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

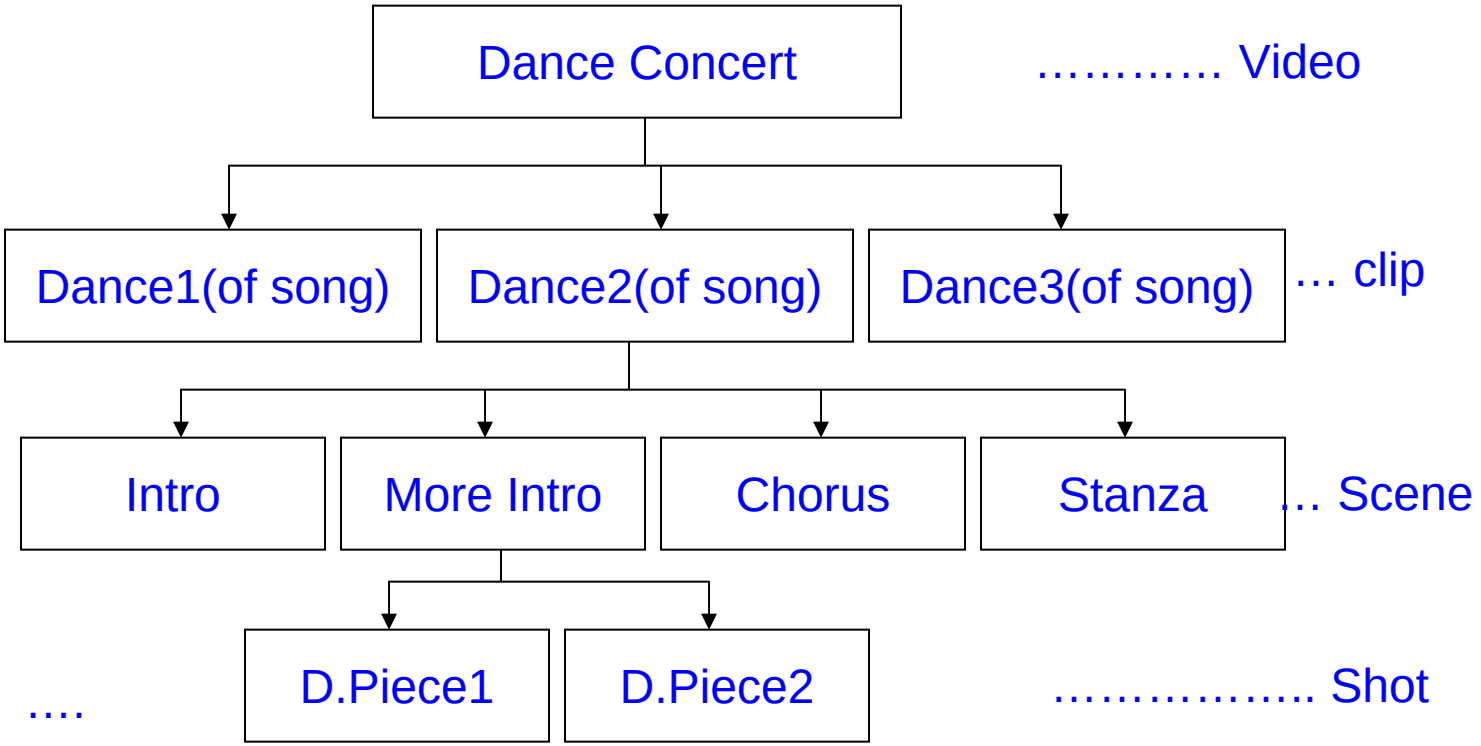
Part-I: Motivation

- 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

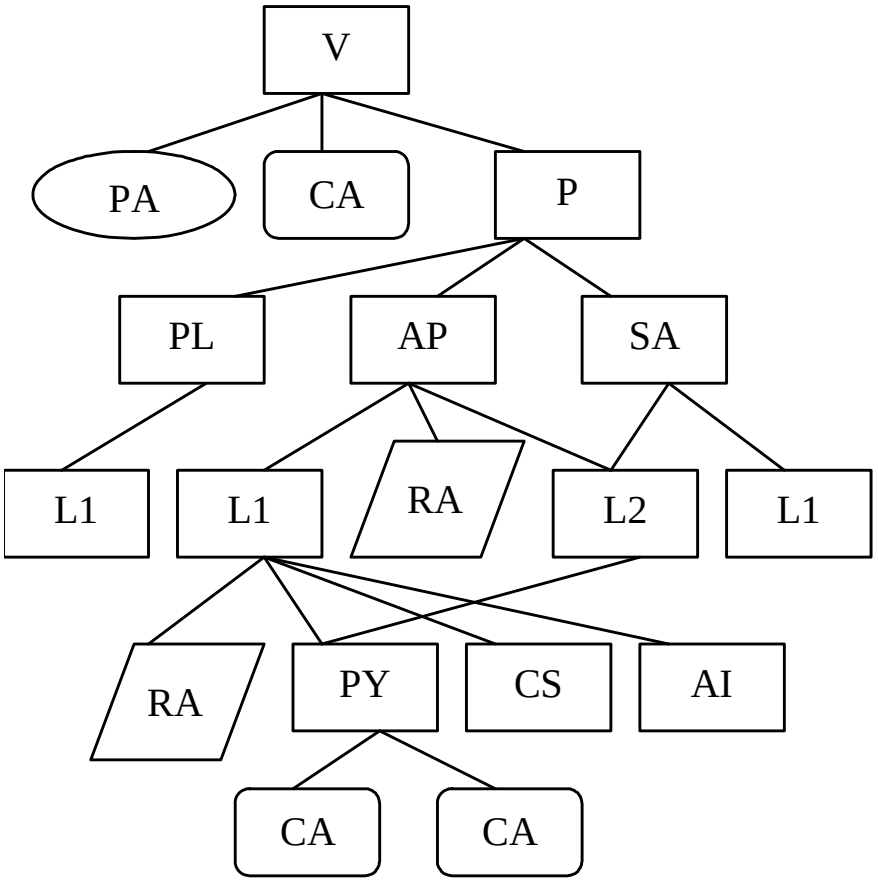
- Types of Dance Archival
  - Human memory (from generations to generations verbally)
  - Using notations (Labanotation, Banesh)
  - Recording mediums (CD, VCD, DVD etc)
- Problems:
  - Limited human memory
  - Complex notation symbols and limited Laban experts
  - Searching difficult, because of huge 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

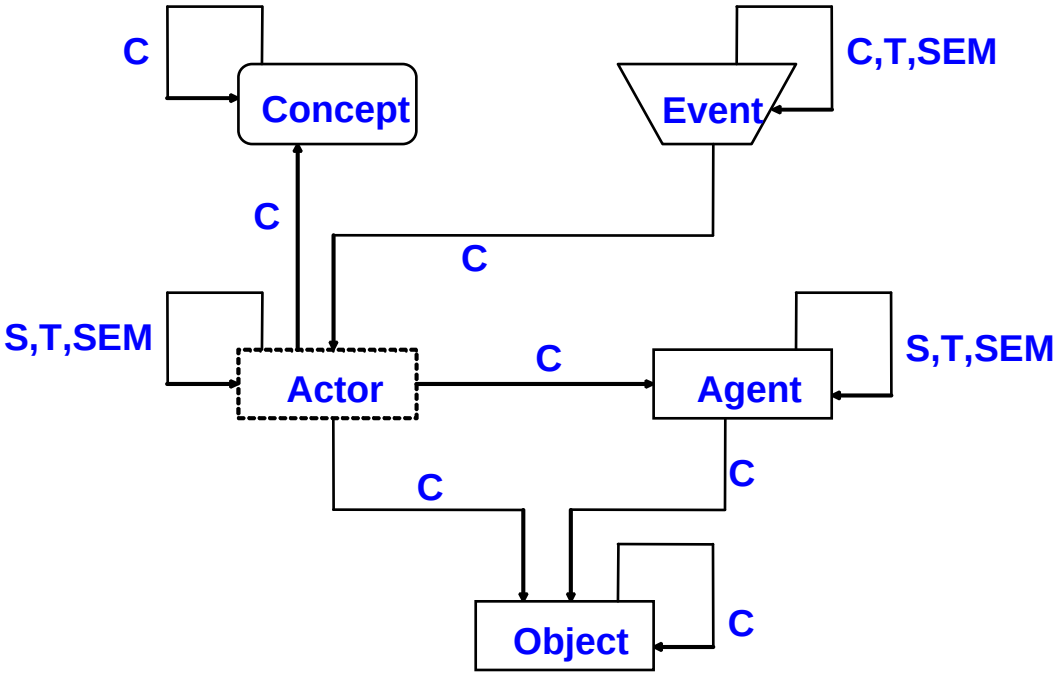
SA-Saranam

L-Line of lyrics

RA-Reference Attribute

Video Semantic Directed Acyclic Graph Model for Indian Dance videos

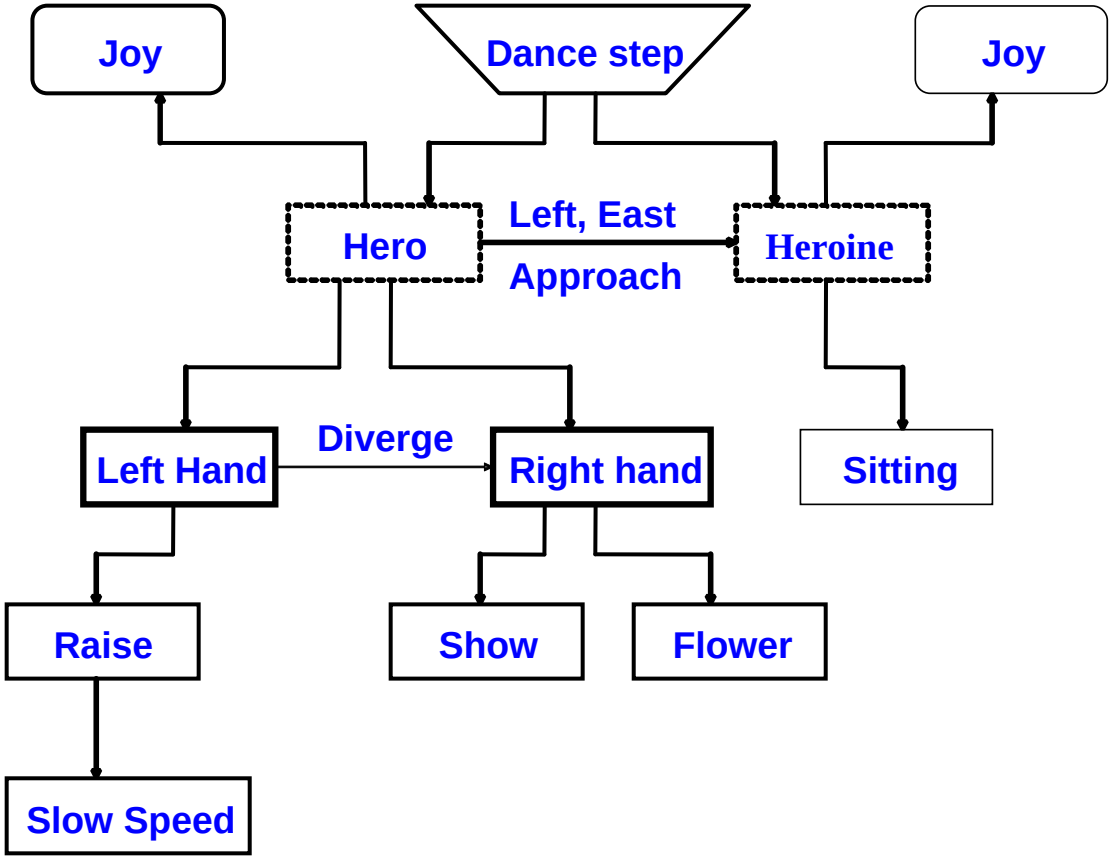
DVSM: Agent oriented DV model



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

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

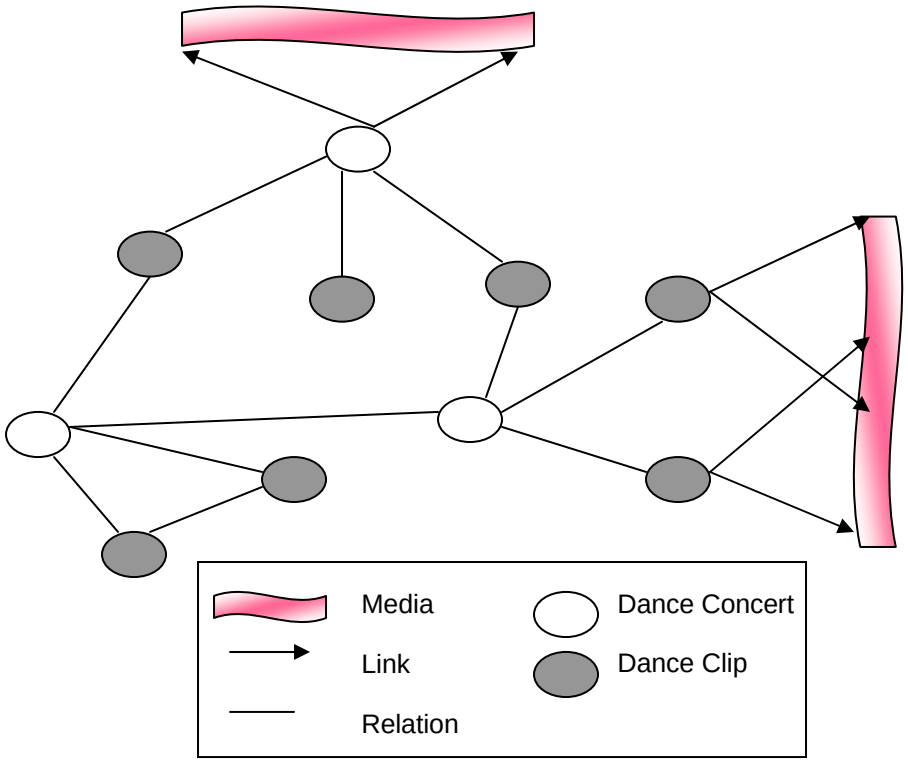
Graph instance of a dance step



Event based Semantic net Model

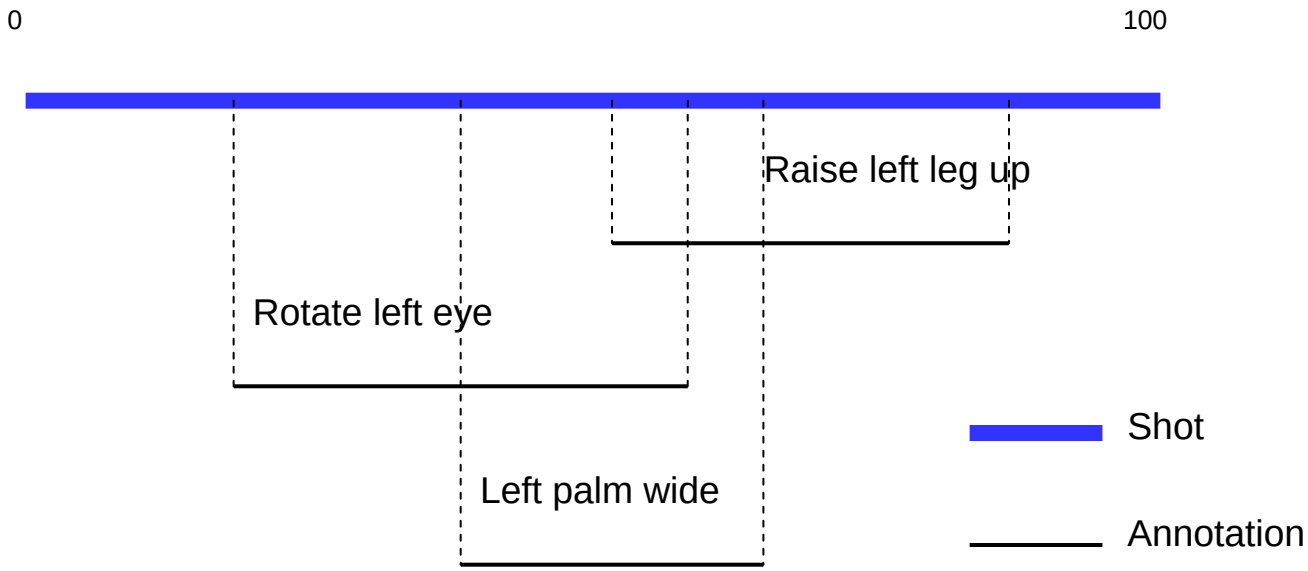
All annotations of dance media are organized as a semantic net.

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

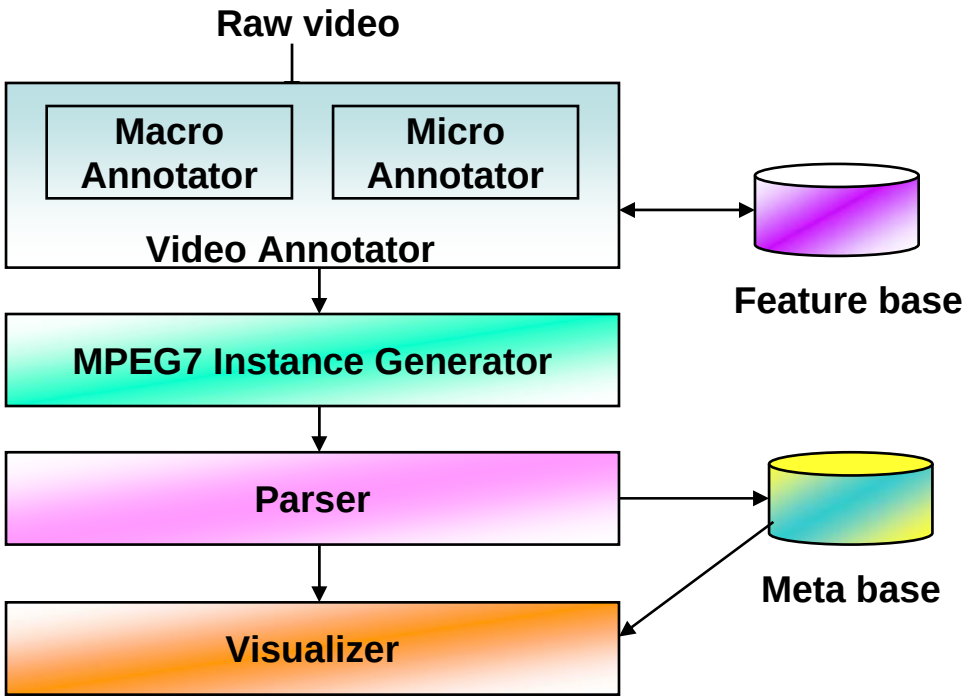


Description schemes for Dance Media

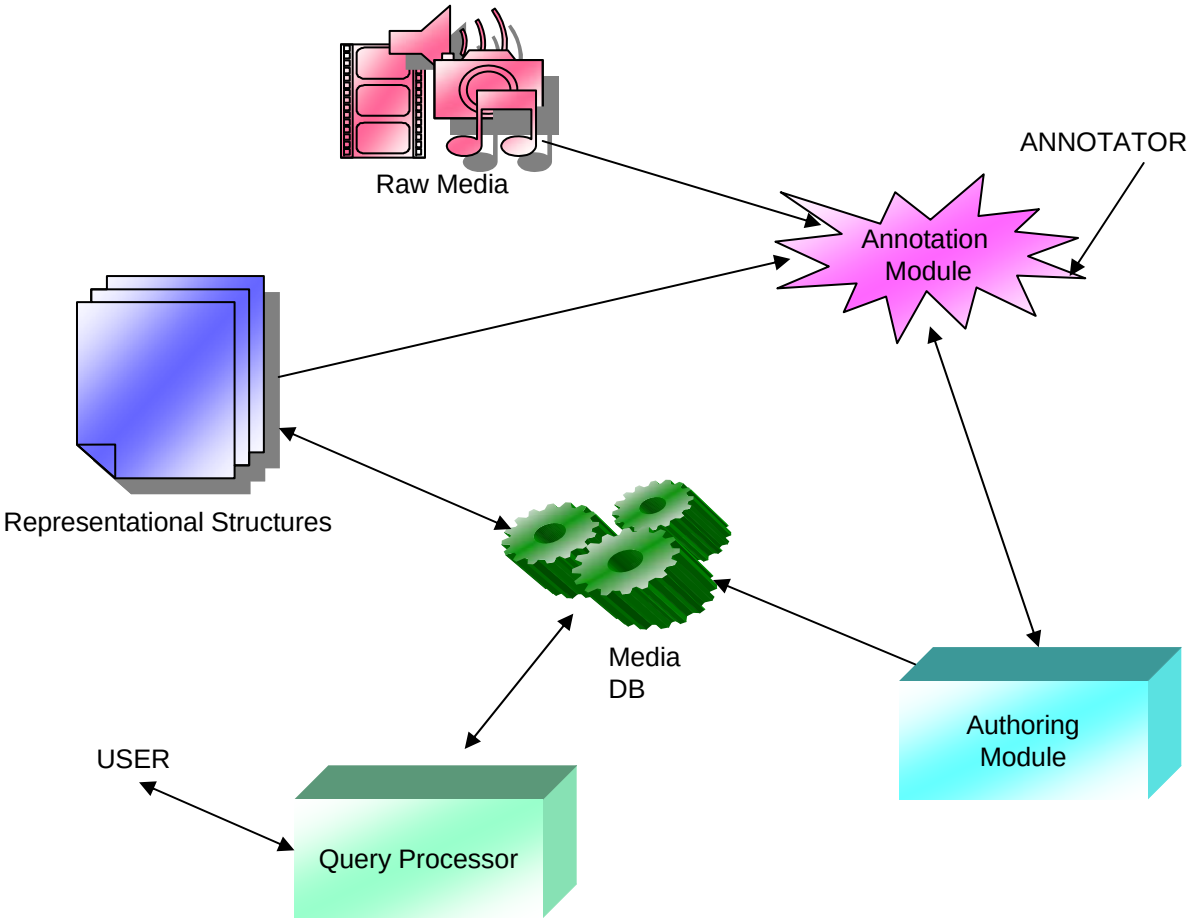
- DanceConcertDS
- DanceClipDS
- RelationDS
- LinkDS
- LifeSpanDS
- ResourceDs
- PersonDS
- CharacterDS
- SongDs
- DancePieceDS
- MovementDS
- STRDS
- EventDS
- ObjectDS
- SemioticsDS
- BasicInfoDS

XML Schema

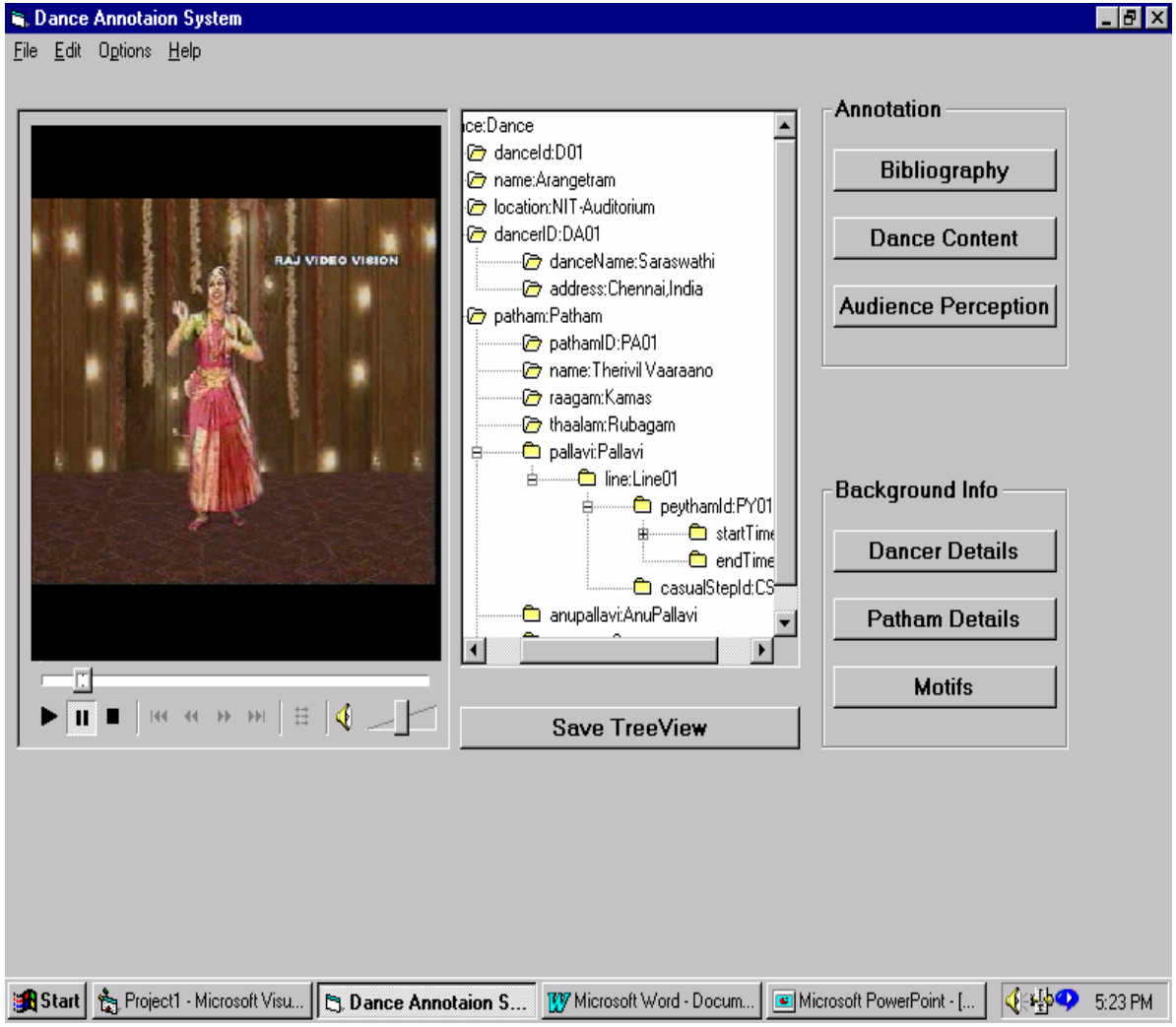
Dance Video System Architecture



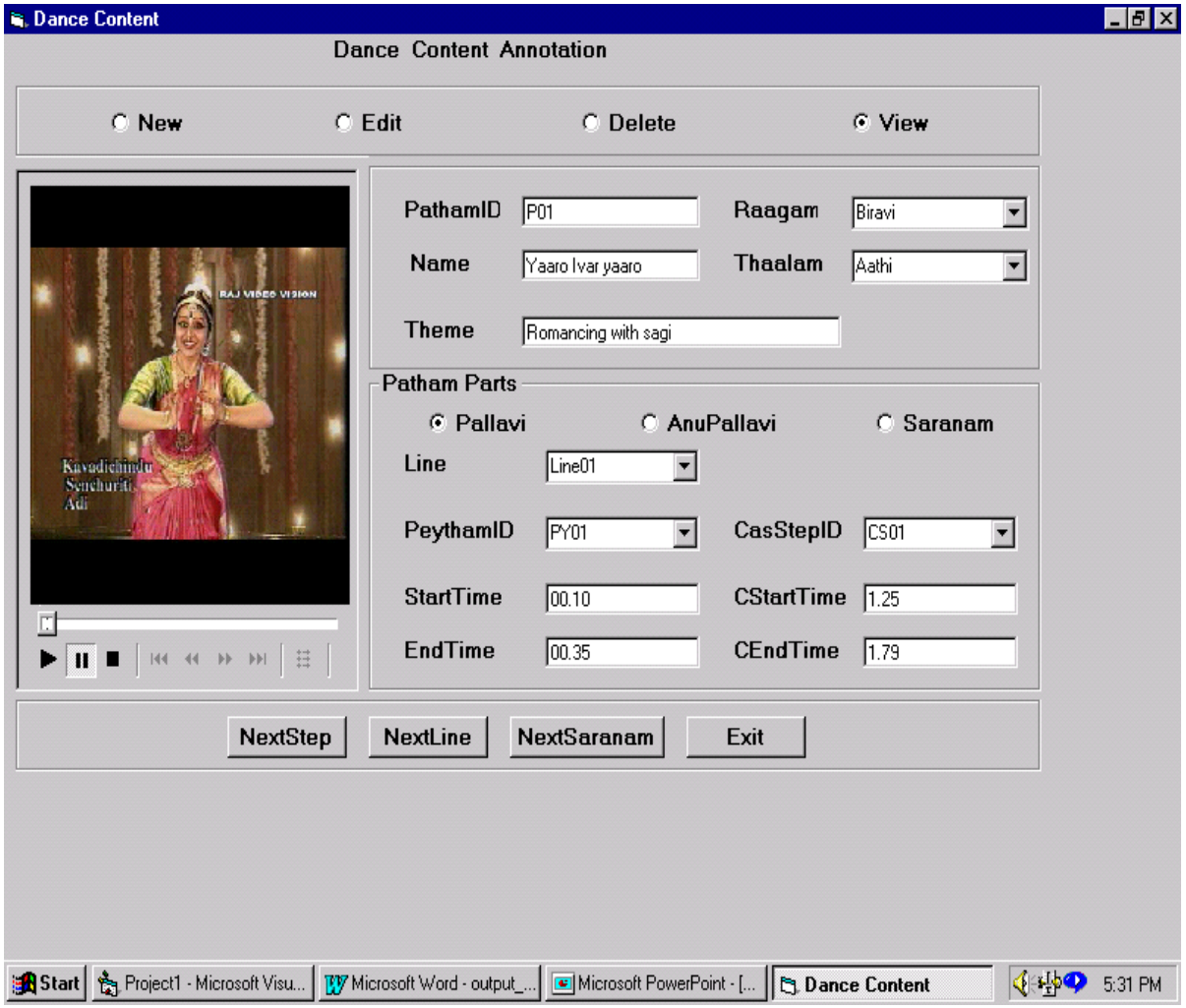
DMAR System Architecture



Semantic Annotation – Semi automatic



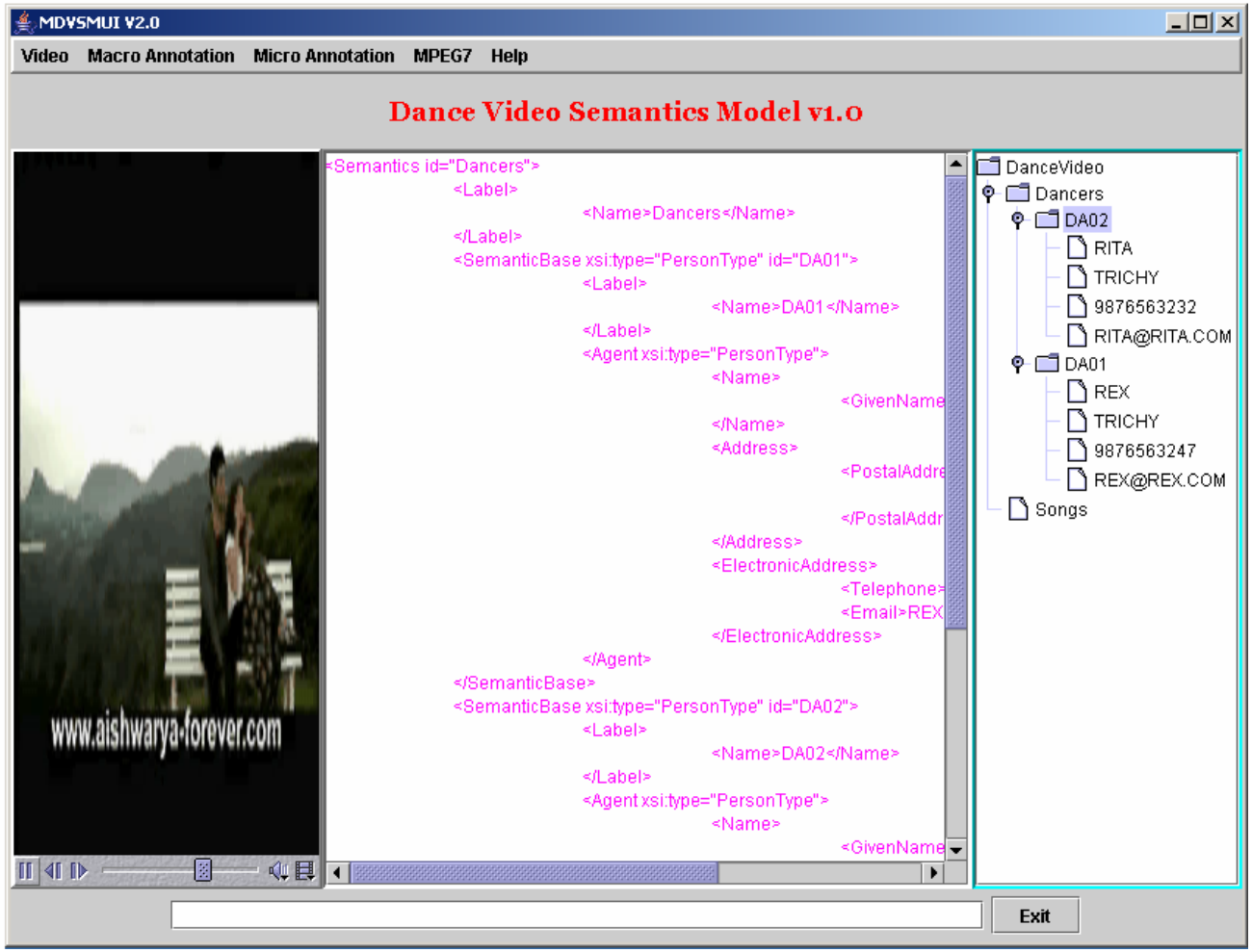
Screen shots of VSDAG



Screen shot of macro annotation

Screen shot of micro annotation

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

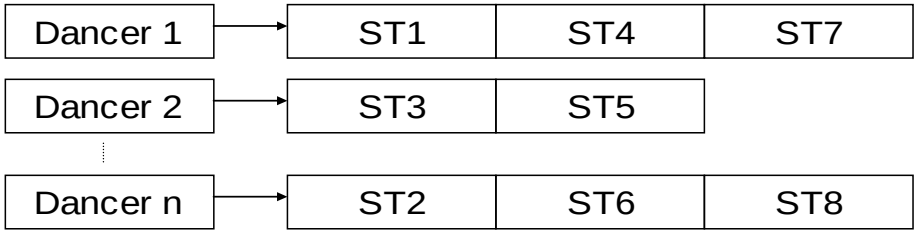


Figure.1: The inverted file DA_IF

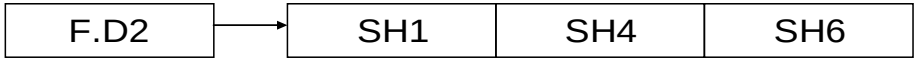


Figure.2: Inverted list of D1

Query Processing Engine

Backus Naur Form (BNF) Query Syntax

Metrics

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

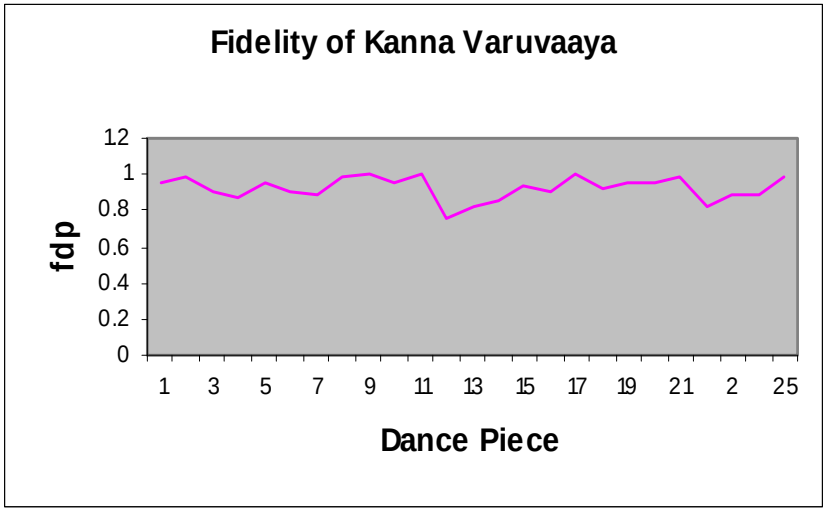
Fidelity of DancePiece(*fdp*) and Dance(*fdance*)

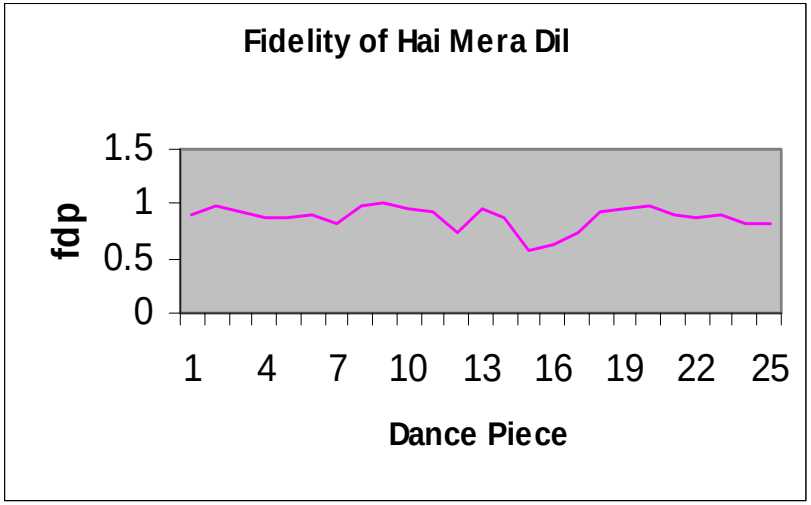
Ability to resurrect the original dance sequence by following the annotations

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

$$fdancei = \frac{\Sigma\ fdpi}{n}$$

where n - total # dp of dancei





Applications

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

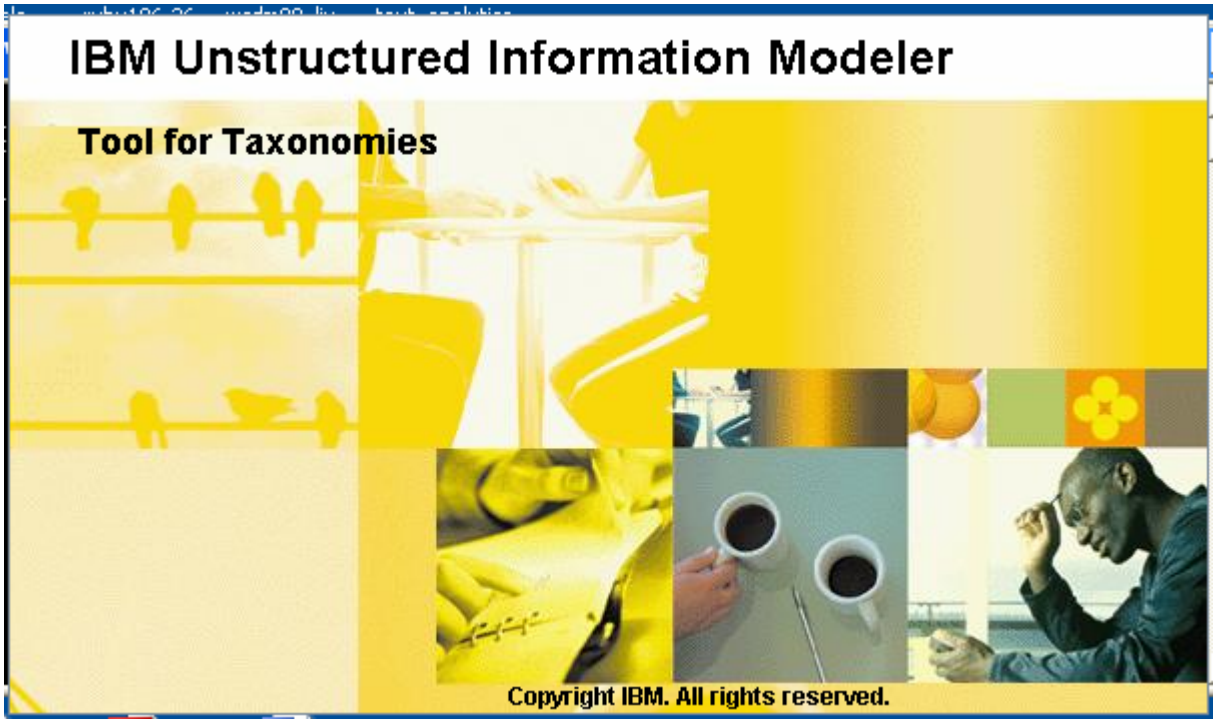
Part-II: Feedback and Opinion Mining(FOM)

- 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?

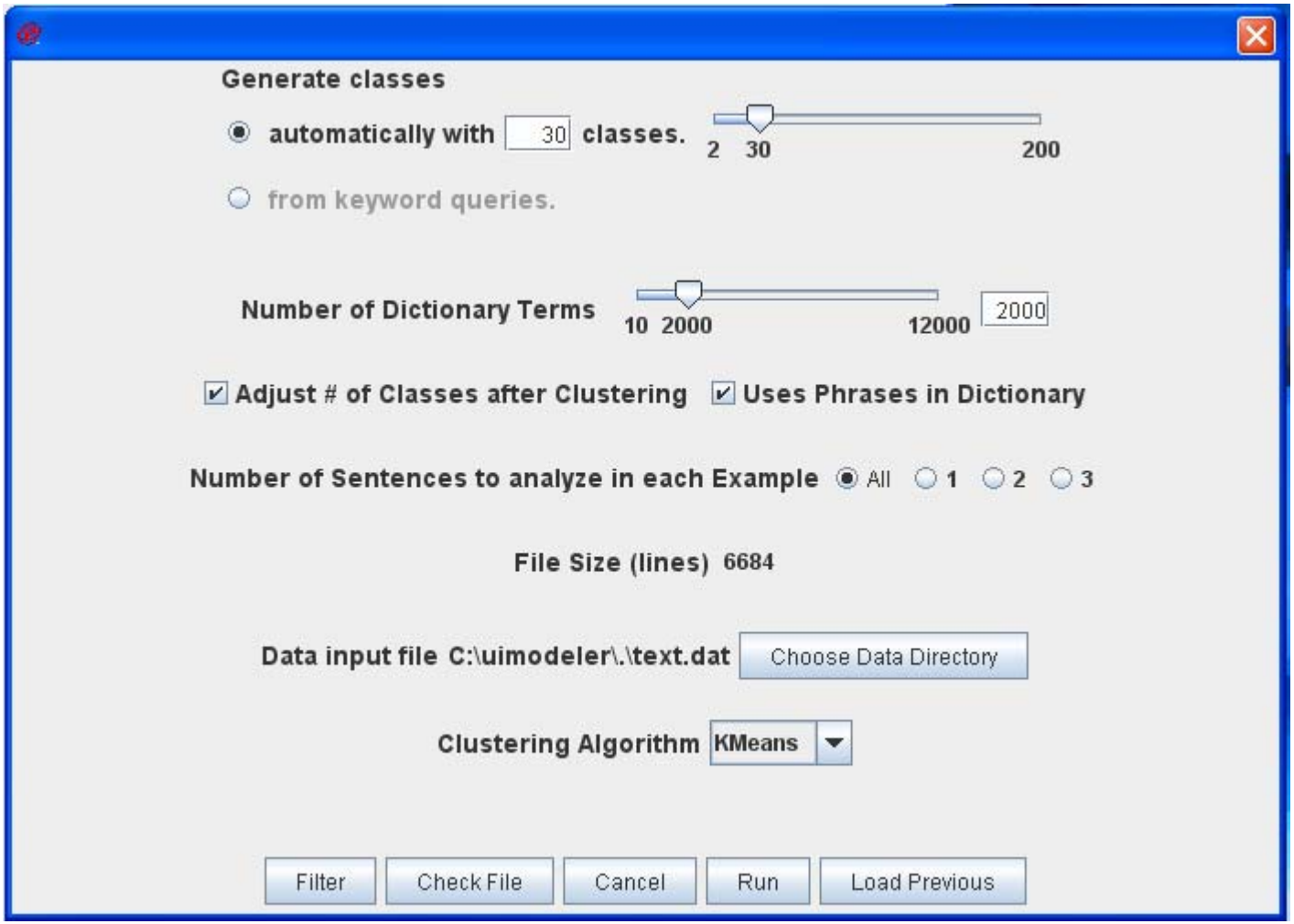
Phases in FOM

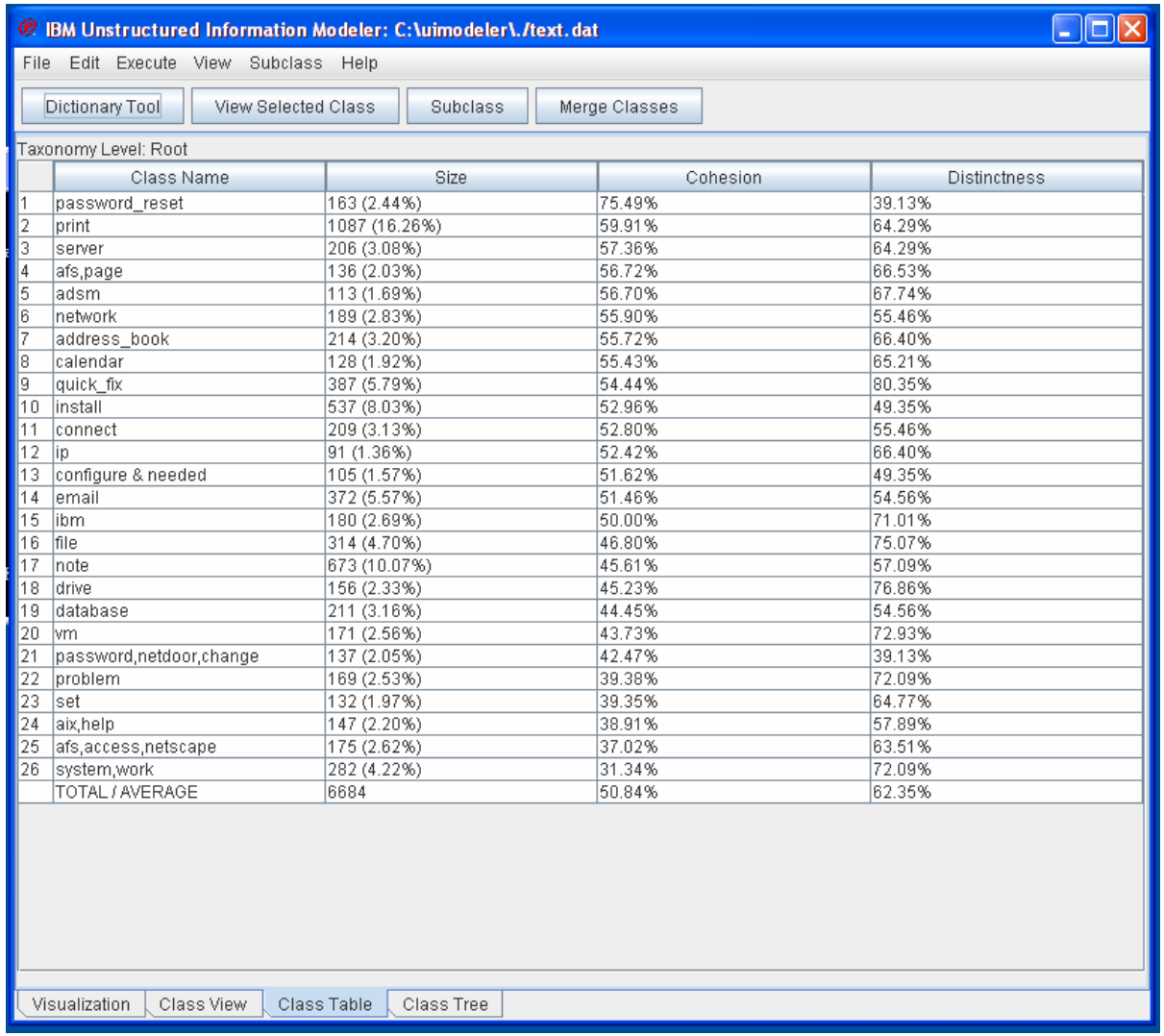
- Feature Selection
- Clustering
- Taxonomy Editing-fine tuning categories
- Visualization – plots, scatter diagrams etc
- Pattern Discovery – trends, correlations

IBM Unstructured Information Modeler

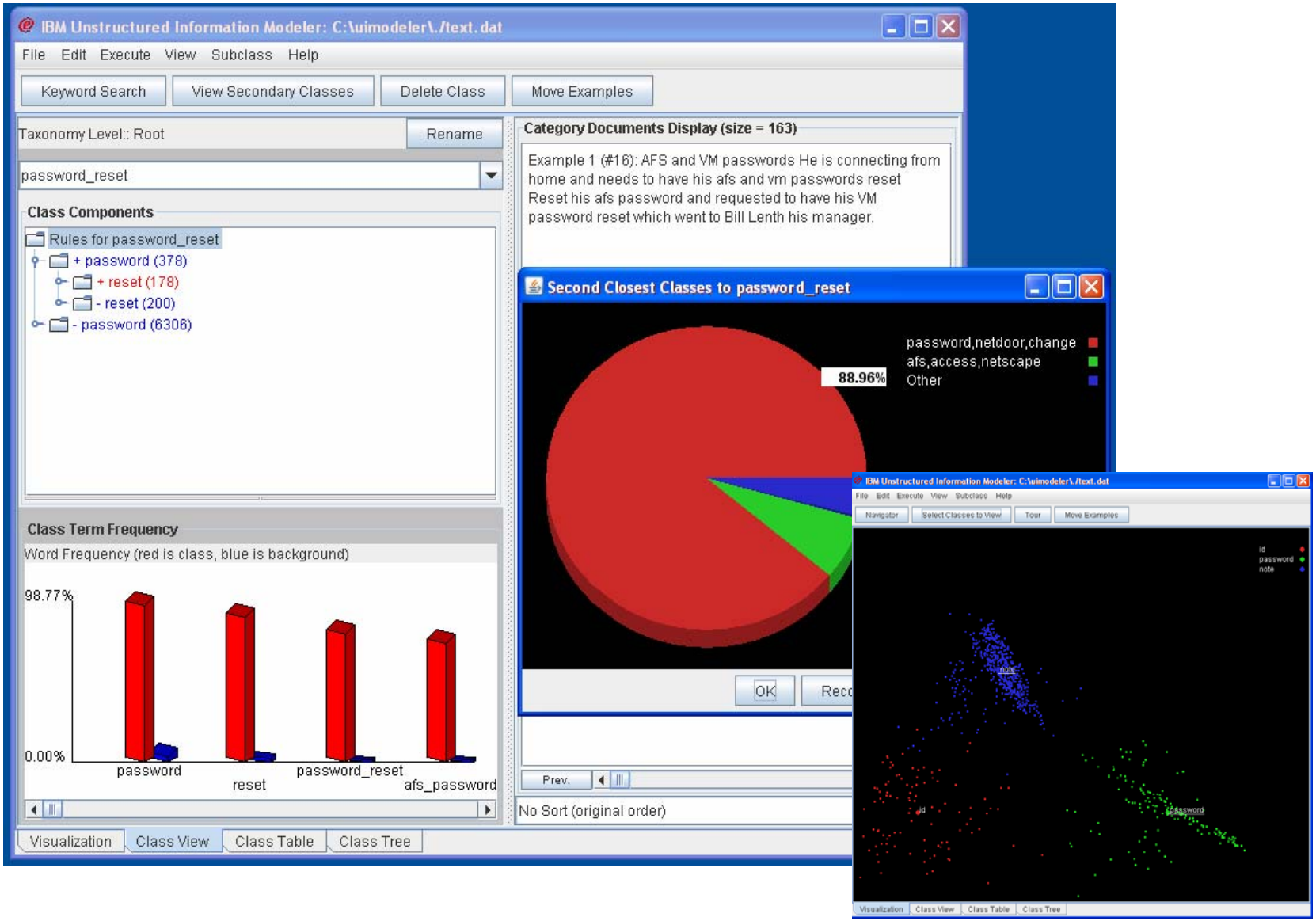


Download from IBM AlphaWorks freely


Generate classes
automatically with 30 classes.
2 30 200
from keyword queries.
Number of Dictionary Terms
10 2000 12000
2000
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
Choose Data Directory
Clustering Algorithm
KMeans
Filter
Check File
Cancel
Run
Load Previous



	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%


IBM Unstructured Information Modeler: C:\uimodeler\./text.dat
File Edit Execute View Subclass Help
Keyword Search
View Secondary Classes
Delete Class
Move Examples
Taxonomy Level:: Root
Rename
password_reset
Class Components
Rules for password_reset
+ password (378)
+ reset (178)
- reset (200)
- password (6306)
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.
Second Closest Classes to password_reset
password,netdoor,change
afs,access,netscape
Other
88.96%
OK
Class Term Frequency
Word Frequency (red is class, blue is background)
98.77%
0.00%
password
reset
password_reset
afs_password
Prev.
No Sort (original order)
Visualization
Class View
Class Table
Class Tree

Publications

K.Rajkumar, B.Ramadoss (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.Ramadoss (2007). Semantic modeling and retrieval of dance video annotations. INFOCOMP Journal of Computer Science, 6(1):9-17, Brazil.

K.Rajkumar, B.Ramadoss (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. Ramadoss (2006), Modeling the Dance Video Semantics using Regular Tree Automata, Fundamenta Informaticae (FI), IOS Press, Amsterdam, The Netherlands

K. Rajkumar, B. Ramadoss (2006), Modeling and Querying the Expressive Semantics of Dance Videos, Journal of Information and Knowledge Management (JIKM), World Scientific, Singapore

K. Rajkumar, B. Ramadoss (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

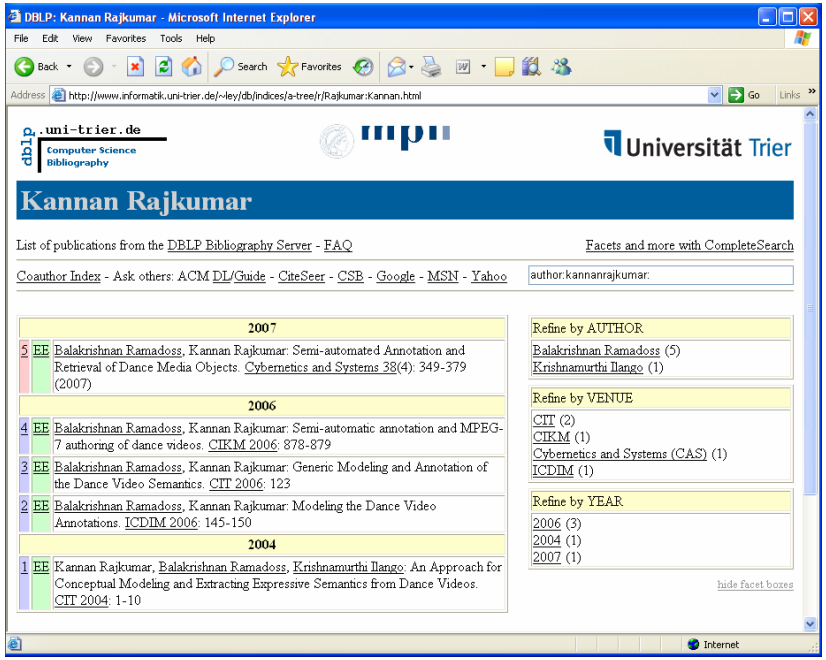
K. Rajkumar, B. Ramadoss (2006), Generic Modeling of the Dance Video Semantics, IEEE Conference on Information Technology (CIT'06), Sep 20-22, 2006, Seoul, Korea

K. Rajkumar, B. Ramadoss (2006), Modeling and Annotating the Expressive Semantics of Dance Videos, 4th International Conference on Information Research and Applications (*i*TECH'06), 94-104, June 20-25, 2006, Varna, Bulgaria

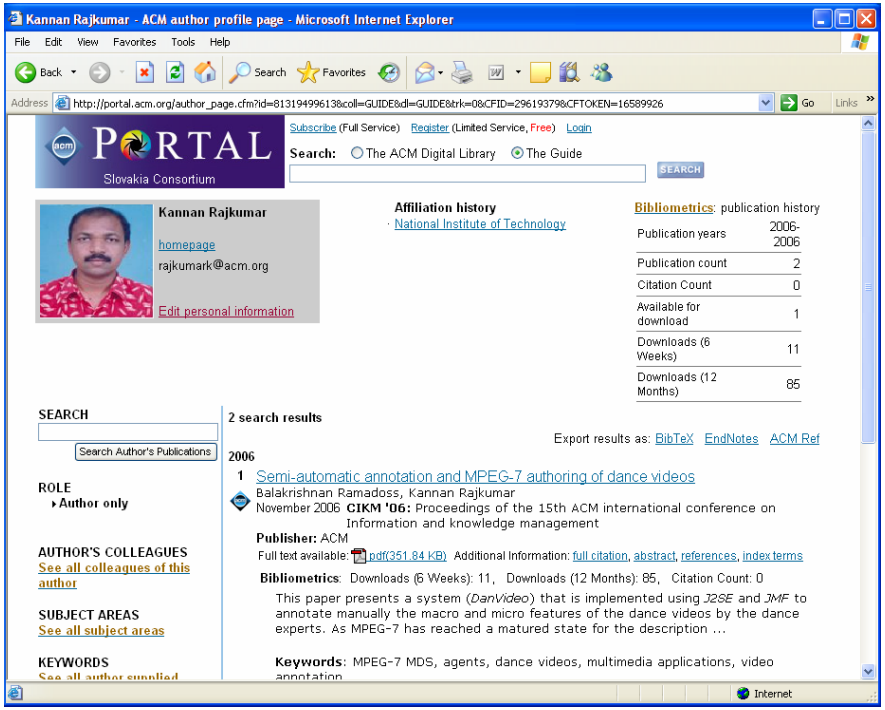
K. Rajkumar, B. Ramadoss (2006), Modeling the Dance Video Annotations, IEEE International Conference on Digital Information Management (ICDIM'06), Dec 6-8, 2006, Bangalore, India

K. Rajkumar, Christian Gutl, B. Ramadoss (2008). Discovering knowledge from multimodal lecture recordings, Intl. Cinference on Data Engineering and Management 2008, Feb 9, 1-3, India

How to access me



Google string: kannan rajkumar
or rajkumar kannan



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