M.Sc. Remote Sensing and GIS

RT-202

Geographic Information System

Unit-IV

4.2 Integration of Remote Sensing and GIS

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Introduction

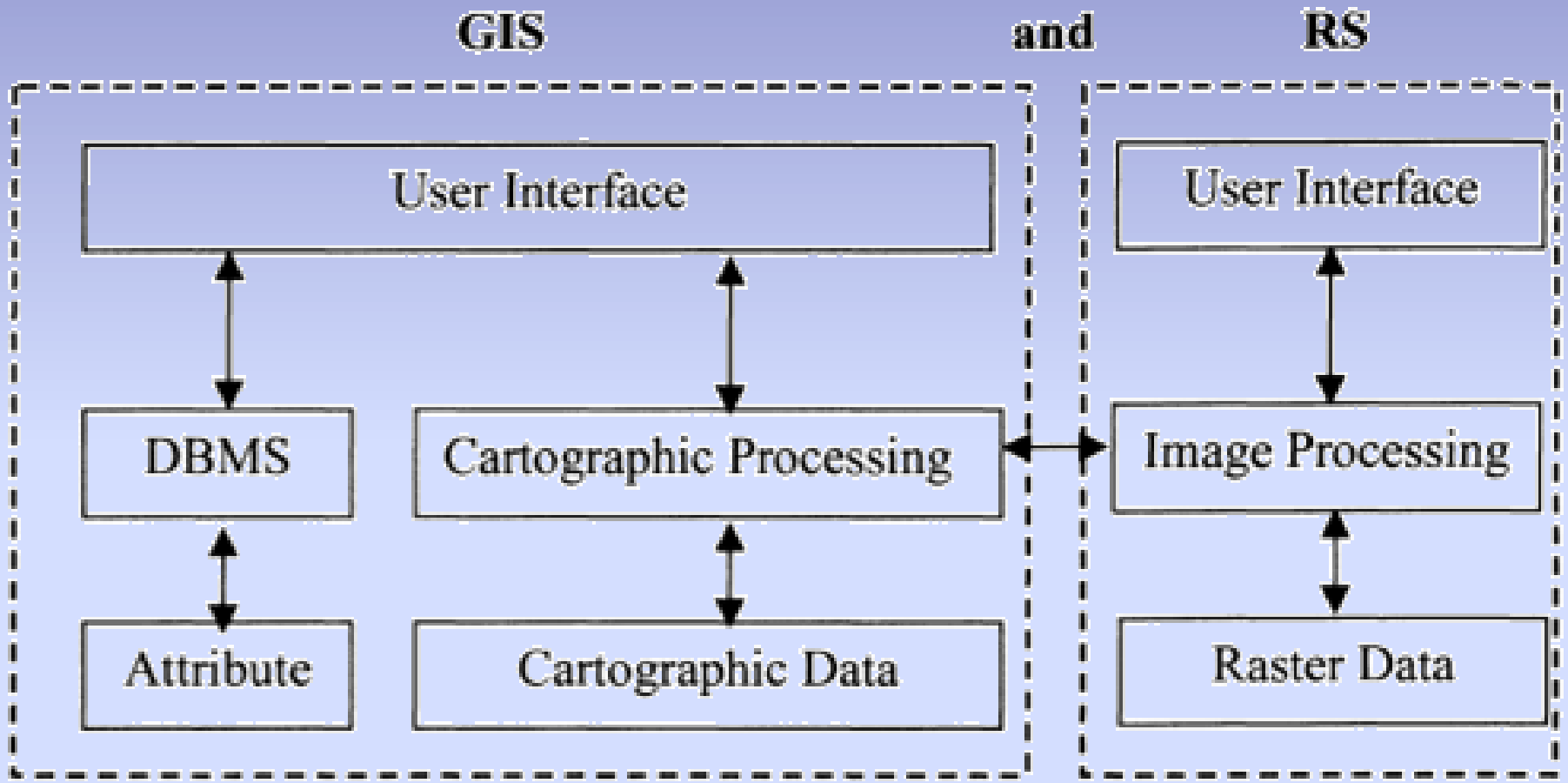
- Integration of remote sensing imagery and GIS is a paramount requirement to efficiently handle the ever-increasing amounts of spatial data.
- Over the past two decades, the integration has been performed at different levels, with different operational and functional characteristics.
- Background research on the techniques and levels of performing the integration, the general categories of applications representing the use of remote sensing imagery and GIS within such integration levels, as well as the role of remote sensing imagery in each of these categories is presented.

Integration Levels

- In order to set a framework for the integration of remote sensing and GIS, three main levels of integration have been identified by Ehlers et al. [1989].
  - Level 1: Separate But Equal
  - Level 2: Seamless Integration
  - Level 3: Total Integration

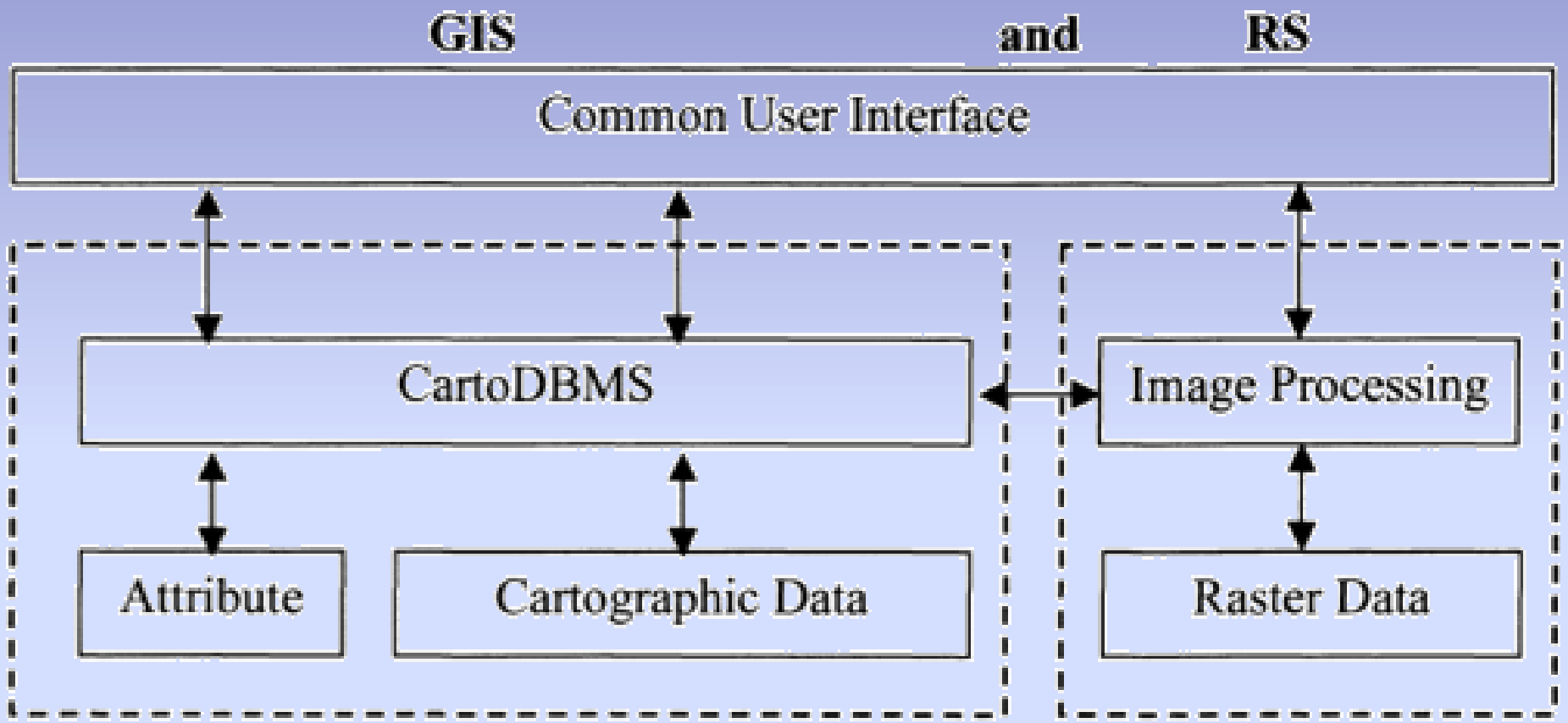
Level 1: Separate But Equal

- The first level of Ehlers' hierarchy is called "Separate But Equal," which indicates the separation of image processing and the GIS system.
- In this approach, the user would be able to simultaneously display vector data and remote sensing imagery and to move either the image analysis results into the GIS and digitize a classified image or use GIS data to georeference the imagery.
- Level 1 is based upon mainly exchanging data between systems.
- This level is considered to be a very low (or early) level of integration. With the advances in computer technology, this level is now disappearing and being replaced with a more advanced level of integration Level 2.


GIS
and
RS
User Interface
User Interface
DBMS
Cartographic Processing
Image Processing
Attribute
Cartographic Data
Raster Data

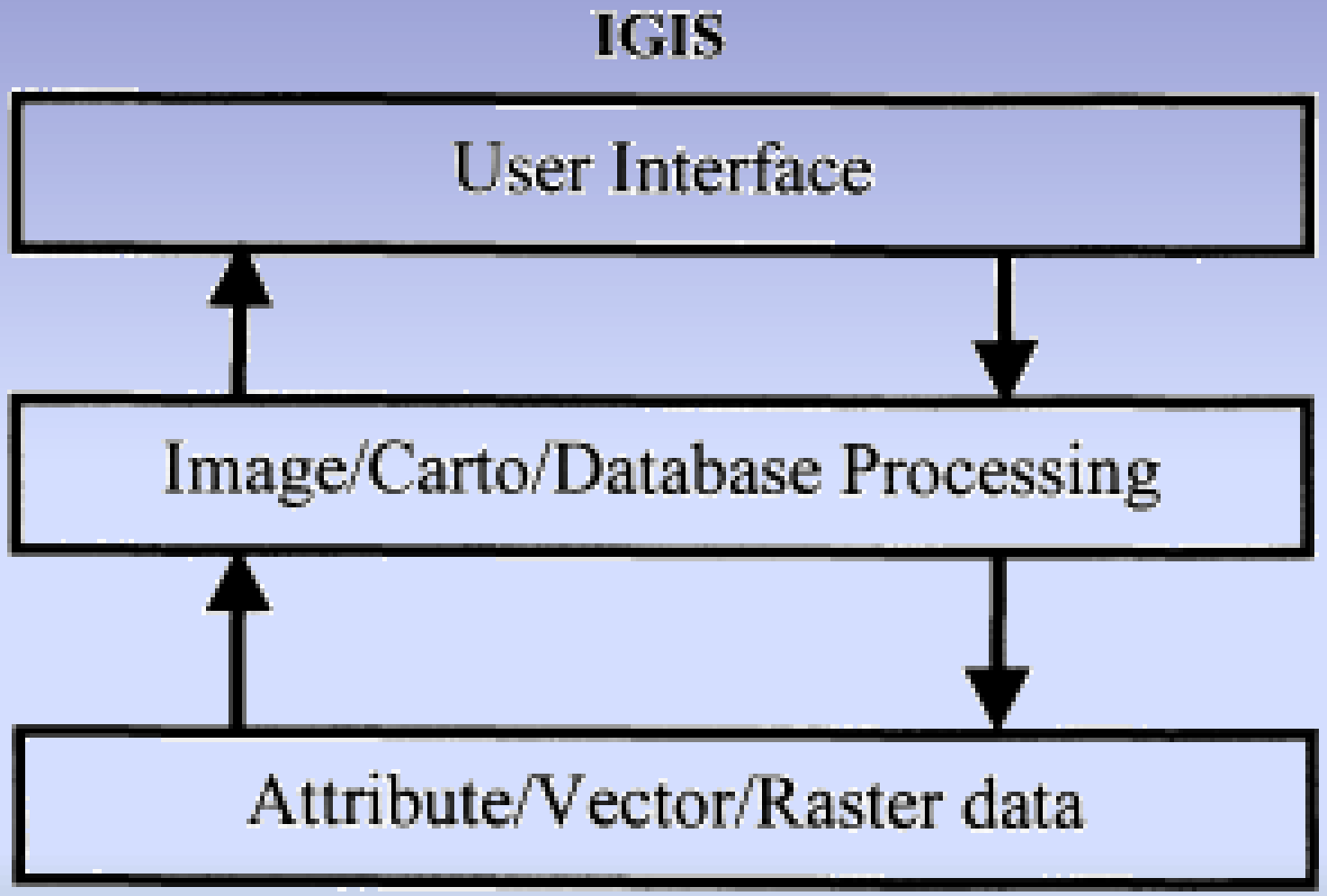
Level 2: Seamless Integration

- This level involves "Seamless Integration" in which raster-vector processing is allowed.
- GIS and image analysis systems are stored in the same computer. Simultaneous access to the functions of both systems is allowed through a common interface, but the separate systems operate independently, and data must be exchanged regularly between the two systems.
- Although problems of format conversion and raster/vector overlays have been reported for the usage of that level, it provides a temporary solution to the integration task.


GIS
and
RS
Common User Interface
CartoDBMS
Image Processing
Attribute
Cartographic Data
Raster Data

Level 3: Total Integration

- This system is called "Total Integration" in which we have one system that allows the user to process remote sensing data and vector data simultaneously.
- This makes use of full GIS and image analysis functionality simultaneously with no need for data conversion between systems.


IGIS
User Interface
Image/Carto/Database Processing
Attribute/Vector/Raster data

Roles of Remote Sensing Imagery within an Integrated GIS (IGIS)

- Remote sensing imagery can play three main roles in a GIS with respect to the collection, retrieval, visualization, and query of spatial information, namely passive, stand alone, and active [Derenyi and Fraser, 1996].