HITACHI
Inspire the Next

Imagery Analysis Services for Mining Operations




Hitachi Solutions, Ltd.

Hitachi Solutions, Ltd. is a core IT company of the Hitachi Group, and we have over 10 years' experience in the image processing business.

We provide innovative and high-value solutions by integrating our image processing capability with operational systems to deliver continual mining process improvement.

Our Approach

There are three key phases to the deployment of image processing solutions.

Image analysis

Both images and intelligence data are required for operational decision making. Hitachi has technology for object extraction, change detection technology and machine learning technology.

01

Big data handling

Once you start utilising image analysis, complexities in management arise as usage scenarios increase resulting in the business becoming more reliant on data.

02

Big data handling and Real time

Remote sensing platforms such as Unmanned Aerial Vehicles (UAVs) and Satellites are additional agile eyes that use fully automated surveying to obtain high frequency geographical data and real time situational awareness.

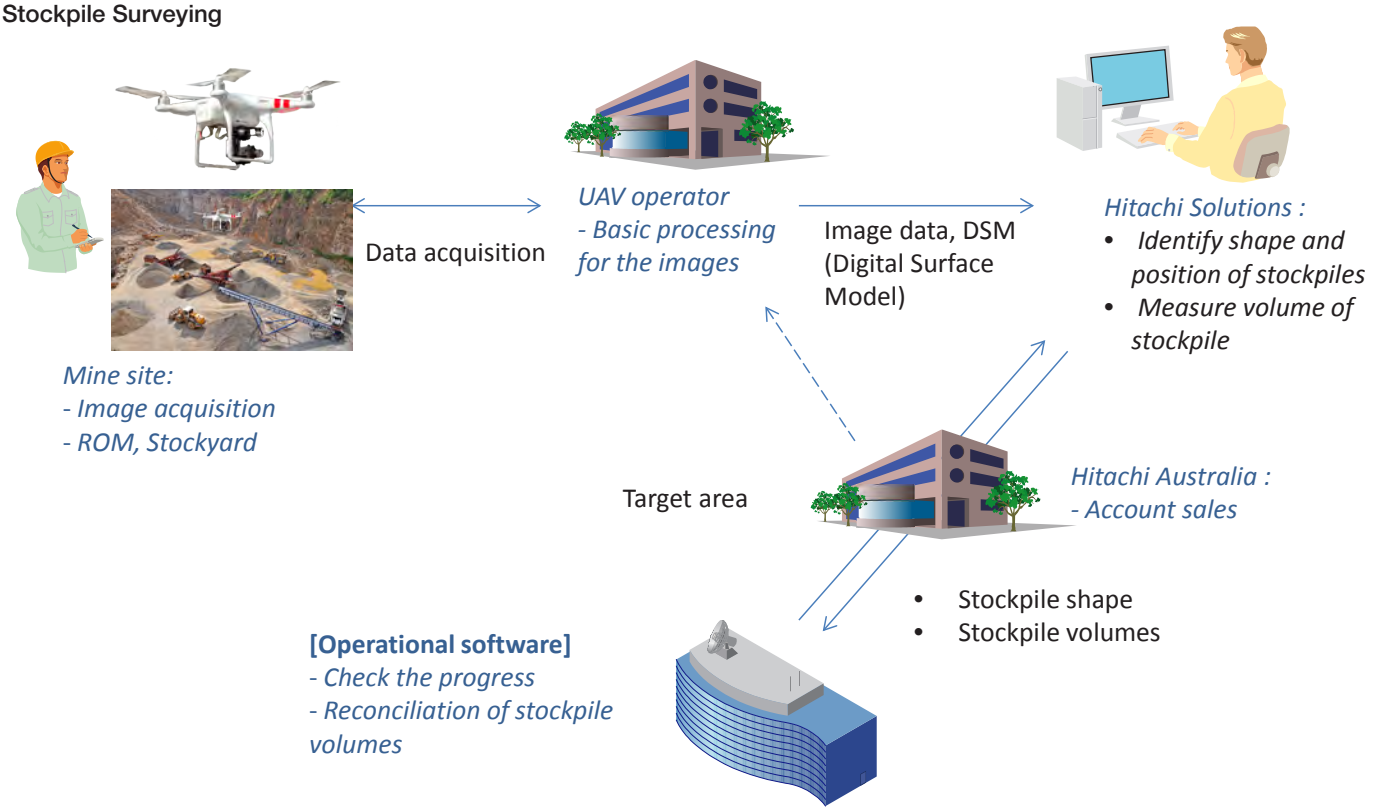
03

Services

Stockpile Surveying

We have developed software that has the capability to firstly divide each stockpile into a ROM pad or a stockyard, and secondly calculate the volume of each stockpile using a Digital Surface Model (DSM). Its value lies in improving productivity by reducing the number of human surveyors, and by meeting stockpile reporting requirements.

Stockpile Surveying



Applications

- Stockpile Condition Monitoring
- Stockpile Reconciliation

Benefits:

- Reduction of human survey requirements
- Fewer Heavy\Light vehicle interactions around stockpiles
- Repeatable and accurate stockpile volume information
- Better understanding of material flow around ROM stockpiles

Case Study: Australian Mining and Metals Group

Our customer found it challenging to measure the volume of their highly dynamic stockpiles for the purposes of stock reconciliation.

They had previously used visual survey judgment for this purpose and needed a more standardized method to measure their stockpiles.

Our Solution

- We acquired images by cooperating with UAV operator, and created a 3D model of the stockpile
- We automatically identified randomly positioned stockpiles
- We calculated volume of each stockpile automatically

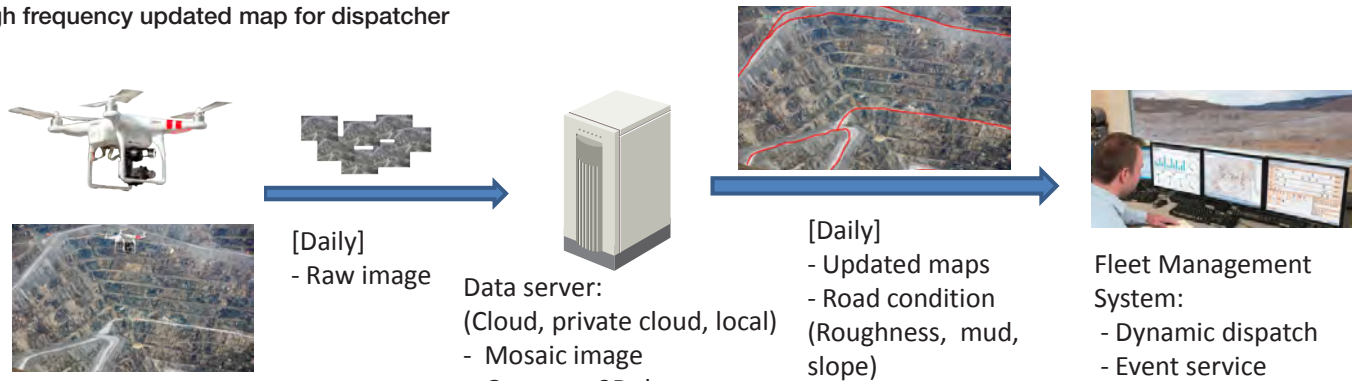
Outcomes

- Lower cost, more accurate and consistent than human surveys due to the uneven nature of the stockpiles
- Greater stock control and financial auditing certainty

Pit Wall Analysis

This enables high frequency updated maps and road condition information to be made available to the fleet operator.

High frequency updated map for dispatcher



Applications

- High frequency updated map for dispatcher

Benefits:

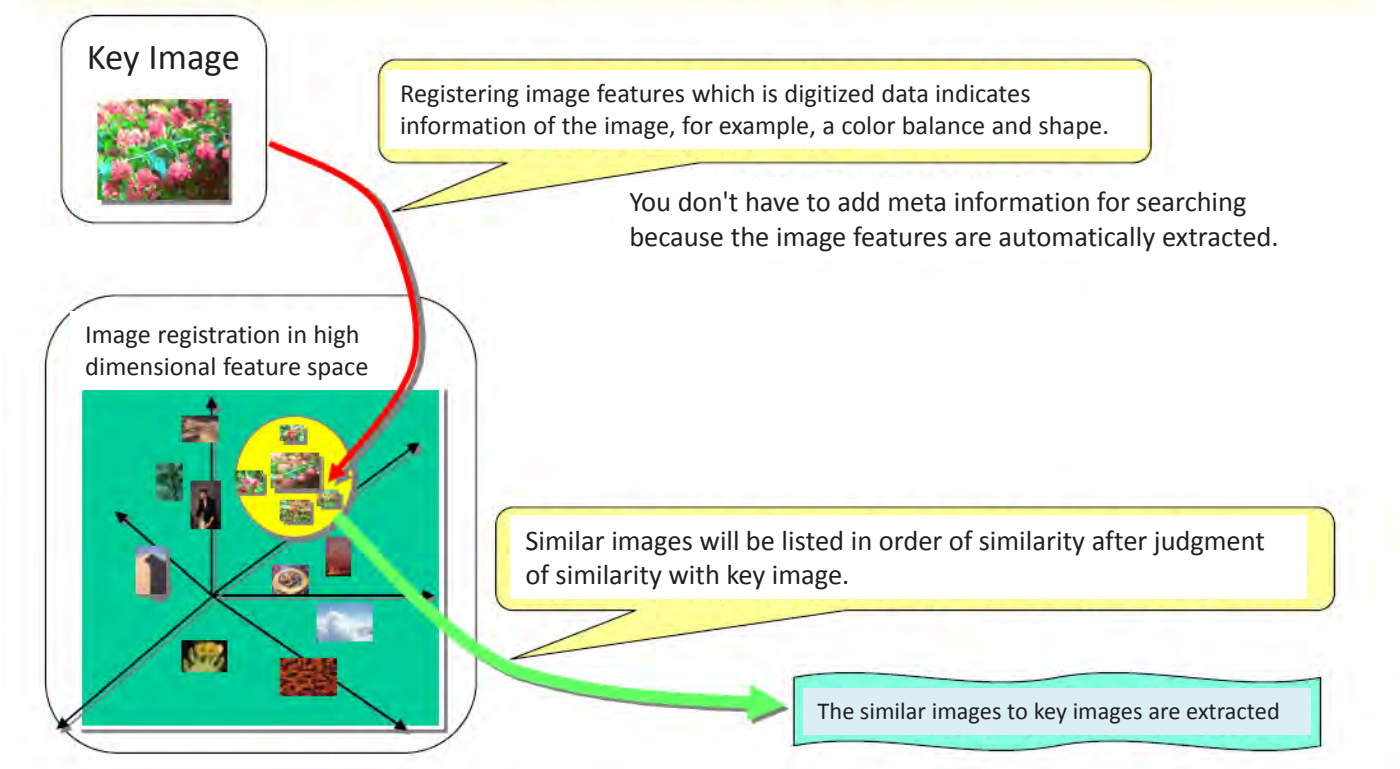
- Improvements in productivity and safety

Operational Overview/ Awareness

Using image analysis to provide an overview of mining operations produces a large volume of data, resulting in extensive requirements for data and processing. This would usually make daily monitoring of various mining activities challenging.

Hitachi has developed an image search engine, called “EnraEnra”. This engine is the fastest of its kind and is able to find target images from an archive of 1 million within 1 second. We are offering this engine as a part of our “Image Search Solution”. This assists monitoring activities by extracting important frames of video and interesting objects.

Summary of Similar Image Search



Applications

- Monitoring for high risk areas and tasks.
- Monitoring for incident areas
- Regular monitoring of pit and stockpile for confirming progress and operations

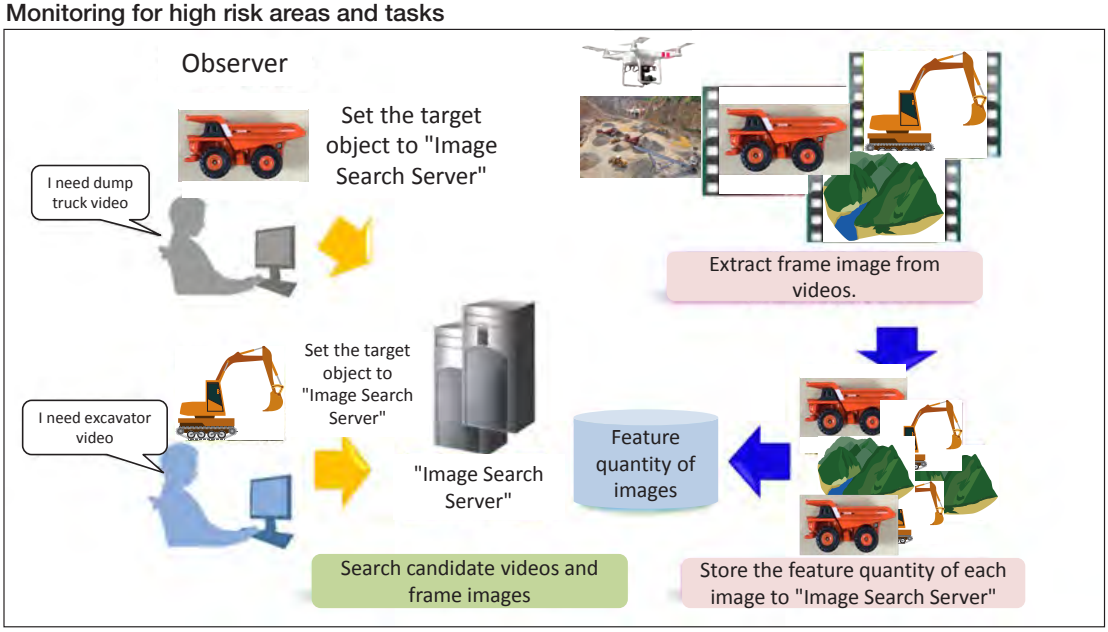
Benefits:

- Improvements in productivity and safety

Monitoring of High Risk Areas and Tasks

You can set objects and scenes that you would like to find in existing video feeds in advance. (e.g. service car, construction machine, tools, human...). The Image Search Solution will find similar objects in those videos.

Monitoring for high risk areas and tasks



Environmental Solutions

Hitachi has been a shareholder of DigitalGlobe since 1994 and we have been one of the top distributors of DigitalGlobe's products in the world from 2002. Hitachi also can provide the RapidEye satellite imagery, if slightly lower resolution and cost meets the needs of the application.

Hitachi Solutions utilizes satellite imagery to generate the Normalized Differential Water Index (NDWI), which will determine if there is water on the surface of the earth at a particular location.

Applications

- Mine Dewatering discharge or "Wetting fronts" survey for environmental compliance.
- Water inundation studies for flood events
- Asset Health Monitoring

Case Study

Challenge

To detect the area of devastation by flood in Thailand.

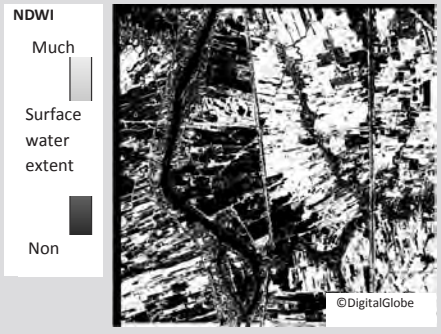
Solution

We analyzed 8 bands WorldView-2 images which were acquired before and after the event and generated NDWI (Normalised Water Difference Index) for both images.

A. Data acquired on 21 Nov. 2010	B. Data acquired on 23 Oct. 2011	Normalised Water Difference Index of image A.	Normalised Water Difference Index of image B.
			

Outcome

We detected the area of devastation by comparing both NDWI of A) and B). And we highlighted that in the white area of the picture as shown here.



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