

Extending the Capabilities of Capture with Advanced Recognition

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INTRODUCTION

Capture technology has long utilized OCR and various types of field recognition, along with rules, regular expressions and database look-ups to automate data capture from documents. Advanced Recognition introduces algorithms in the areas of pattern recognition, computer vision, machine learning, and artificial intelligence (AI), which can result in additional features like auto-classification, document separation, data capture from semi- and unstructured documents, and semantic understanding.

This can not only improve the efficiency of existing Capture processes, it can enable users to extend their Capture platforms into use cases they never thought possible, resulting in additional cost savings and efficiency gains.

Advanced Recognition in Action

For example, a large German-based multinational company started a “paperless office” initiative with a single Capture application for HR. The initial goal was to just create electronic images of all their personnel files with the aim of saving floor space and integrating the electronic files with their ECM and ERP systems. Through the success of this project and the demonstrated benefits, Capture and automation gained management’s attention.

While continuing to realize these initial benefits, the company was able to add multiple business applications to its Capture platform without adding additional personnel. They were able to do this by utilizing Advanced Capture, which enabled them to achieve greater accuracy, in addition to providing a solution that was easier to deploy and implement in real-time. Ultimately, in their shared services environment, they found it advantageous to capture all incoming documents for all business units.

The bottom line is that Advanced Recognition services can be used to reduce costs in existing Capture applications and enable new Capture processes as well. Users can leverage functionality like enhanced classification and self-learning to widen the breadth of their document understanding and increase their number of automated workflows.

Adoption in Early Stages

Infosource breaks down the Capture market into five stages of automation. It's our perspective that even with the acceleration of digital transformation (DX) projects driven by the COVID-19 pandemic, the majority of Capture users still have not gone beyond Level 2 in their Capture Technology Deployment Level. (See Figure 1)

Automation Level	0	1	2	3	4
Capture Technology Deployment Level	Early stages; scan-to-email or desktop	Digitization, basic capture	Automated Data Entry	Advanced Capture	Full end-to-end process automation
Workflow Automation	Largely Manual	Documents are digitized, workflow is mainly manual	Automated capture and data extraction of limited doc types; limited automation of process steps	Automated classification and extraction from unstructured doc types; select automated workflows or steps	Integrated automation of processes and steps
<i>Invoice Processing example</i>		<i>Scanning of invoices, manual keying of data</i>	<i>Data extraction and validation vs. accounting systems</i>	<i>Extract from email, automated capture plus approval and exception processes</i>	<i>Fully automated order to cash from purchase requisition to payment</i>

Figure 1: Infosource Levels of Capture Automation

This means that, at best, most organizations are automating data entry from limited document types such as fixed forms and or what we call semi-structured documents like invoices (which all include the same information, although it can appear in varying places on each vendor's format). This limits automation. Workflows, aside from those associated with a limited set of documents, are still primarily manual. In addition, there are steps like manual sorting and document separation within processes already utilizing Capture that add cost and time.

WHAT IS ADVANCED RECOGNITION?

Advanced Recognition introduces new functionality into the Capture mix. Technologies like machine learning, AI, and computer vision can be used to widen the scope of Capture implementations, as well as introduce new capabilities into existing processes. These technologies can be deployed within a Capture application itself, or increasingly, called as independent services to complement Capture software.

Advanced recognition can also help businesses better process inputs that are increasingly coming from a wider variety of sources. As you can see below in Figure 2, the percentage of input into Capture software from paper scanning sources like scanners and MFPs is declining, in favor of a great variety of electronic sources like email and Mobile devices.

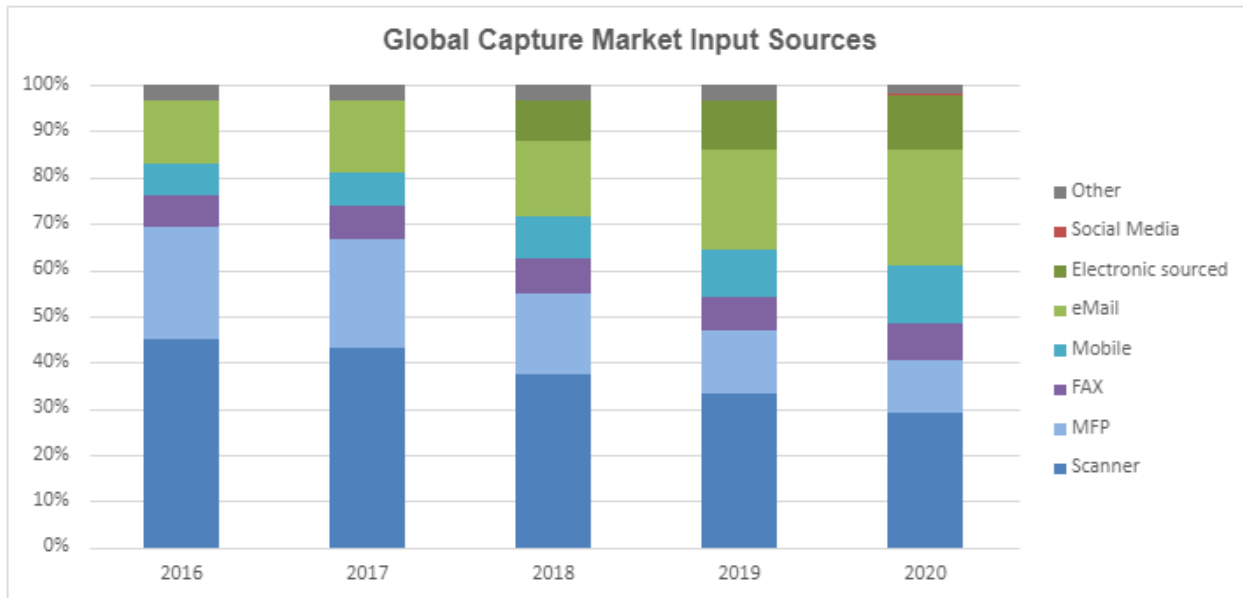


Figure 2: Global Capture Market Input Sources

In addition to documents, data may now be coming into Capture applications from mobile devices, voice transcriptions, social media, and other sources. Advanced Recognition allows for these multi-source data to be classified, validated and where appropriate, extracted for automatic entry into business processes.

Why Hasn't Every Organization Done This?

There are many companies who have implemented Basic Capture to convert and index their paper or extract data from a single form type to solve a departmental problem and stopped there. Often, it was in response to an immediate need:

- “We have purchased an ECM solution to streamline our workflow, we need to install a basic scanning system to get the paper into a digital format.”
- “We need to reduce our paper storage costs, so we installed a batch scanning solution to convert our back files of paper into indexed images.”
- “We have a specific form from which we can automate data entry to reduce costs and improve efficiencies.”

Having successfully installed and used a scanning-centric Basic Capture solution for a number of years, organizations have achieved the first step toward a “paperless office”, but often do not think about how to improve or expand their solution. The initial solution is out of mind for the IT department and CIO, who have achieved initial ROI payback goals and have other pressing issues to worry about. Here is an outline of relative costs of an end-to-end Capture operation with limited automation:

Capture Step	Labor Cost	Comment
Document Preparation	+++	Clerical
Scanning	+++	Scanner Operator Cost
Recognition	0	Unattended
Indexing & Validation	+++++	Very Labor Intensive
QC and Exception Processing	+++	QC and Rescan Cost
Release to Workflow	0	Unattended

As you can tell, document preparation, indexing/ validation, quality control and exception processing are all labor-intensive. These costs can be reduced through application of Advanced Recognition. In addition to cost savings, increased speed of processing can add substantial value to line-of-business applications and shared services environments. Now is the time to look into how Advanced Recognition technologies can help improve processes and reduce costs.

CAPTURE, MANAGE AND CONTROL MULTIPLE INPUTS

Capture is no longer just about scanning and extracting basic data from images. In today’s state-of-the-art digital workplace, information is begin captured, analyzed, synthesized and utilized to create and enhance business value. Today’s Capture requirements include the ability to process documents input via faxes, mobile devices, digital copiers (MFPs), emails and other forms of electronic submission. Once data from incoming documents is recognized, extracted and routed, these data can be called for utilization in business processes and analytics. Given today’s digital workplace, why hasn’t every organization embraced Advanced Recognition to automate business processes?

Surprisingly many capture solutions are still being used for the limited purpose of scanning and manually indexing paper and electronic documents. Many of these systems were bought in the past decade and have not been updated. As these solutions often run in the mailroom or back office they often receive little “C-Level” attention. The prevailing thought is often, “*oh well it will all be electronic soon as paper is going away,*” and, as the saying goes, “*if it ain’t broke, don’t fix it.*”

Although scan and store can help your business save money, it only scratches the surface in terms of how Capture technology can help an organization. Today’s Digital Transformation, which accelerated during the pandemic due to regulations that prevented in-person contact, is increasing the number of documents and other types of unstructured data that affect your business. Basic

scan-and-store will not help manage this new influx of data. The only way to adapt to new market digital workplace requirements is with Advanced Recognition.

In fact, in a sign of the times, while the Capture market in 2020 grew only 1%, hindered by a WW economic slowdown, revenue invested in Case Management use cases, such as customer onboarding and claims processing, grew 5%. Due to the complex nature of documents involved in Case Management, it is an area ripe for the application of Advanced Recognition technologies and Infosource is forecasting a 12% CAGR for money spent on Case Management applications from 2020 through 2025. In contrast, we are projecting a decline in investment in Capture for Records Management (RM), which has historically often been addressed with Basic Capture, although we do see opportunity for Advanced Capture in emerging, more complex RM applications like data mining and analytics.

AUTOMATED CLASSIFICATION DRIVES BUSINESS VALUE

In the past, batches of documents being Captured had to be sorted, and separators entered between document types. Manual processes were slow as operators had to insert patch cards or separator sheets to classify documents, files and folders. These labor-intensive processes add cost and time for the printing, insertion and potential removal of the dividers after scanning.

Consider how human understanding is applied to processing a document: the operator picks up a document and quickly identifies the type. Once a knowledge worker recognizes the document type, they can then bring up the appropriate interface to manually key data. The system validates these data against rules associated with the field and can also use database lookups. If the knowledge worker gets it wrong, they have to retype it. It's all very time consuming.

Advanced Recognition works in a similar way but more efficiently. The automated Capture system looks quickly at several characteristics of a document, including size and overall layout. It can leverage both image and textual elements to determine the type. If the system returns a low-confidence level related to its classification, the document can be flagged as an exception and manually classified. However, with the machine learning algorithms incorporated in Advanced Recognition, the next time a similar type of document comes through, there is a greater chance its classification will be automated.

This auto-classification should provide enough information to determine which step comes next in a process, including what type of data should be extracted and/or where a file should be sent for further processing.



Advanced Recognition

This saves printing costs of barcodes, patch codes, and separator sheets and can reduce, or even eliminate, the need for manual sorting. With today's improved feeders in document scanners, the cost of document prep, which was previously around \$10 per thousand pages, can be reduced to nearly nothing. Most organizations report a return on investment within 12 months simply by implementing automated classification alone, of course each case should be considered individually.

Because it reduces manual classification and data entry, Advanced Recognition has enabled Capture to be more widely adopted in environments without dedicated scanning operators. This means more businesses are now able to take better advantage of data from documents received in field offices, in customer facing encounters and even coming directly from customers themselves. The need to efficiently process this type of front-office/on demand information accelerated significantly during the pandemic, when remote interactions become the norm. Spending on front-office/on demand Capture applications grew 14% in 2020, while spending on back-office/batch applications dropped -15%.

Even post pandemic, we expect spending on front-office/on demand applications to outpace back-office/batch sales by a significant margin [see Figure 3: Capture Market Forecast by Technology Segment]. Integrating Advanced Recognition capabilities within a remote/distributed Capture workflow can be effective in many digital workplace applications.

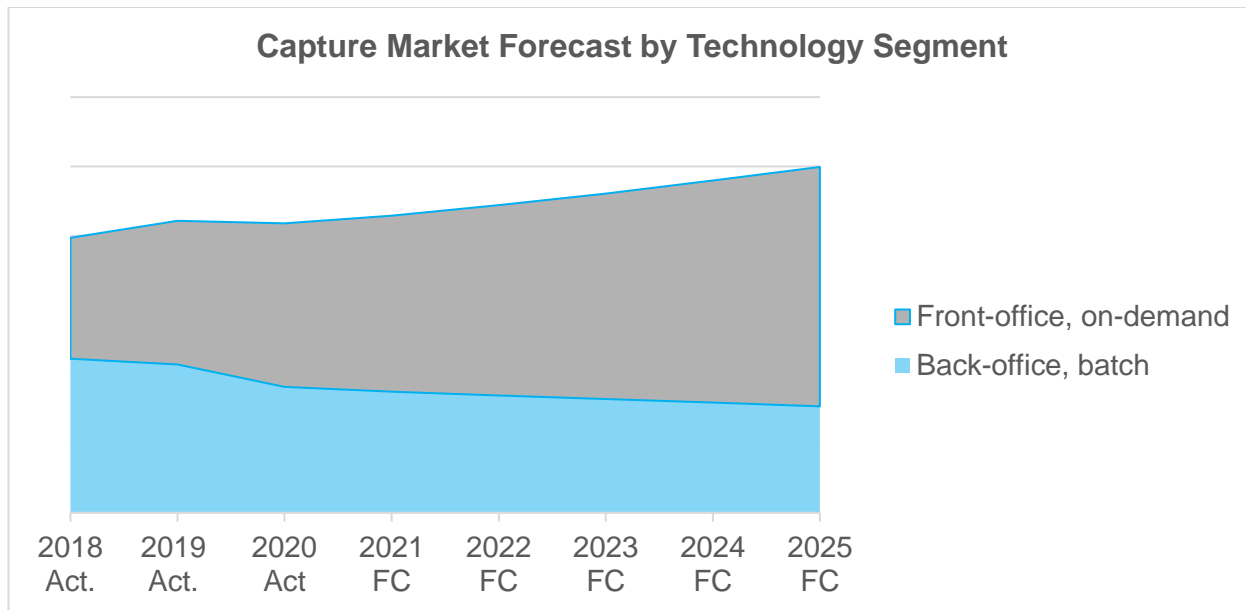


Figure 3: Capture Market Forecast by Technology Segment

DOCUMENT CLASSIFICATION REDUCES THE COST OF SET-UP

In Basic Capture solutions, managers spend large amounts of time setting up new form types. To identify document types, the operator has to label or barcode the form or utilize a dedicated separator sheet. They then have to laboriously go field-by-field drawing boxes around each zone with a mouse and then connect that with validation rules. Some simple rules are sometimes included, but often the look-ups and validation rules have to be specifically programmed.

Advanced Recognition uses AI techniques to “learn” new document sets and other input types, which then can be incorporated into the rule set. Advanced Recognition works on the basis of auto analysis of textual document content, image-based analysis of document topology or a combination of textual and image analysis. The system can be trained to identify document types and subsequently “learn” to identify variations. This reduces the need to manually set up and identify each specific document type and locate the fields to capture. Small changes between similar documents automatically become incorporated, eliminating the need for customization and coding.

A digital mailroom is a good example of how Advanced Recognition is being applied. Mail is opened, prepped, and scanned. Electronic documents can also be input via email or watched folders. The Advanced Recognition classification then goes to work to identify the document types. There of course can be exceptions flagged that require verification by the operator and could provide the basis for further recognition training. A combination of OCR, ICR (Intelligent Character Recognition), and barcodes are applied for auto indexing. Once uncertain fields are verified, either automatically or through some human intervention, then documents and associated data are sent to relevant databases. Documents can then be called by workflows for routing to appropriate recipients for review and approval.

EXTRACT AND VALIDATE DATA FASTER

Through Advanced Recognition, a Capture system can not only “classify a document,” it can also “read a document.” OCR is not new technology, but it has been enhanced and optimized for various business applications. Application specific lexicons and business rules and the ability to do fuzzy matching have improved accuracy rates in some specific business applications. Application-oriented OCR is being applied to invoice and forms processing and other areas for improved automation.

Validation of extracted data is important in making Capture systems reliable. Using forms and invoice processing as examples, there are solutions that utilize mathematical formulas, such as “quantity x unit price” to validate the extended amount, as well as calculate discounts.

By leveraging from preset form types, for example invoices that have already been set up, machine learning in Advanced Recognition makes it possible to integrate a new document or form types in a

fraction of the time that legacy capture and OCR applications required. It is now easier to add new document types to a process whether they are in paper, fax, or PDF formats. Advanced Recognition enhances auto-validation protocols, improves data accuracy and reduces the number of costly exceptions.

INITIATE AND VALIDATE WORKFLOWS

Document classification and extracted, validated data, can be combined with business rules to generate additional metadata that is not on a form initially. This additional metadata can then be leveraged to affect workflows. One example is an order that exceeds the supplier's credit. It is possible via a look-up into the supplier database to place the customer's credit limit within the metadata, and even provide a look up linkage to his account and history. By capturing all relevant business data immediately, organizations can better interact with clients and prospects in real-time.

Within the ECM, ERP or other business applications, processes can be accessed and modified at the time of Capture in real-time in order to better understand and route information and images. In the above situation, breaching a credit limit may require a supervisor's approval. So, the workflow is modified to allow routing to the supervisor with an attached message, which is automatically created.

Consider a Customer Engagement Management (CEM) environment where the customer is required to submit a document while on a chat session or phone call to a customer service representative. Using Advanced Capture, the customer may take out a mobile device or scanner to convert a piece of paper to an image on demand. This image could then be displayed on the representative's screen, as well as the customer's, with relevant extracted data and perhaps with a dynamically updated application or claim form. If the information runs up against a business rule requiring an exception, the workflow routes the new information and may then require an additional approval level.

TAKE ACTION

We have discussed the advantages of moving from Basic Capture to Advanced Recognition systems that are impacting business. These benefits include:

1. Streamlining existing Capture operations. Advanced Recognition can be utilized to automatically identify different document types, eliminating the need for separator sheets with the ability to auto-classify documents. This will reduce set up cost and improve efficiency.
2. Understand and Extract more relevant data. With Advanced Capture, we can "machine read" documents and apply AI to enable learn-by-example extraction. This can reduce set up times for new documents, improve accuracy, and increase the meta data being captured in your operations.
3. Consider applying Advanced Recognition to obtain data from additional input sources such as mobile devices, fax, and other electronic inputs as the business application requires. Now

more than just scanned documents are available for input into business processes. PDF documents can be very versatile “containers”. Video, voice, and object recognition can even be incorporated into Capture processes. By applying Advanced Capture understanding and data tagging techniques, more information can be transmitted and utilized in your business processes.

4. The additional understanding that is obtained through Advanced Recognition opens up opportunities, not only for better understanding and increased data availability, but also through application of AI, to initiate business workflows when appropriate. Data derived from Advanced Recognition can be utilized in rules-based systems that call for managerial intervention when necessary, makes data available on demand for customer-facing applications, or automatically routes information to multiple business processes.

Advanced Recognition unleashes information and opens up opportunities for organizations to improve operationally, provide enhanced customer experiences and differentiate in the marketplace. It is said that “information is power” and now we have Advanced Recognition to better harness that power.

ABOUT INFOSOURCE CAPTURE SOFTWARE

Infosource is a leading global analyst firm headquartered in Geneva, Switzerland. In December 2019, Infosource acquired HSA, Inc., an analyst firm founded in 1989 that specialized in Capture software, which now serves as foundation for Infosource’s software division.

Infosource Software is the leading authority on Capture systems and provides analysis and guidance on the Capture software market, which covers the use of Artificial Intelligence pattern recognition technologies to provide a business understanding and extraction of data from unstructured and semi-structured 'human understandable' inputs.