Computer Science Department  
Michigan State University  
CSE480 Database Systems, Spring 2003  
Lab Week #13: Multimedia Databases

Oracle references on image databases:

http://download-west.oracle.com/docs/cd/B10501_01/appdev.920/a88786/mm_imgre.htm
#1004101

You will use the first one hour of this lab working with Oracle Intermedia. Second hour of the lab will be devoted to help session for the project. Next week again the first one hour of the lab will be on Oracle Intermedia and the second hour will be devoted to help session for the project.

In this lab you will have hands-on-experience with Oracle Intermedia which deals with multimedia databases. Focus is on image databases and content-based image retrieval. In content-based image retrieval systems, the database consists of many images (hundreds of thousands) and for a query image the system returns several images from the database that are similar to the query image. Similarity is based on a distance measure (manhattan distance for Oracle) discussed in the class. For example, the database may store thousands of color images from the web and if you give a query image, the database system will return related images in the database which are within certain distance from the query image.

A content-based image retrieval system processes the information contained in image data and creates feature vectors (signature) for its content in terms of visual attributes such as color, texture and shape. Any query operations and matching deal solely with these feature vectors and not with the raw storage of images such as jpg files. Thus, every image inserted into the database is analyzed, and a compact representation of its content is stored in feature vectors (signature).

In this lab you will do the following:

- Import images to Oracle database system.

- Create a table CSE480Images and insert the images as well as their annotation information into the table.
• Generate image properties for these images in the database.

• Query image properties.

• Generate signature for these images.

• Import a query image and generate signature for the query image.

• Query the database for the query image.

1. Import Images:

Oracle accessible Directory has been created:

'\egor/oracle-data/cse480'

'p0.jpg', 'p1.jpg', 'p2.jpg', - - - , 'p9.jpg' image files have been added to this directory.

Display the images directly from the files using the unix command:
xv File_Name

2. Create a table for the images:

create table

CSE480Images (photo_id NUMBER,
photographer VARCHAR2(64),
annotation VARCHAR2(255),
photo ORDSYS.ORDImage,
photo_sig
ORDSYS.ORDImageSignature);

(a) What does type ORDSYS.ORDImage define?
(b) What does type ORDSYS.ORDImageSignature define?

3. Insert images into the table:

(a) Use SQL insert to insert text as well as images to the table.

```
INSERT INTO CSE480Images VALUES (1, 'John Doe', 'ape1',
ORDSYS.ORDImage.init('file', 'ORDIMGDIR', 'p0.jpg'),
ORDSYS.ORDImageSignature.init());
```

commith;
(b) What do the parameters 'ORDIMGDIR' and 'p0.jpg' represent?
(c) What does the constructor ORDSYS.ORDImage.init() accomplish?
(d) Do the following SQL query:

```sql
select photographer, annotation
from CSE480Images
where photo_id=1;
```

What do you see?
Will you see the images if you had selected photo?
photo contains object id.
(e) Now insert the other nine images, 'p1.jpg' through 'p9.jpg', into the CSE480Images table the same way.

4. Initialize properties for the images:

Before the images in the database can be used for content based search, image properties such as the width and height of the images need to be derived and stored. After this is done, signatures for the images in the database ineed to be generated before content-based queries can be done.

(a) Run the following:

```sql
DECLARE
   -- create an object Image of type ORDSYS.ORDImage
   -- you can think of Image as a variable which can
   -- have object id of type ORDSYS.ORDImage
   Image ORDSYS.ORDImage;
BEGIN
   -- Select a row for update
   SELECT photo INTO Image FROM CSE480Images
   WHERE photo_id = 1 FOR UPDATE;
   -- Set property attributes for the image data
   Image.setProperties;
   UPDATE CSE480Images SET photo = Image
   WHERE photo_id = 1;
   COMMIT;
END;
```
(b) What does the method Image.setProperties accomplish?
(Note that UPDATE actually initializes the attribute Photo to
the object id of Image. This allows Oracle access to image prop-
erties through the attribute Photo.)

(c) Now run the following:

```sql
SQL query:
SELECT photo_id, s.photo.getWidth()
FROM CSE480Images s;
```

The value you see is the width of the image in number of pixels.

(d) Run an sql to get the height of the image.

(e) Now you initialize the image properties for the other images the
same way.

5. You will run queries on image database that you have just created in
next week’s lab.