Multimedia (spatial) databases

Principles of Modern Database Systems
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New kinds of data

- Text, documents
- HTML,XML, XML-Schema documents
- bitmaps, raster images
- audio
- video
- maps
- time series
- vector data, geometrical models

Properties of multi-media data objects

- (very) large data items
- more or less complex internal structure
- E.g. query by humming:
- Need special data entry equipment (e.g. microphone)
- Need special result presentation equipment (e.g. loudspeaker)
- Can be stored as BLOBs
- Alt. filenames in tables
- Problem: How to index and query BLOB *contents?*

Multi-media query

- Query:

select track from songs where
contains(content,:mysong,0.9);

- Need way to enter :mysong and to realize result.
- Large results
- Order as top-10 list
- Similarity matching
- Contains can be foreign function
- Indexing desirable!

Multi-media indexing

- Different indexes sensitive to different predicates
- Hashing: $x=x_0$
- B-tree: $x_l < x < x_u$
- R-tree: $x_l < x < x_u$ and $y_l < y < y_u$
  2D matching and up
- Proximity queries (nearness)
- B-tree supports nearest(x_0)
- R-tree supports nearest ($\{x_0,y_0\}$), overlaps(r_1,r_2)
- SS-tree supports withindist($\{x_0,y_0\}$,d)
- High dimensionality not efficient (> 8)

Feature indexing

- Extract feature vector from object
- For example color spectrum, sharpness, pitch
- not(overlaps(f(x),f(y))) => not(overlaps(x,y))
- Feature matches => object may match
- Use R-tree to store feature vectors
- Extract feature vector from compared object
- Search objects in database where feature vectors overlap
- Make careful test for each found object (e.g. detailed image analysis)
- May need to limit dimensionality of vector