ARTIFICIAL INTELLIGENCE AS THE PLATFORM FOR OBSERVATION OF EARTH CHANGE DETECTION

K.M. Mustafa [1], R.B. Rustamov [2]

*1. Hall School Wimbledon, London, UK
2. Institute of Physics, Ministry of Science and Education, Baku, Azerbaijan*

Content

- *Introduction*
- *Satellites for data classification*
- *High quality data processing with use of up-to-date technology*
- *Conclusion*

➢ In this paper has demonstrated variety of approaches to change detection (semantic segmentation and classification) to achieve expected better outcomes for further use in a post-processing which can be used in a large variety of applications.

➢ This paper is dedicated to the use of artificial intelligence for change detection taken place in the Earth surface. It has been undertaken to demonstrate capability of supervised and unsupervised methods in land use/land cover (LU/LC) classification being to achieve expected outcomes in accuracy of Earth change detection

➢ Artificial Intelligence (AI) is the active and strong technique for development of computers and calculation systems who can carry out tasks where human intelligent need in this area.

➢ algorithms of the artificial intelligence takes an important role in LU/LC, where for classification of LU/LC can be divided into different classes.

AI is the useful instrument, that makes possible most effectively operation of software with lower cost and less time spend which can carry out IBM human function as:

- reasoning;
- planning;
- communication; and
- perception.

Spatial resolution of satellites defines capacity of definition in the minimum size of objects or elements reflected in the satellite image. The high spatial resolution demonstrates small size of pixels providing a more details of features of the object or element. It has been shown types of satellites in Figures 1, 2 and 3 with a capacity of spatial resolutions:
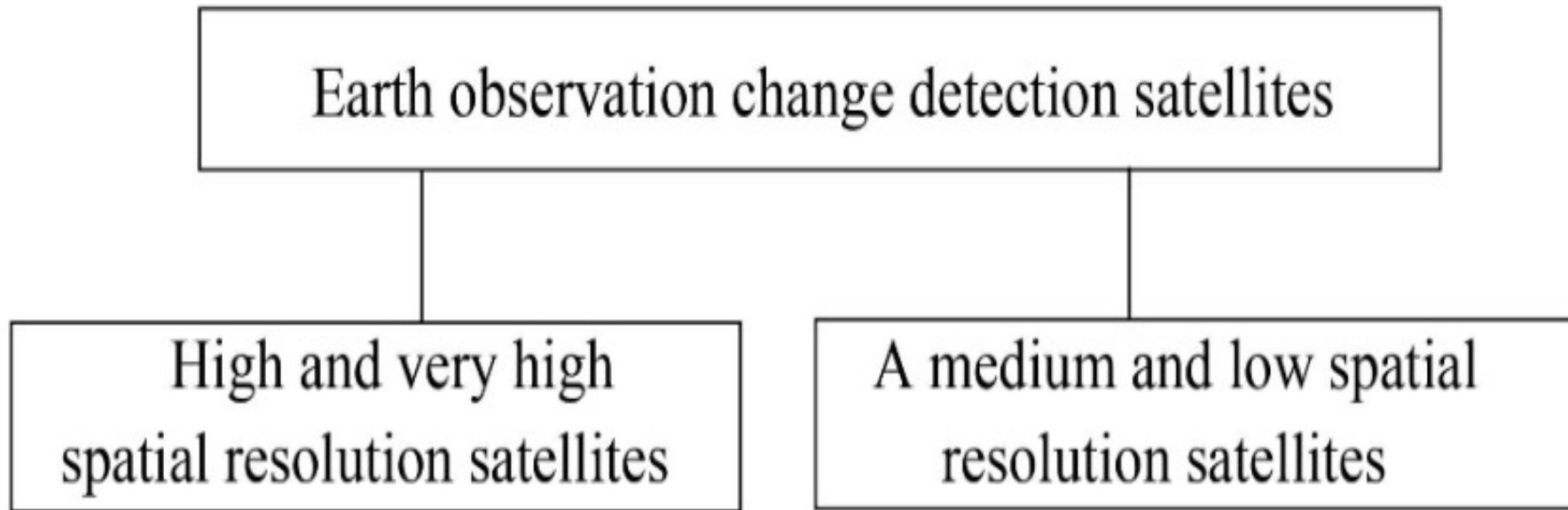
Figure 1. Earth observation satellites
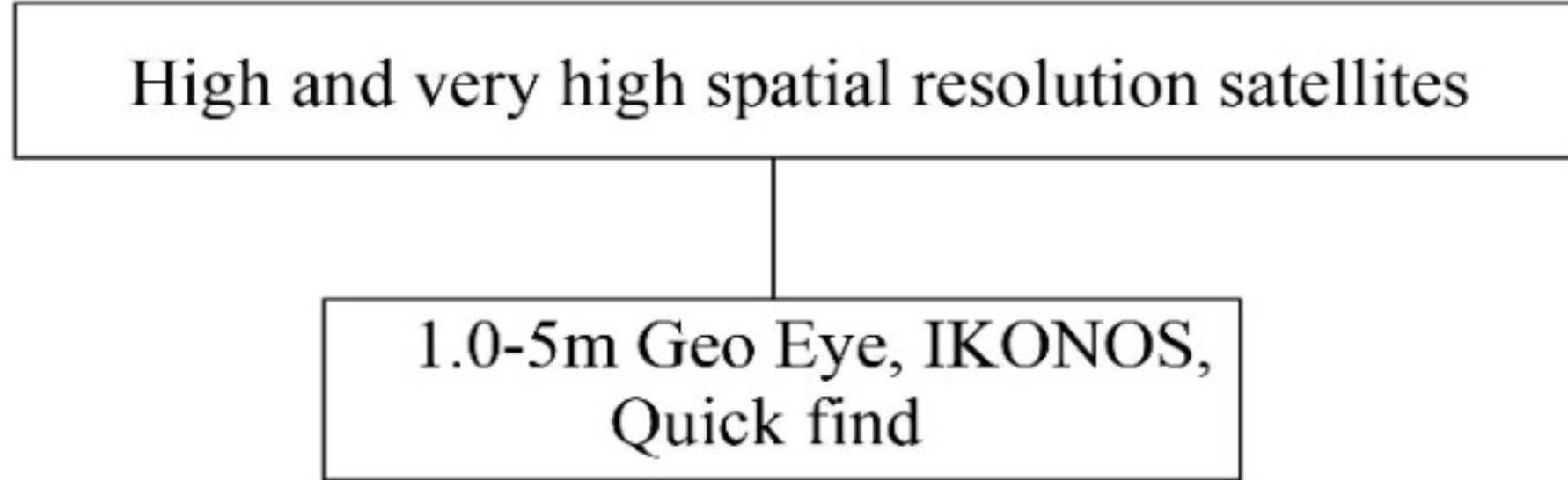
**Figure 2. High and very high spatial resolution satellites**

A medium and low spatial resolution satellites

NOAA, AVHRR, > 1 km Pixel Size
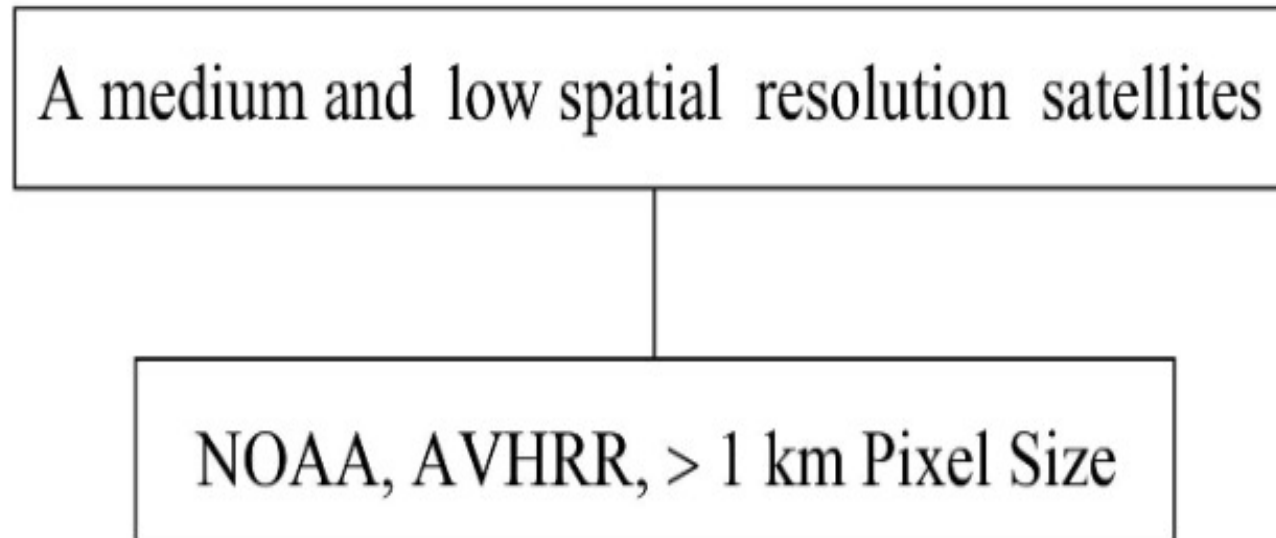
Figure 3. A medium and low spatial resolution satellites

It can be used and integrated big amount of information with a Big Data with successful application up to date technology of identification as artificial intelligence (AI) and machine learning (ML) for LC/LU purposes **(Figure 4).**
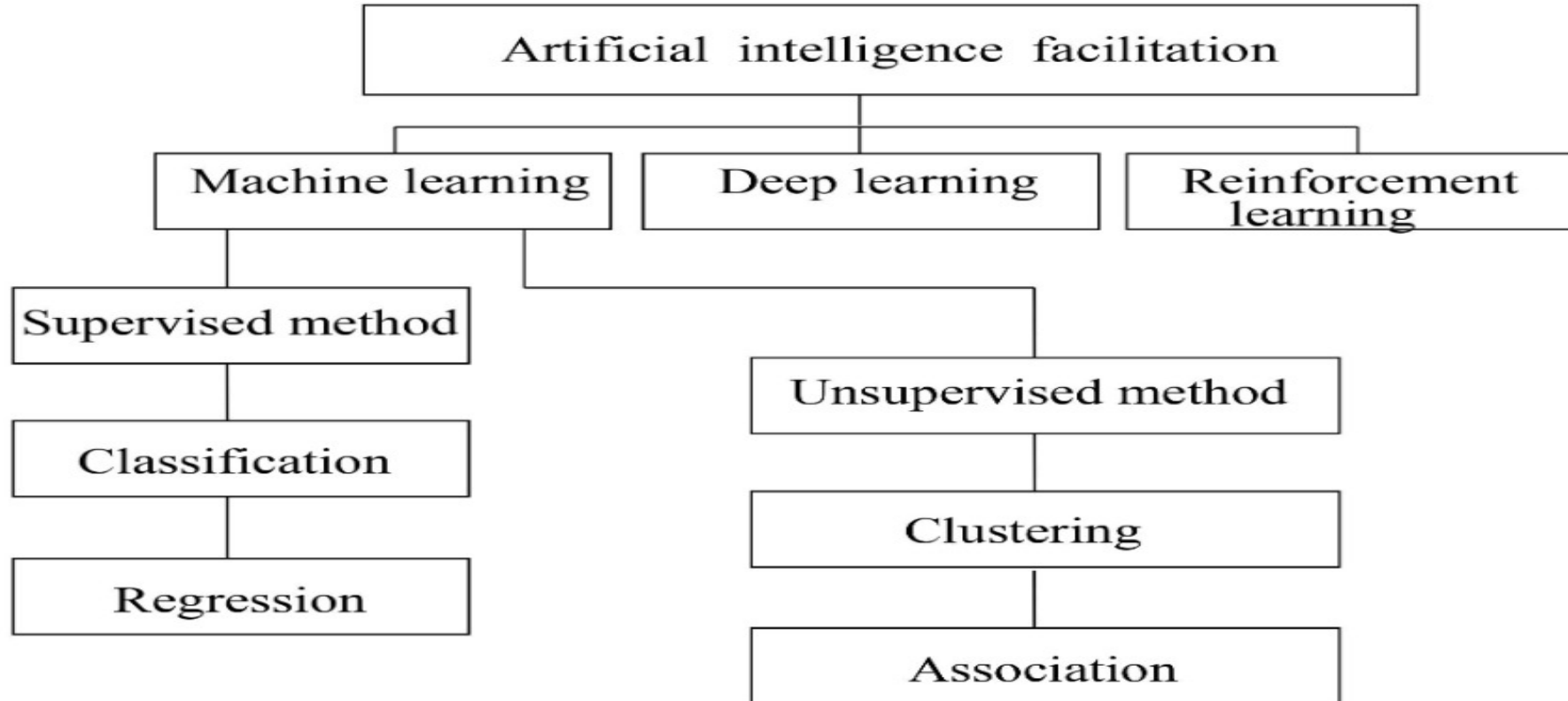
**Figure 4. AI as a tool for LC/LU classification of change detection**

One of the popular methods of use for classification is the random forest (RF) algorithm. It opens an opportunity to classify a big amount of information with high accuracy achievement. It mainly relates to learn the system development during the training process and selected trees anticipate the model of outputs. This approach creates an environment to minimize time processing thanks to effective selection of the samples considering for processing. It has described in and demonstrated in Figure 5.
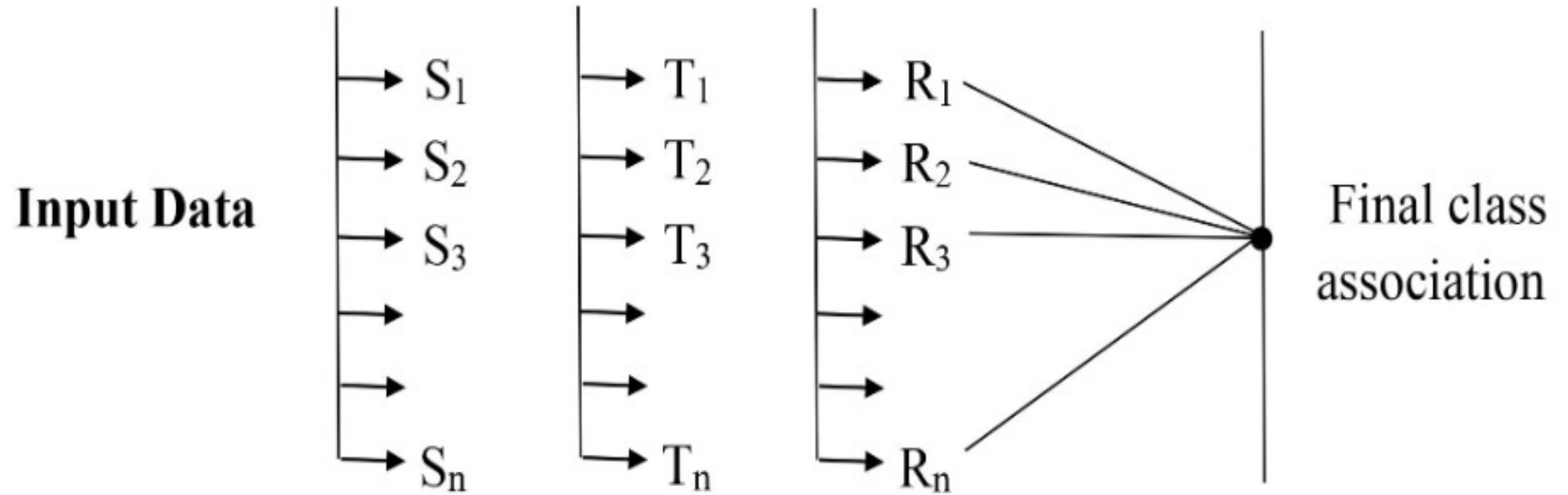
Figure 5. The structure of operation of Random Forest algorithm

The LU/LC classification, without a doubt, plays a critical role in the regional socio-economic development of countries and the management of natural resources, **Figure 6**.
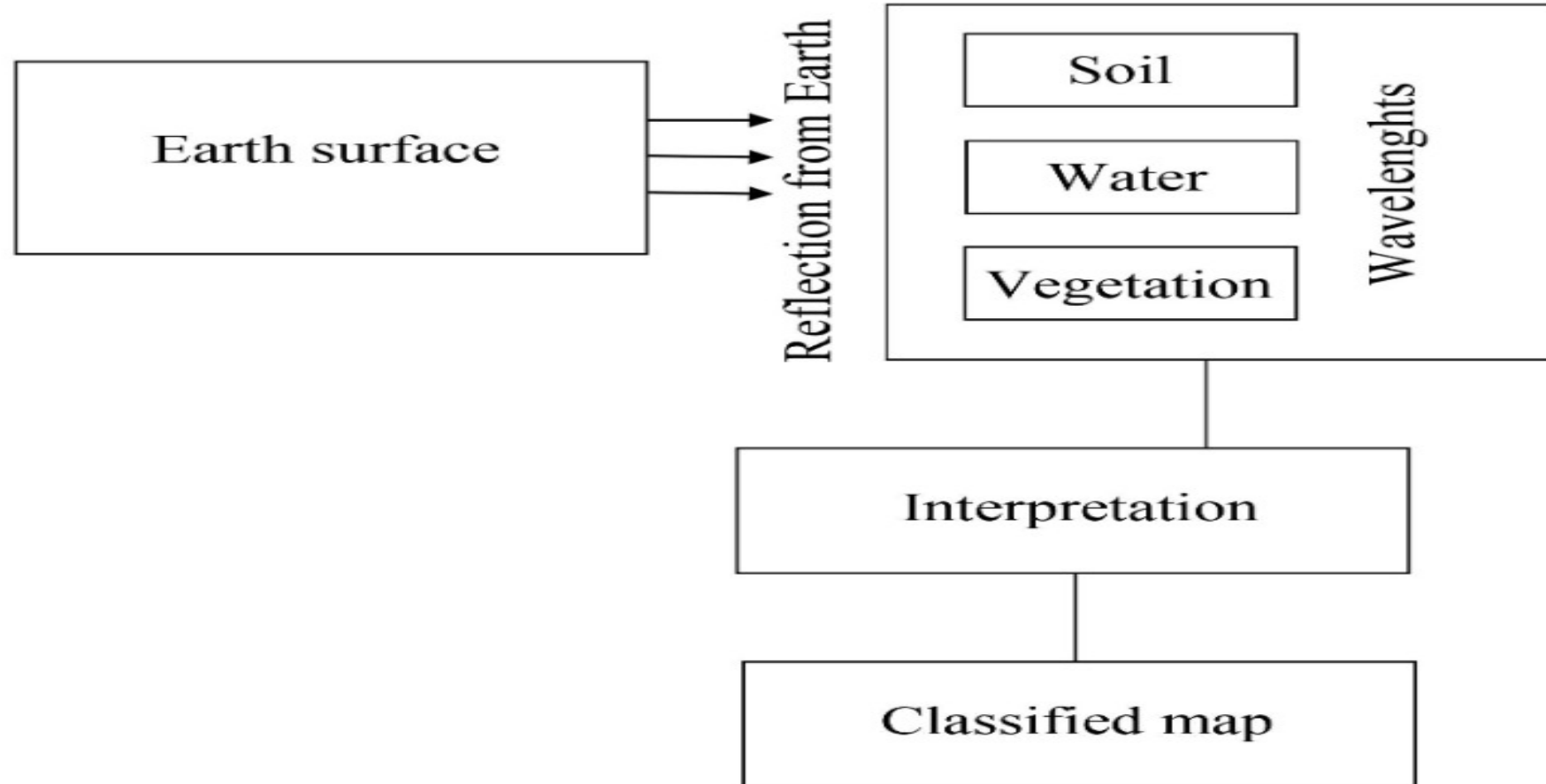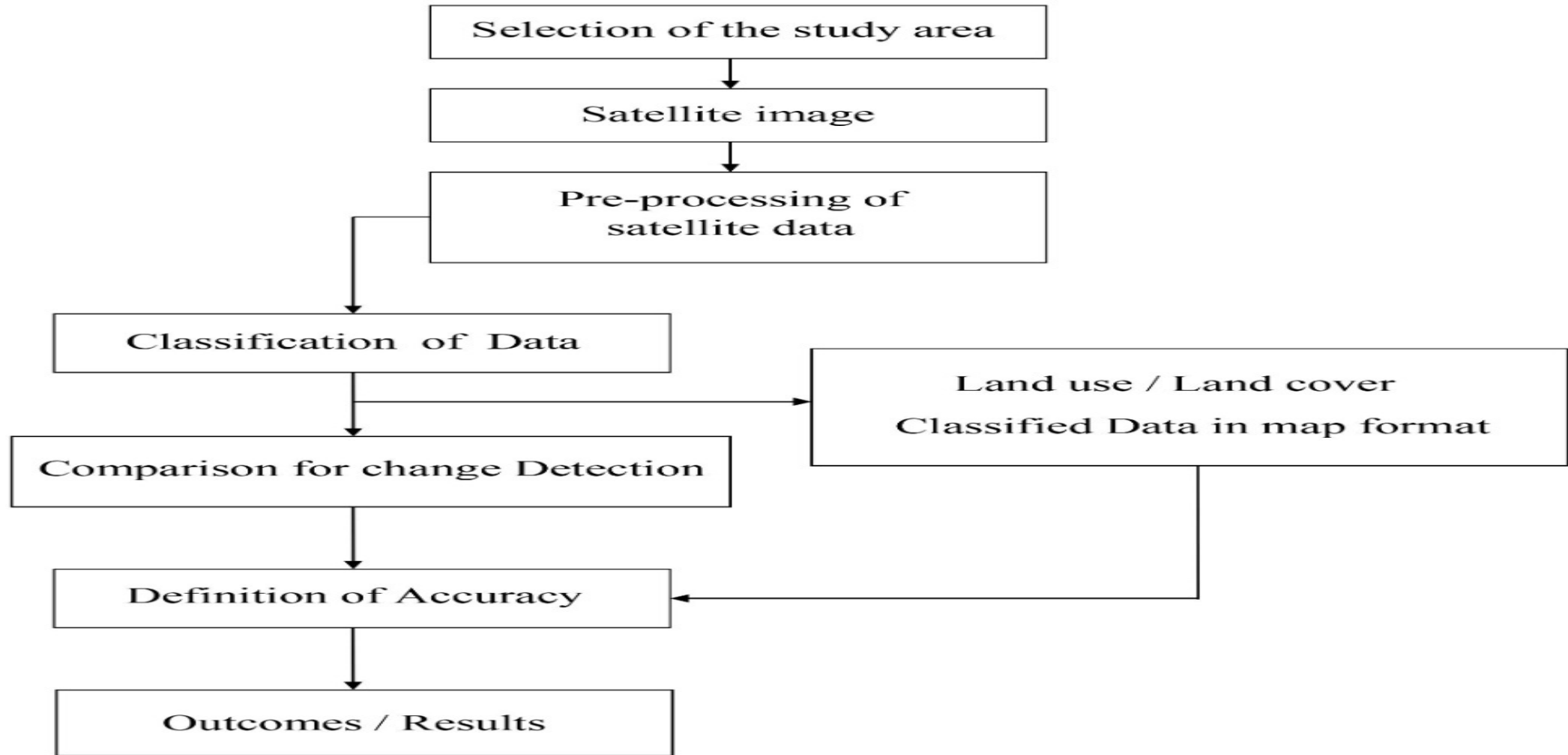
Figure 6. Land use / Land cover classification

THE STAGES OF DATA PROCESSING FOR CHANGE DETECTION

It has been demonstrated all the stages needed to be used for satellite data processing for detection of Earth observation changes. Figure 7 describes diagram of lines of follow up segments of satellite data processing.

Figure 7. Methodology of satellite data processing

- The fact is that classifiers developing high accuracy Land Cover/Land Use maps have a big demand and it needs reliable information from satellite images achieved by remote sensing method even for big scaled and complicated data. Classifiers of the machine learning play a vital role in achievement of a good results classification.

- A development of thematic maps on the base of classification with use of satellite information classification is one of the large applied type of remote sensing with further use of up-to-date technology like artificial intelligence for change detection.