TREC 2005 Video Retrieval Evaluation
Introductions

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Origins

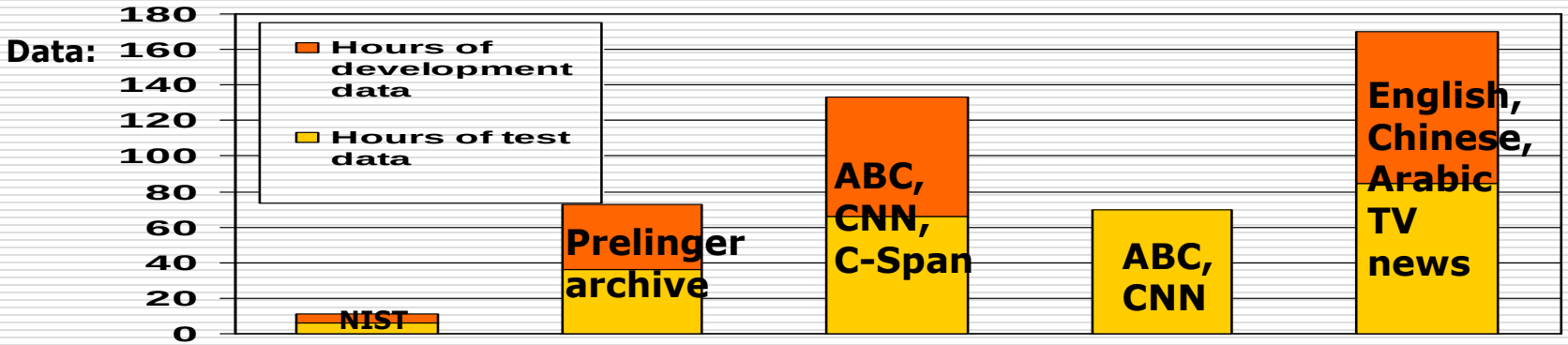
- Problem:
  - Rapidly growing quantities of digital video
  - Increasing research in content-based retrieval
  - But no common basis for evaluation/comparison
- Approach:
  - Find as much video data as possible and make it available to the community of researchers
  - Use the data to build an open metrics-based evaluation in the Cranfield/TREC tradition
  - Invite participation and see what happens…

Goals

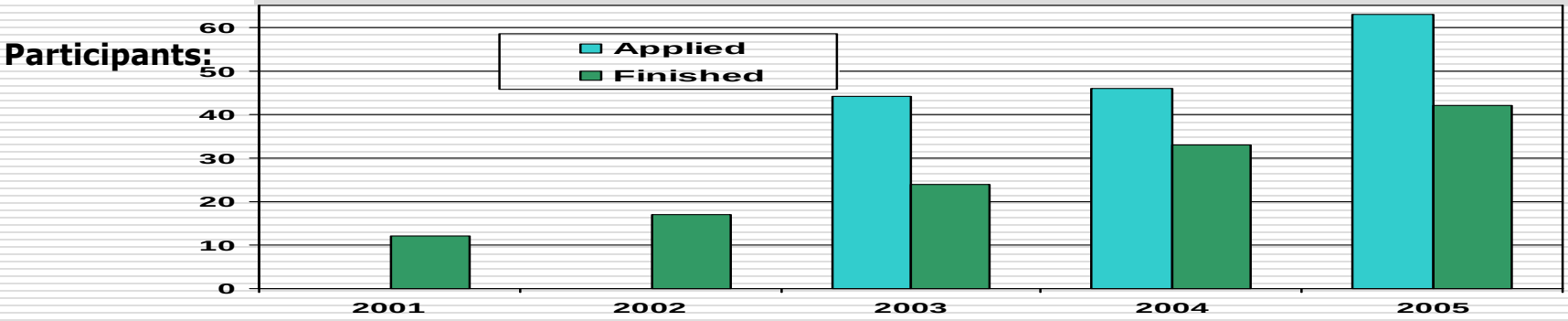
- Promote progress in content-based retrieval from large amounts of digital video

- Answer some questions:
  - How can systems achieve such retrieval (in collaboration with a human)?
    - usefulness of generic features
      - which features most useful?
      - how/when to combine?
    - human & system collaboration
      - who does what?
      - what is the optimal interface?
  - How can one reliably benchmark such systems?

Evolution: data, tasks, participants,...



Tasks:	2001	2002	2003	2004	2005
	Shot boundaries	Shot boundaries	Shot boundaries	Shot boundaries	Shot boundaries
		High-level features	High-level features	High-level features	High-level features
	Search	Search	Search	Search	Search
			Stories	Stories	Camera motion
					BBC rushes



Peer-reviewed papers:	2001	2002	2003	2004	2005
		10	**17**	**46**	**39** (so far)

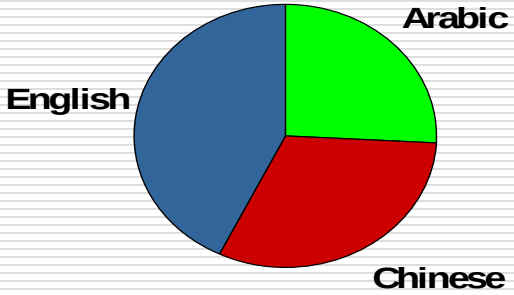
Evolution… 2005

- Data: 170 hrs (Nov.'04 news in Arabic, Chinese, and English)
- 4 evaluated tasks
  - Shot boundary determination
  - Low-level feature (camera motion) extraction
  - High-level feature extraction (10)
  - Search (automatic, manual, interactive)
    - Base scenario: an English-only searcher looking for video in Arabic, Chinese, and/or English
- 1 exploratory task: BBC rushes (thanks to Richard Wright at BBC)
- Collaborative annotation of LSCOM-lite features in common development data
- Thanks to Gary Marchionini and the Open Video Project at UNC for providing the NASA videos for the shot boundary task

More about the data: News

Distribution of sources from November 2004

Language	Episodes	Source	Program	Total(hrs)
Arabic	15	LBC	LBC NAHAR	13.13
Arabic	25	LBC	LBC NEWS	23.14
Arabic	17	LBC	LBC NEWS2	6.80
Chinese	28	CCTV4	DAILY_NEWS	25.80
Chinese	21	CCTV4	NEWS3	9.30
Chinese	21	NTDTV	NTD NEWS12	9.28
Chinese	18	NTDTV	NTD NEWS19	7.93
English	26	CNN	AARON BROWN	22.80
English	17	CNN	LIVE FROM	7.58
English	27	NBC	NBC PHILA23	11.83
English	19	NBC	NIGHTLY NEWS	8.47
English	25	MSNBC	MSNBC NEWS11	11.10
English	28	MSNBC	MSNBC NEWS13	12.42
				169.58



More about the data: News

- Unpatched Windows had problems with larger drives
- Some non-news (sitcoms / soap operas) included
- Even narrow time window comprises lumpy data
  - US election campaigns dominate news up to 7. Nov.
  - Yassar Arafat's illness and death on 11. Nov.
  - protest after Ukrainian run-off election on 21. Nov
- Repetition of footage across multiple broadcasts from same source
- ASR/MT from multiple sources of varying quality
  - US government contractor running (untuned) Virage Videologger on Arabic, Chinese, and English
  - MS ASR beta system (+ manual translations) on Chinese

More about the data: News - ASR/MT

Re-quired	Development				Test			
	MPEG-1	Virage ASR/MT	MS-ASR	XLT of MS-ASR	MPEG-1	Virage ASR/MT	MS-ASR	XLT of MS-ASR
Ara	26	26	--	--	30	30	--	--
Chi	43	42	--	39	42	42	--	41
Eng	68	--	68	--	68	--	68	--

Op-tional	Development				Test			
	MPEG-1	Virage ASR/MT	MS-ASR	XLT of MS-ASR	MPEG-1	Virage ASR/MT	MS-ASR	XLT of MS-ASR
Chi	43		39		42		42	
Eng	68	57			68	39		

More about the data: BBC rushes

- 50 hours shot for later use in producing travel programming
- Some characteristics:
  - Mostly just natural sound (including crew noise)
  - Sometimes with an on-screen host
  - Lots of redundancy
    - very loooong shots (e.g.,... sun rising over several minutes)
    - multiple takes of actor/participant trying to get lines right
- Potential gold mine for reuse after the original production is complete, BUT inaccessible.
- Question: What sorts of things, large or small, can software do to help a searcher, unfamiliar with the material, efficiently find out what is there?

Evaluated tasks: 41 finishers

Bilkent University	Turkey	-- LL HL SE
Carnegie Mellon University	USA	-- -- HL SE
City University of Hong Kong	China	SB LL -- --
CLIPS-IMAG, LSR-IMAG, Laboratoire LIS	France	SB –- HL --
Columbia University	USA	-- -- HL SE
Dublin City University	Ireland	-- -- -- SE
Florida International University	USA	SB -- -- --
Fudan University	China	SB LL HL SE
FX Palo Alto Laboratory	USA	SB –- HL SE
Helsinki University of Technology	Finland	-- -- HL SE
Hong Kong Polytechnic University	China	SB -- -- --
IBM	USA	SB –- HL SE
Imperial College London	UK	SB –- HL SE
Indian Institute of Technology (IIT)	India	SB -- -- --
Institut Eurecom	France	-- -- HL --
Institute for Infocomm Research	Singapore	-- LL -- --
JOANNEUM RESEARCH	Austria	-- LL -- --
Johns Hopkins University	USA	-- -- HL --
KDDI R&D Laboratories, Inc.	Japan	SB LL -- --
Language Computer Corporation (LCC)	USA	-- -- HL SE
LaBRI	France	SB LL -- --

Evaluated tasks: Who finished?

LIP6-Laboratoire d'Informatique de Paris 6	France	-- -- HL --
Lowlands Team (CWI, Twente, U. of Amsterdam)	Netherlands	-- -- HL SE
Mediamill Team (Univ. of Amsterdam and TNO)	Netherlands	-- LL HL SE
Motorola Multimedia Research Laboratory	USA	SB -- -- --
National ICT Australia	Australia	SB LL HL --
National University of Singapore (NUS)	Singapore	-- -- HL SE
Queen Mary University of London	UK	-- -- -- SE
RMIT University	Australia	SB -- -- --
SCHEMA-Univ. Bremen Team	EU	-- -- HL SE
Technical University of Delft	Netherlands	SB -- -- --
Tsinghua University	China	SB LL HL SE
University of Central Florida / Univ. of Modena	USA,Italy	SB LL HL SE
University of Electro-Communications	Japan	-- -- HL --
University of Iowa	USA	SB LL -- SE
University of Marburg	Germany	SB LL -- --
University of North Carolina	USA	-- -- -- SE
University of Oulu / MediaTeam	Finland	-- -- -- SE
University Rey Juan Carlos	Spain	SB -- -- --
University of Sao Paulo (USP)	Brazil	SB -- -- --
University of Washington	USA	-- -- HL --

Exploratory BBC rushes task: 6 finishers

Accenture Technology Labs / Siderean Software, Inc.	**USA**
City University of Hong Kong	**China**
Dublin City University	**Ireland**
IBM	**USA**
University of Amsterdam	**Netherlands**
University of Central Florida	**USA**

Special thanks…

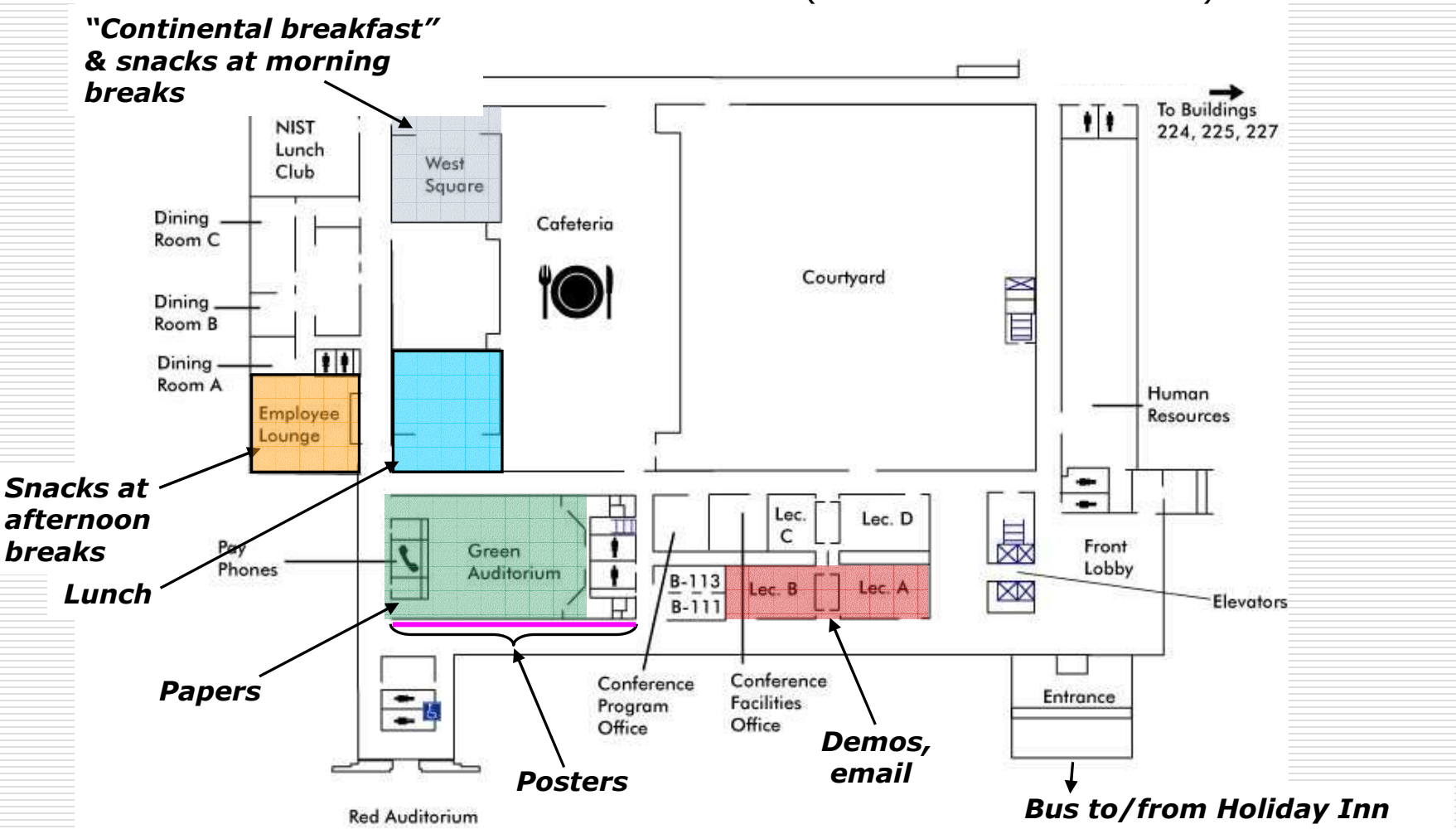
- ARDA, NIST/ITL for funding
- Christian Petersohn (Fraunhofer (Heinrich Hertz) Institute) for the master shot segmentation
- DCU Centre for Digital Video Processing for formatting the master shot reference and selecting the key frames
- Univ. of Amsterdam, Univ. of Iowa, and DCU for helping in emergency distribution of data
- CMU & IBM for the annotation tool and data management
- All the participants who annotated training data
- CMU for donating ASR, MT, and a large set of low-level features

Agenda: Day 1

- Arranged by task
- Time for discussion of approaches & evaluation
- Monday
  - High-level features
  - Low-level features (camera motion)
  - Lunch
  - Rushes
  - Demos & Posters
  - Workshop supper (Rock Bottom Restaurant/Brewery)

Map: NIST Admin. Building, 1st Floor

(included in the notebook)



Agenda: Day 2

- Tuesday
  - Shot boundaries
  - Search
    - Interactive
    - Manual
    - Automatic
  - Lunch
  - VACE plans
  - TRECVID feedback and plans