Ground Truth Image Database for Global Scale Research

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Introduction

From 1972, many people have talked about Global Environmental Problem. Many researchers have made many ground truth surveys. They have used their own surveying method. There are huge information about the Earth by ground truth. However, those information is too detailed for ordinal people. Even scientist in a kind of field can not understand information in other kind fields. Many surveyor took many pictures in their field survey. These pictures are one of the most understandable information in other fields. In this paper Image database system for global scale research is reported.

1.Important Information

Ordinal photographs can give us many information. For example, we can recognize landcover, vegetation condition and vegetation type etc., from pictures. If these pictures have location and time which pictures had been taken, these are very useful data for ground truth. But almost pictures have no information of taken location. Existing of location information is depend on each surveyor. Because of no recording function of location in the ordinal camera.

If location information can be seen in pictures, all these pictures can be used meaningful. However, Location and time information are not enough for ground truth. Ground truth picture should include taking direction and inclination. Therefore, important information for ground truth are image, location, date, direction and inclination.

Figure 1 Prototype GPS camera

2. System

Ground truth image data are managed by the ground truth image database. These image data is taken by GPS camera (produced by Konica). Figure 1 shows a prototype GPS camera. Figure 2 shows GPS camera type 3. GPS camera can add location information in pictures. Figure 3 shows result of GPS camera. The

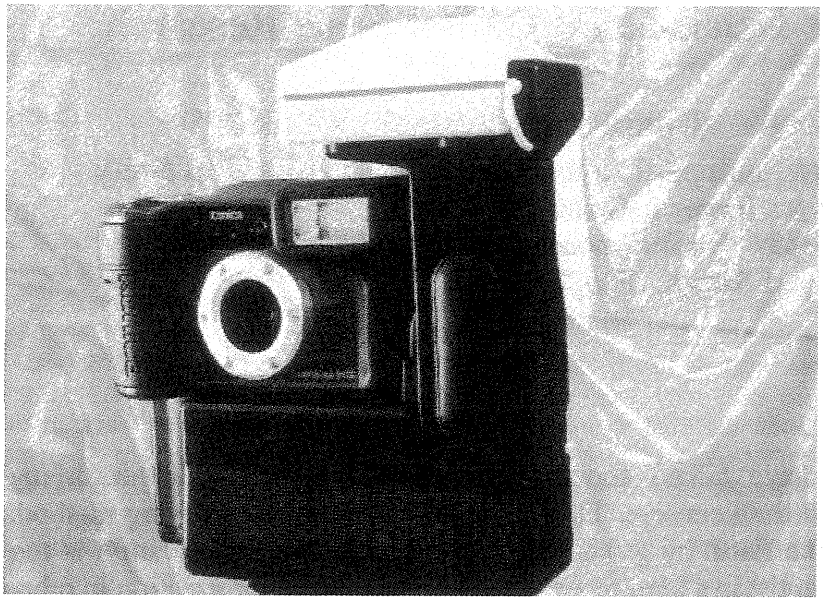

Figure 2 GPS camera type 3

ground truth image database system can use the character information of upper part of picture as header file using OCR technology (Figure 4). Figure 5 shows display of ground truth image database system. This system applies digital map as base map.

3. Application

Figure 6 and 7 show the remote control helicopter with GPS camera. Figure 8 and 9 show pictures from the remote control helicopter. These images are very useful as ground truth data. This helicopter does not need large space as taking off and landing. Therefore, this helicopter system can be used wherever. For example, from a narrow road, a small park and even a small boat.

65 reflectance data were corrected at 65 measurement points in Mongolia with GPS camera Images. Therefore it is easy to plot each measurement point in map (Figure 10). A average reflectance pattern was calculated from these data (Figure 11).

Figure 3 Result of GPS camera

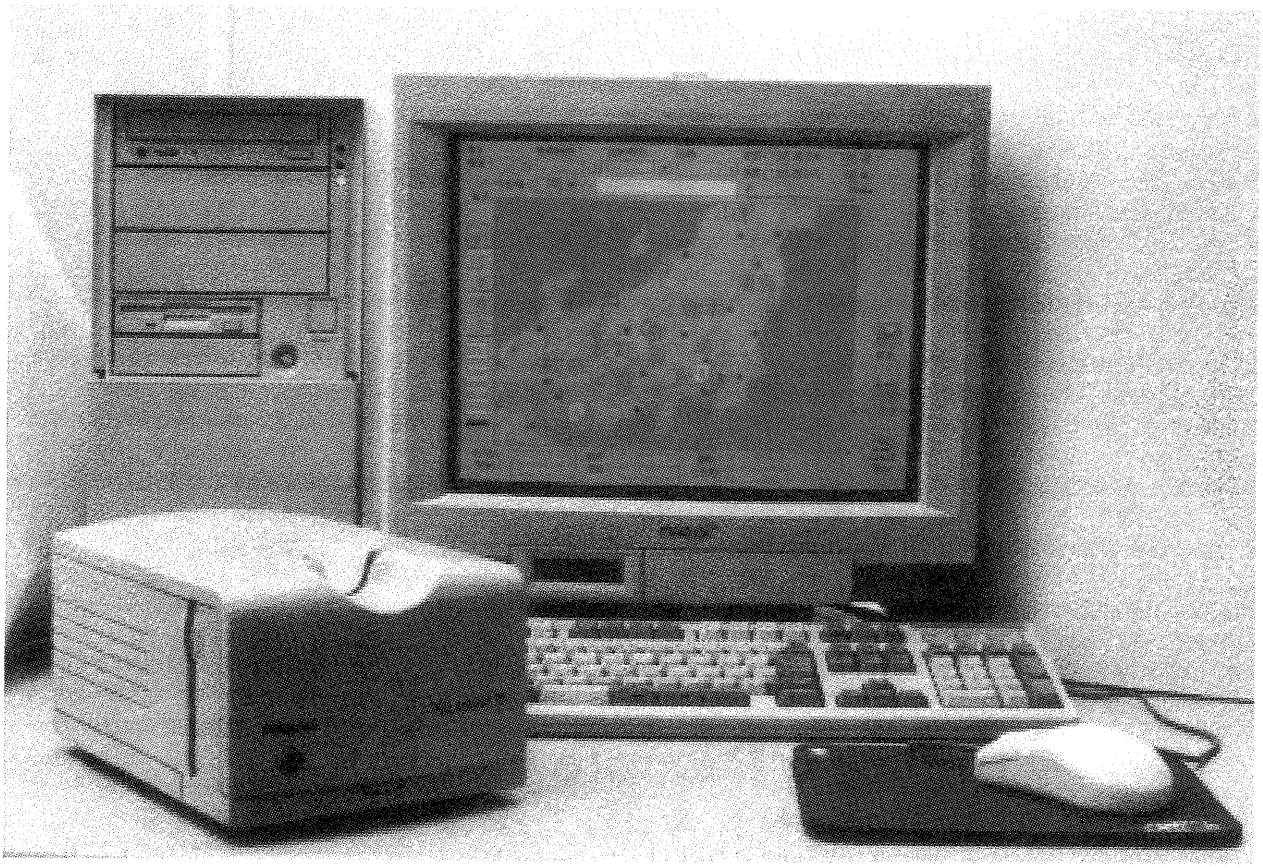

Figure 4 Ground truth image database system

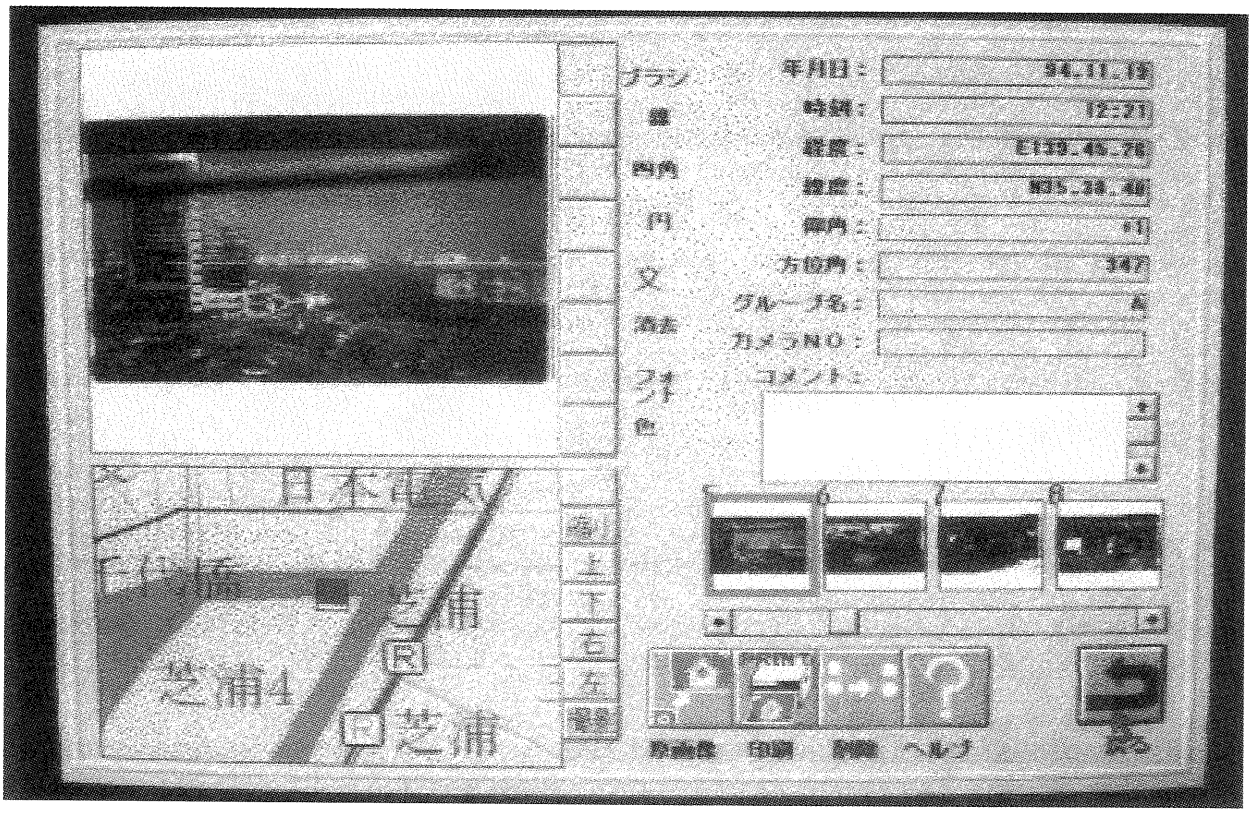

Figure 5 Display of Ground Truth Image Database

Figure 6 Remote Control Helicopter with GPS Camera

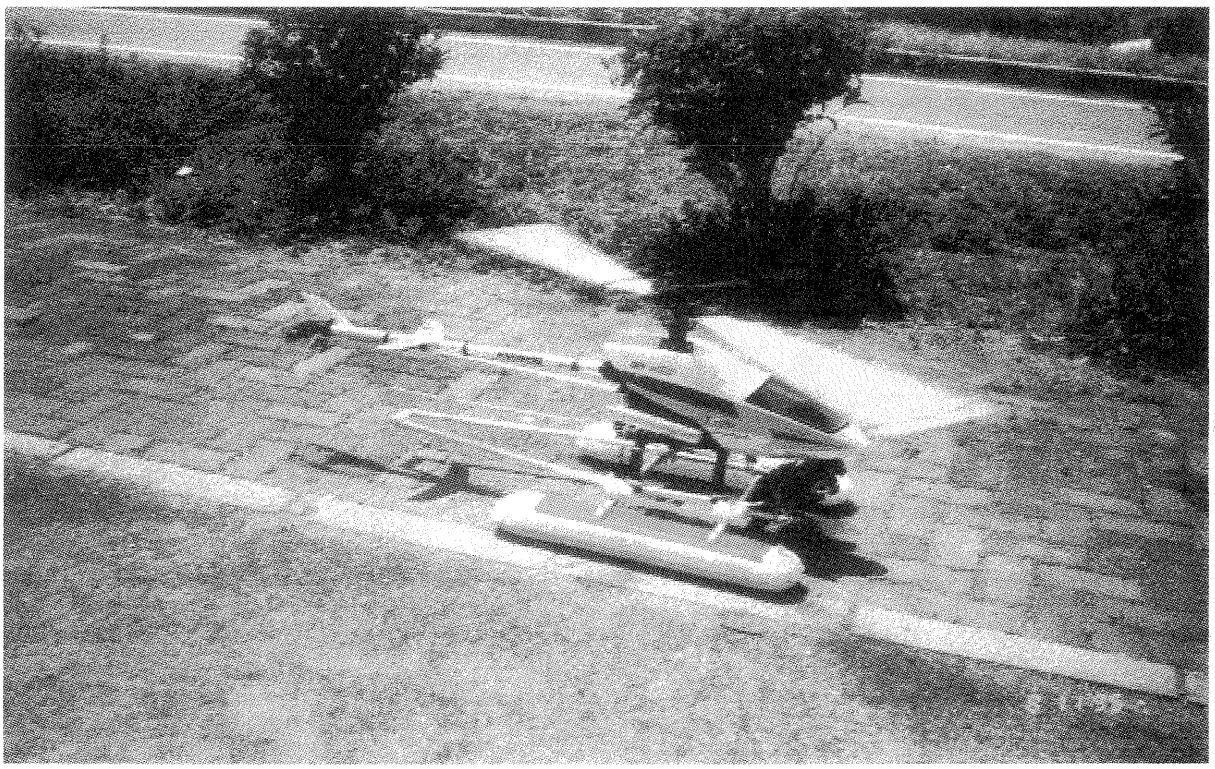

Figure 7 Remote Control Helicopter with GPS Camera

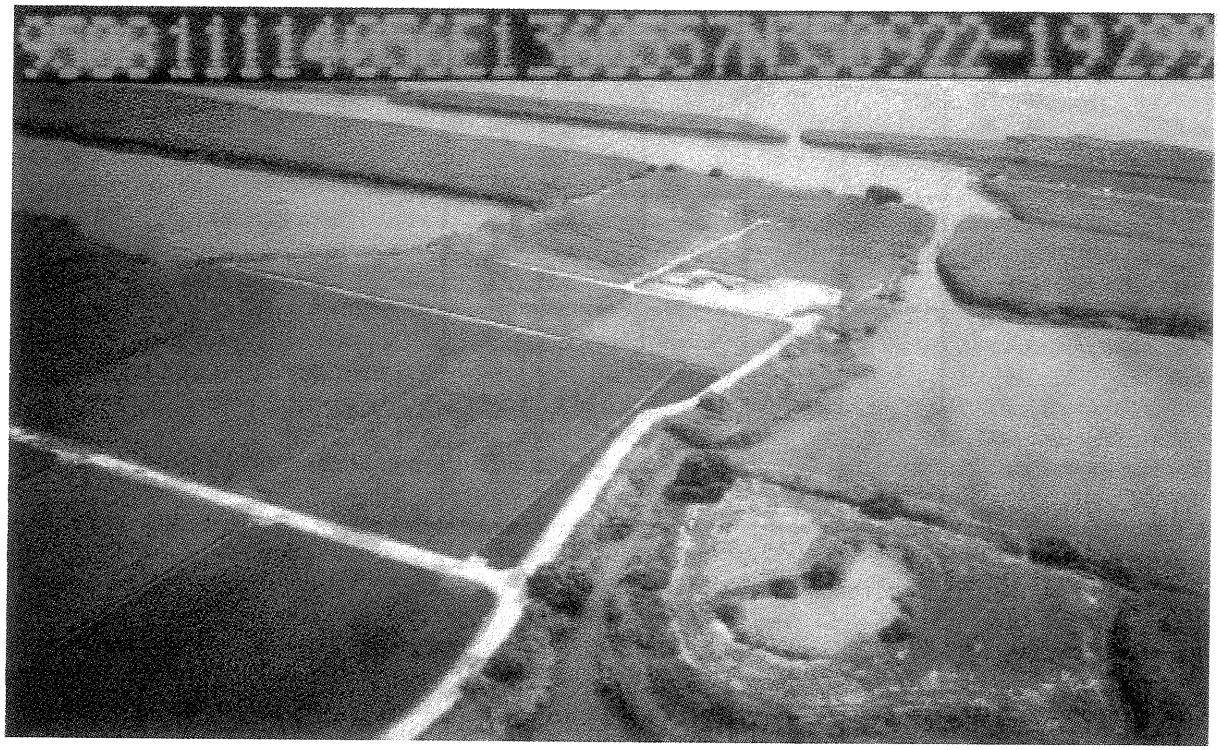

Figure 8 Result of Remote Control Helicopter

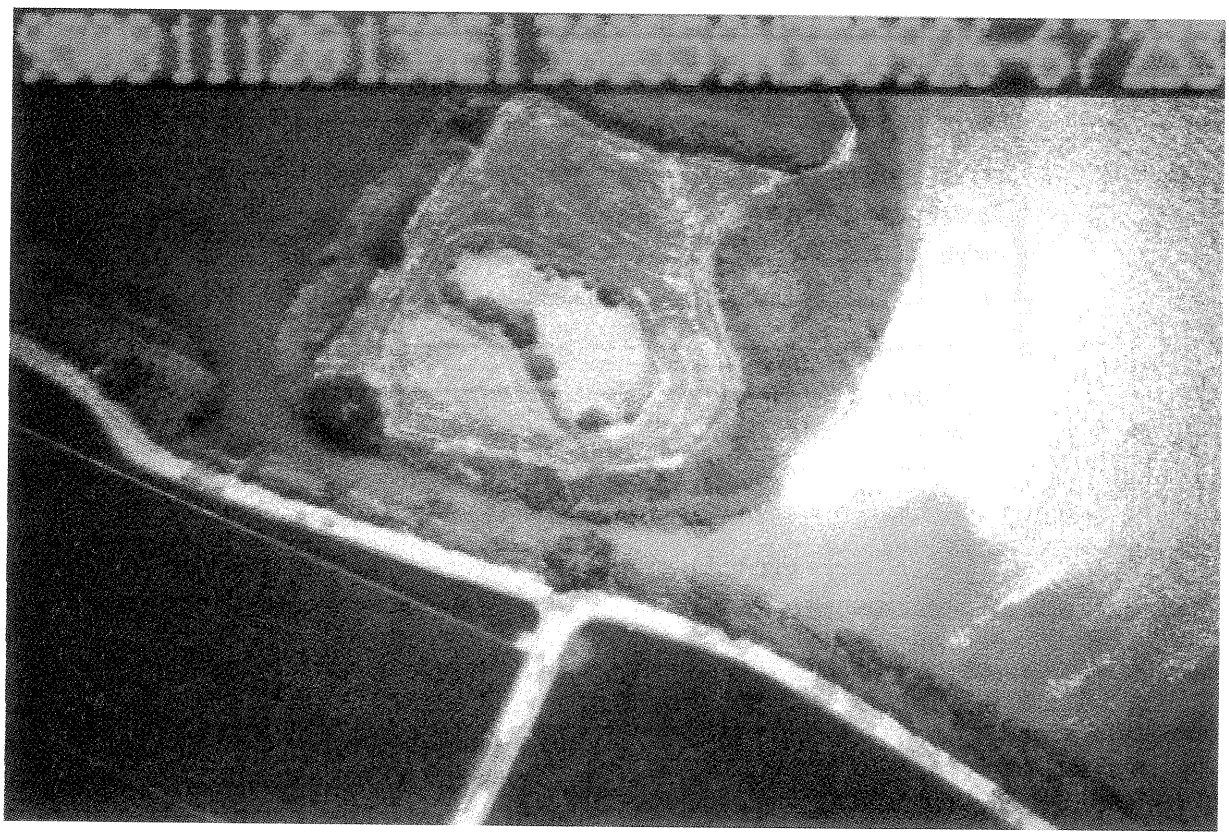

Figure 9 Result of Remote Control Helicopter

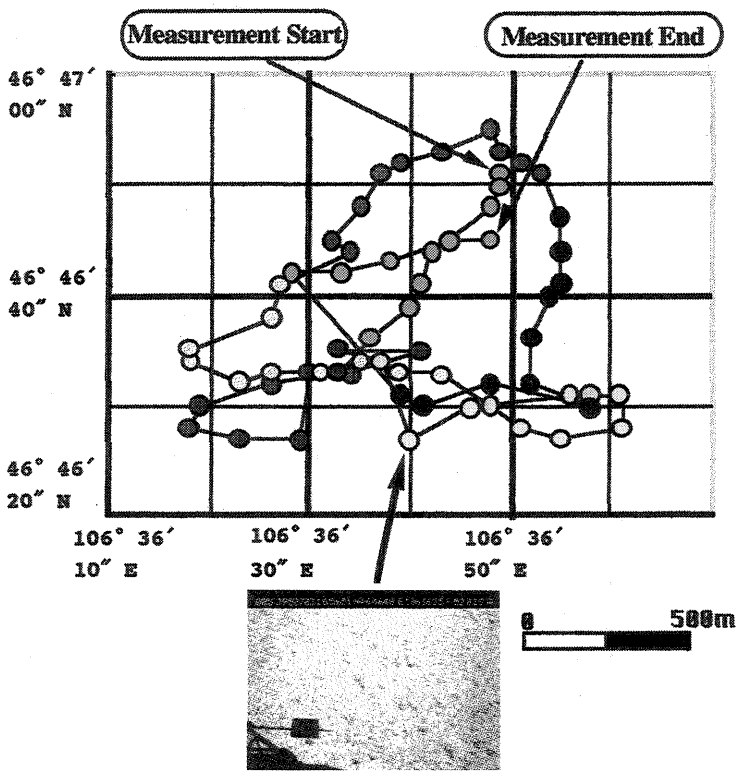

Figure 10 65 MeasurementPoints

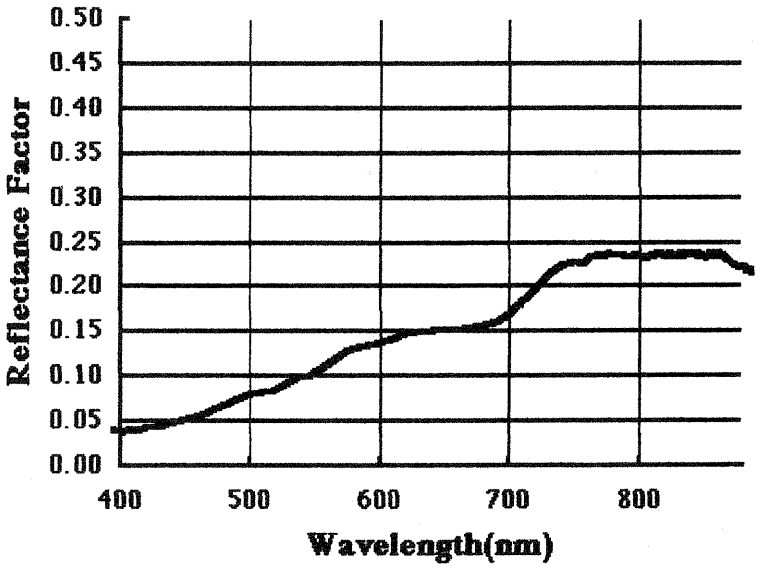

Figure 11 Average Reflectance

4. Summary

If every surveyor and researcher use GPS camera and Ground truth image database system, all researchers can hold ground truth data in common through internet. If no image data is existing around concerning area, each researcher can exchange ground truth survey with GPS camera. A new network should be established with GPS camera and ground truth image database through internet. This network should be covered all over the world.

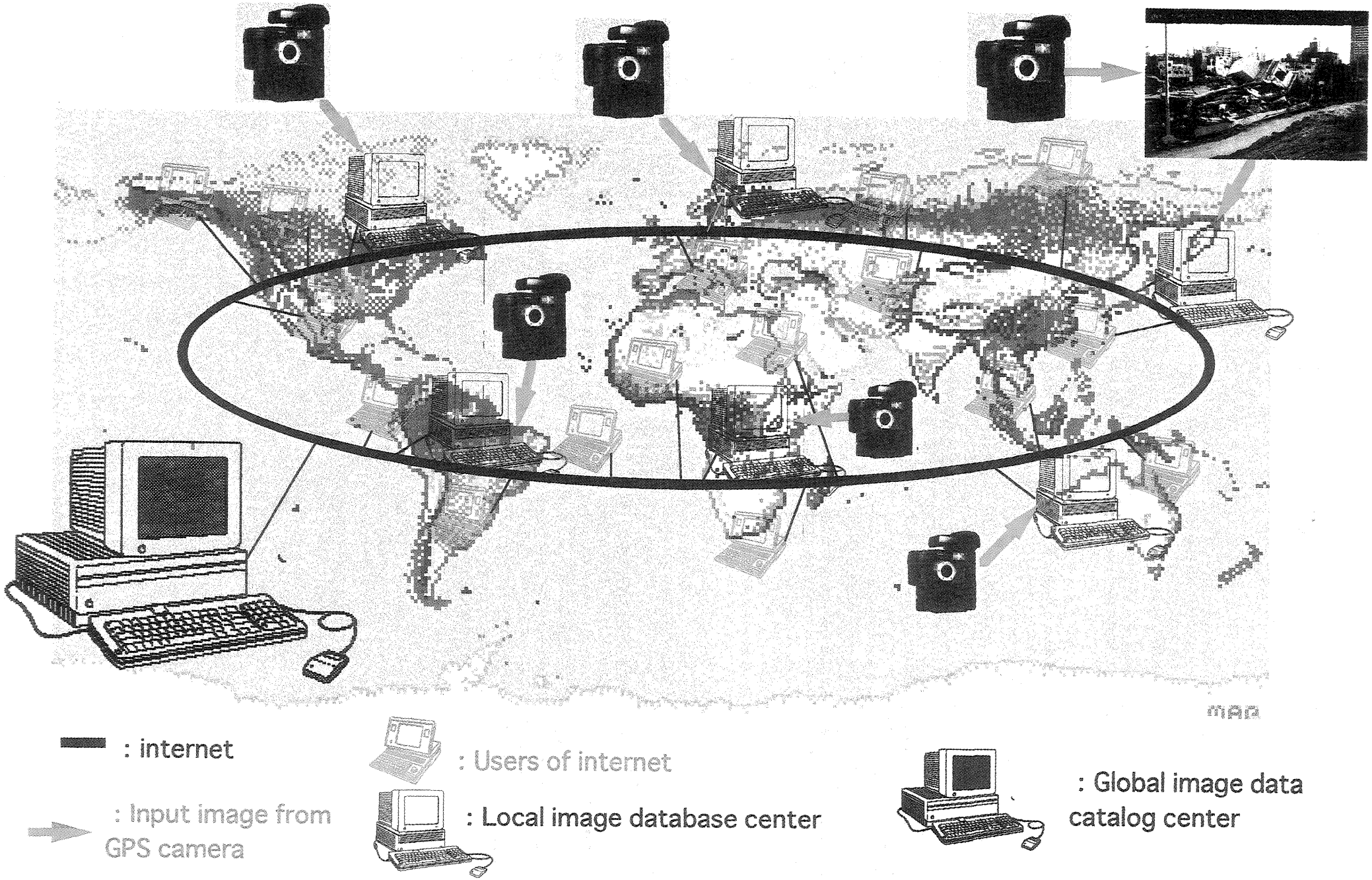

Figure 12 Global Image Network (GIN)