



## FUTURE OF IMAGE TECHNOLOGIES IN FINANCIAL SERVICES

### Abstract

Images are all-pervasive and all-powerful. The human brain takes cognizance of a multitude of things happening in its surroundings, using the visual medium. The inability to perceive and process information available through images, has been a primary lacuna in computer technologies; because, computers process data that is in the form of bits and bytes, while the human brain processes what it sees, hears, and perceives, to arrive at a decision.

There is a clear need for the computer to emulate the human mind – in reading, understanding the images, and making a meaningful analysis, in order to arrive at accurate decisions. The advent of visual technologies, in association with artificial intelligence, has paved the way to deciphering visually available data; thus opening new vistas in computer-aided decision-making.

Astutely, imaging technologies have witnessed early adopters in the defense and healthcare verticals, as these industries produce and use gigantic amounts of image data. The financial services industry is slowly gearing up towards using images to improvise their operations, as well as transform their offerings to create more value to customers, and their businesses.

## Proliferation and impact of imaging data and associated analytics

Images are real and omnipresent, and unlike other forms of data, they cannot be forged easily. These traits make images repositories of 'really big data', and hence, exploiting such data can be a great source of information for financial institutions.

To understand the vastness and enormity of the amount of information available, look at the following facts –

- Facebook has over 100 billion images, and the number is increasing exponentially, every day. It has been estimated that it would take 3,200 person-years to view them all – if a person spends one second on an image
- YouTube is estimated to have about 690 million videos that would take 3,450 person-years to view them all

- Among financial institutions, insurance companies have substantial amounts of data in the form of vehicle images, x-rays and scans, and medical reports, which are seldom used by legacy underwriting, policy management, claims, and management information systems during processing
- Similarly, banks have tons of unstructured data on interactions with customers, customer photographs, and old documents, to name a few. The data, if deciphered well, can provide valuable inputs for the future of the financial institutions

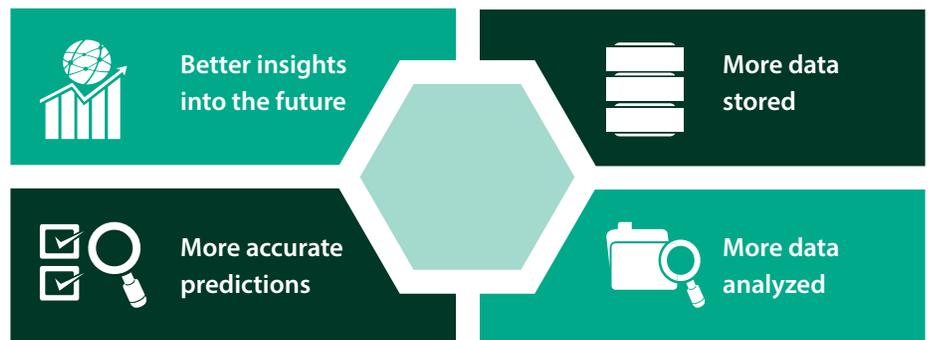


Figure 1.0

*Insights are more appropriate if all data – both structured and unstructured is stored and analyzed together.*

On the other hand, information technology has taken giant strides in terms of reading, understanding, and deciphering data in the form of images. These developments have opened up a 'whole new world of opportunities' for the organizations, to use the image data in a multitude of ways. Predictably, organizations are looking to make big investments in the field.

Some of the predictions are indicative of the amount of growth the imaging technologies field will witness.

- As per IDC predictions, visual data discovery tools will grow 250% times

faster than the rest of the BI market. Investing in this 'enabler' of end-user self-service will become a requirement for all enterprises by 2018

- Rich media (video, audio, image) analytics will at least triple in 2015, and emerge as the key driver for big data analytics technology investment
- The video analytics market is expected to grow from \$1,537.9 million in 2015, to \$3,971.2 million by 2020, at an estimated Compound Annual Growth Rate (CAGR) of 20.9% during the forecast period, from 2015 to 2020

## What is imaging technology? The technology in a nutshell

Simply put, image analytics is the process of transformation of unstructured data – in the form of images / videos – into machine readable parameters / variables, so as to extract valuable information.

Imaging technologies perform multiple transformations on the images, to convert them into logical output parameters, in the form of rich time series. The first step removes the unwanted noise, and prepares the data to be grouped into logical clusters, by identifying low-level features. Once the data is logically grouped, it can be analyzed in a variety of ways – algorithms such as boundary, edge detection, color histograms, and vector detection, are used for processing imaging data.

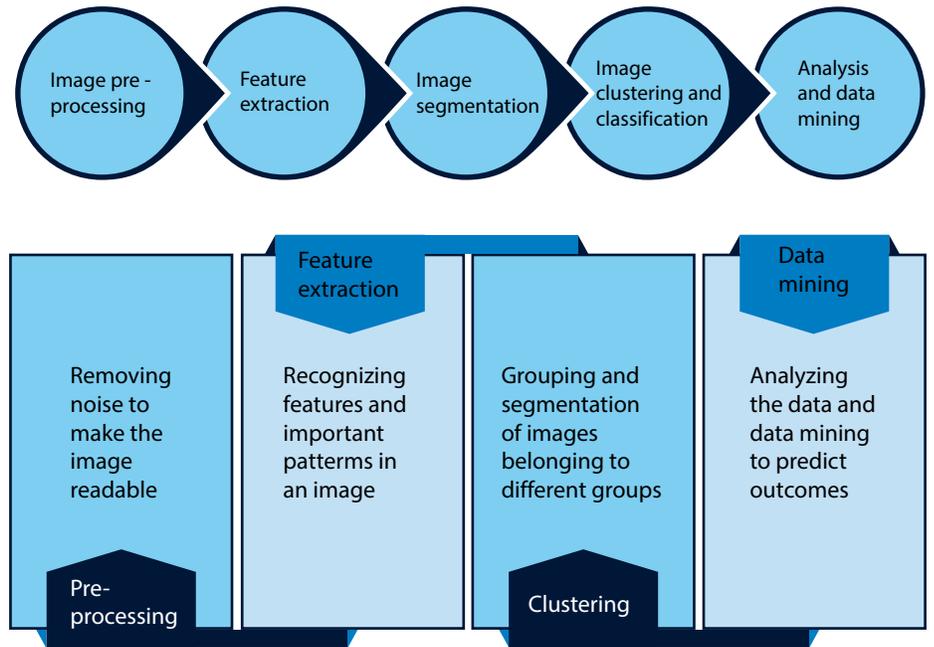
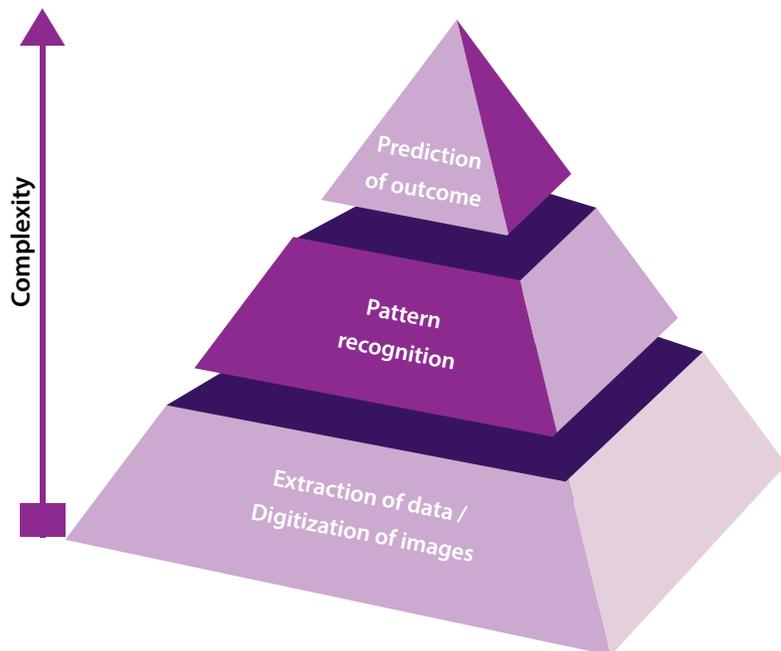


Figure 2.0  
Image Processing Steps

## Chain of transformation – Application of imaging / video technology in the financial industry

The formative years of imaging technologies saw its application mostly in the digitization of documents. As the technology progressed to recognize patterns within images, the later years saw its application in biometrics as well. Recent trends show imaging technologies being used across a myriad of applications – from shopping to banking.

Gradual transformation of the application of imaging-analytics technology, in financial services, saw it move from basic extraction, to intelligent decision-making, as shown alongside:





## Extraction of data

The earliest solutions of imaging technologies focused on reducing manpower costs by digitizing forms. OCR and ICR technologies were commonly used for extraction of data content from images. The financial industry spotted its application in digitization of application / KYC forms, document workflow solutions, check imaging, and truncation systems. It is estimated, that digitization reduces the processing costs by 80%.

- TD Bank, Provident Bank, and Bank of America are some of the banks offering 'Remote deposit capture', thus allowing customers to deposit checks electronically using mobile devices / scanners. The data from the check image is extracted, and used in place of a physical check
- Many organizations are using image-segmentation-based analytics, to index entire libraries of images, videos, and geo-spatial catalogs
- Some insurance companies are leveraging the camera and barcode functionality in smartphones, for pre-filling automotive insurance quote requests, by using images of the 'driving license', and 'vehicle identification number'.

## Extraction of patterns

The next phase in imaging technologies, is deriving patterns from the images, and matching the patterns in future. A classic example of pattern recognition is facial-biometrics, wherein, banks use imaging technology to identify and authenticate a customer.

- HSBC installed 'facial-biometric access control units' in its data centers, to protect sensitive information

- A Danbury, Connecticut-based bank uses facial-recognition technology, video analytics, and customer data analytics, to identify rogue individuals

## Prediction of outcome

Newly derived comfort with using image / video as a great repository of unexplored data has prompted some financial institutions to make headways into predicting outcomes, based on data from images.

A number of systems are being developed to analyze the movements and activities in video / images, to create alerts for particularly undesirable behavior.

- Banks are using predictive video analytics to thwart undesirable happenings in ATMs / branches, by alerting the security in time
- Some companies are using image-sharing through social media, as a basis for tracking the level of influence of the company's latest advertisement / announcement
- Some banks are analyzing their branch videos to look at the path that a customer generally takes before reaching a teller, to identify 'high impact' areas for placing prominent advertisements

The need to bring about innovation, and improve operational efficiencies, has prompted many financial service companies to incorporate image-based technologies. Recent technological advances in quicker image processing and storage, have only expedited the change. Some of the early adopters, today, have used the technology in a range of products – such as barcode reading, QR code reading, fraud detection, security enhancement, and claim processing. The future may witness its application in many more areas.

## Future ahead

Imaging technology will fundamentally change the landscape of innovation in the financial services industry. The widespread use of smartphones, mobile apps, and the new strides made in technology in deciphering information from images and videos quickly, have given impetus to the usage of imaging technologies in a wide gamut of areas. The advent of wearable technologies, such as Google Glass, has given further momentum to this transformation. From being a value-added-service, to a must-have differentiator, imaging technology will be applied effectively, in many ways.





## Imaging technologies for a faster turnaround

Manual image verification and analysis, has been a bottleneck in the processing of insurance claims. Some insurers are experimenting with the idea of on-the-spot damage assessment of motor vehicles, using image recognition software that will enable damage assessment, by identifying the make and model of the car, and the extent of damage. Ukrainian bank – PrivatBank – built a system that allows customers to pay bills by taking pictures of them, and pay for purchases by reading QR codes using Google Glass.

Organizations will be able to identify and realize more opportunities in operational efficiencies and faster turnarounds, by complementing Decision Support Systems (DSS) with image analytics.

## Imaging technologies to understand consumer behavior

Using imaging technologies, `Curulate` can analyze the most popular advertisement of a company, and which image has been shared the most number of times. This enables organizations to understand their most popular products, and align their efforts to leverage the learnings.

Some organizations are using imaging / video analytics to understand the customer trajectories, and decide on `prominent places` to place their advertisements. In the future, images will find usage in content-based user profiling and multimodal brand management.

Image-based age-group identification is another idea that has great potential in financial services. Here, the new products may be targeted at specific segments, created by using social media data, in association with image analytics.

## Imaging technologies in process improvement and better customer interaction

Image-based decision-making will remain the focus, for process improvements. Some banks have started experimenting with ideas such as generating automatic alerts to stakeholders when customer queues near a teller exceed acceptable limits. The Union Savings Bank's new surveillance and facial recognition technology helps in reducing the time taken to conduct investigations, by recognizing a given face across all videos, and providing the clips that hold the image. A major bank in the U.S. is even toying with the idea of instantly recognizing a customer, when he or she enters a branch, using imaging technology.

## Imaging analytics in risk modeling

Facebook can now identify and map 98% of its images correctly, to the right person. Imaging technology is being used for identifying and removing fake social accounts. Such image-based fake-identification has immense potential in enriching credit-scoring and risk-modelling of banks. Images could also be used by underwriters in risk assessment and fraud identification

Many more projects involving imaging technologies, which are currently in labs, seem promising and have the potential to open many more opportunities for the financial services industry. The technology will increasingly become an integral part of the underwriting and claims, customer onboarding, and risk mitigation processes, and will grow from strength to strength in the future.



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