar and a link to "Search Author's Publications". The search results show 2 search results. The first result is the same as the one listed above. The page also includes a section for "AUTHOR'S COLLEAGUES" and a link to "See all colleagues of this author".

Pausing for a while....



Part III - Virtual Walk to India

My heart felt thanks to
Prof. Maria Bielikova,
All faculty members, researchers and
students
of
FIIT-STUBA, SK