



White Paper

# Automated Financial Spreading (AFS)

How commercial lending operations can unlock efficiencies with automation

By: Devendra Soni  
Senior Data Scientist, FIS

## Industry overview

In today's financial market, lenders are at a turning point. Facing pressure from all sides, including regulators, new competitors and more demanding customers, banks are realizing that their own IT infrastructure may pose a significant risk in effectively putting their money to work.

To succeed in this challenging environment, commercial lending operations must be:

- Customer-centric
- Cost-effective
- Risk aware
- Process efficient

By focusing on these four tenets, banks can recommend the right solutions for their customers and provide uniformity and consistency in their underwriting that makes their money work harder. But, in many cases, a bank's commercial lending processes and systems are simply not integrated, transparent or flexible enough to allow them to achieve their goals. FIS® Credit Assessment (formerly Ambit Optimist) is designed to help banks overcome these hurdles and succeed in today's demanding market.

## FIS Credit Assessment

FIS Credit Assessment is a complete solution for credit risk management, delivering benefits for credit and risk officers as well as front-line relationship managers. Commercial bankers get the vital financial analysis, business modeling capabilities and communication tools they need to build, manage and sustain profitable commercial loan relationships. Portfolio reporting tools offer new insights into portfolio performance for proactively managing risks.

Credit Assessment is designed for all forms of commercial lending. In one solution, you can analyze your borrowers' performance and strategies across all commercial business lines including commercial and industrial, commercial real estate, agribusiness, personal guarantors, non-profits, financial institutions and municipalities, as well as numerous sub-industries. In addition, you can deploy your approach to risk rating and covenant management consistently.

Additionally, Credit Assessment can help alleviate regulatory pressure by satisfying examiners with your file quality and process. Credit Assessment is done by analyzing the customer financials, which is also known as Spreading Customer Financials.



## What are financial statements?

Financial statements are written records that convey the business activities and the financial performance of a company. These may be audited by various entities or, in some cases, prepared by management to present the company's financials.

Financial statements for small and medium businesses could be relatively simple to present, while those for larger businesses can get more complicated. The three major financial statements are the balance sheet, income statement and statement of cash flows. Apart from these, a combined audited financial statement can also have a coverage around the company's performance, auditor's report and director's report.

## What is spreading customer financials?

A financial spreading journey is defined with a receipt of financial statements by a credit analyst. The credit analyst scans through pages to identify relevant sections and maps these to a structured format.

For commercial lending, spreading customer financials is key to determine the quality of credit decisioning and underwriting. Spreading customer financials is a manual, time-consuming process that is resource-intensive, increases costs and is prone to errors. This can further undermine the quality of strategic business decisions, highlighting the need for greater accuracy in spreading.

## How do financial statements contribute to financial spreading?

While credit analysts and bankers might review the entire audit report, the focus for financial spreading is interpreting the numbers on the balance sheet, income statement and cash flow statement. The traditional financial spreading process requires a credit analyst to manually review a financial document, often exceeding 50 pages, despite the relevant financial information being contained in only a few sections. The analyst identifies and highlights the specific pages with the necessary information and then extracts the data. Following this, the analyst manually maps external terms to internal accounts for calculation purposes.

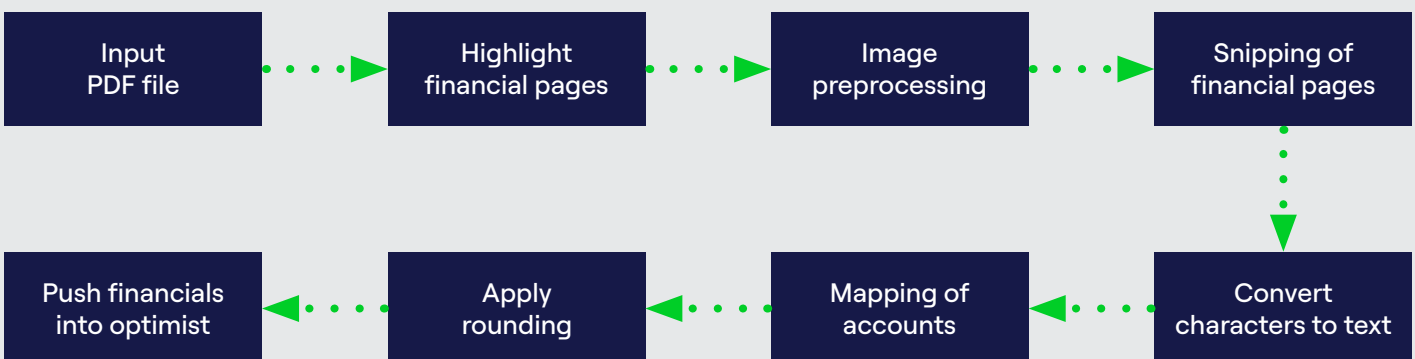


Figure 1. Financial Spreading flow without ML

We face a few challenges in the above process that are identified and summarized below.

## Product management

- Multiple standalone applications are required for credit assessment
- Processing and analyzing financial statements by credit teams requires significant manual intervention
- Because of the manual intervention, banks end up with limited case handling capacity
- Eventually, a greater number of resources are required for timely case processing

## Time to spread

Global Plus provides easier ways to process a full range of product lines, handle investments, calculate fees and produce statements. A single application allows you to process multiple products without the need for compromise. The flexibility of Global Plus helps you adapt rapidly to industry change.

## Disconnected process

There is no real-time synchronization between the credit underwriting team and branches.



# Our solution

## Automating financial spreading using AI

FIS Automated Spreading solves the conundrum of financial spreading by using AI (specifically, computer vision and natural language processing). This unconventional solution leverages optical character recognition (OCR) to scan the pages of a financial statement and machine learning to intelligently identify the mapping of scanned financial terms. FIS sets itself apart through a robust, three-step account mapping process powered by machine learning.

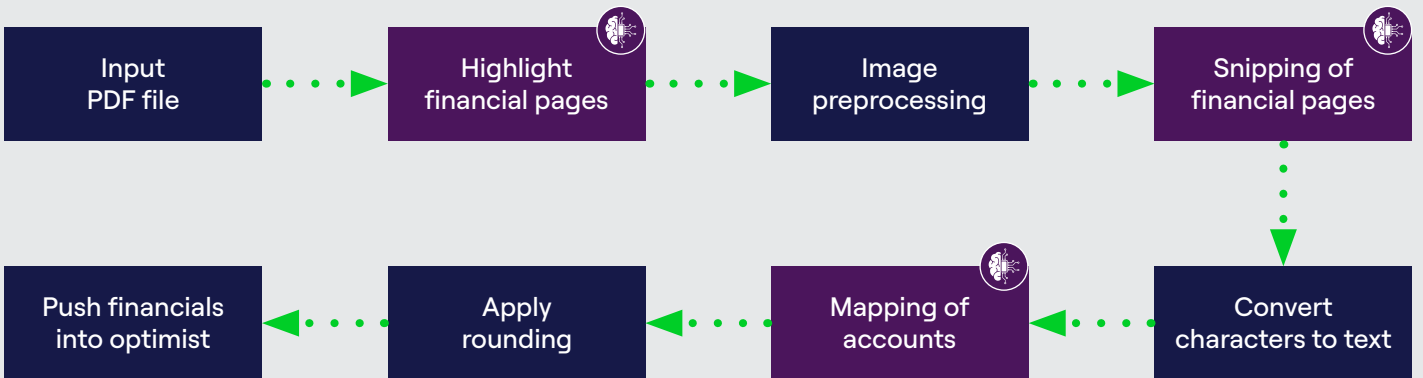


Figure 2. Solution Diagram

FIS Automated Spreading uses microservices-based architecture which are easily pluggable into our existing Credit Assessment product. The following diagram illustrates the solution.



# FIS Automated Spreading – Logical Architecture

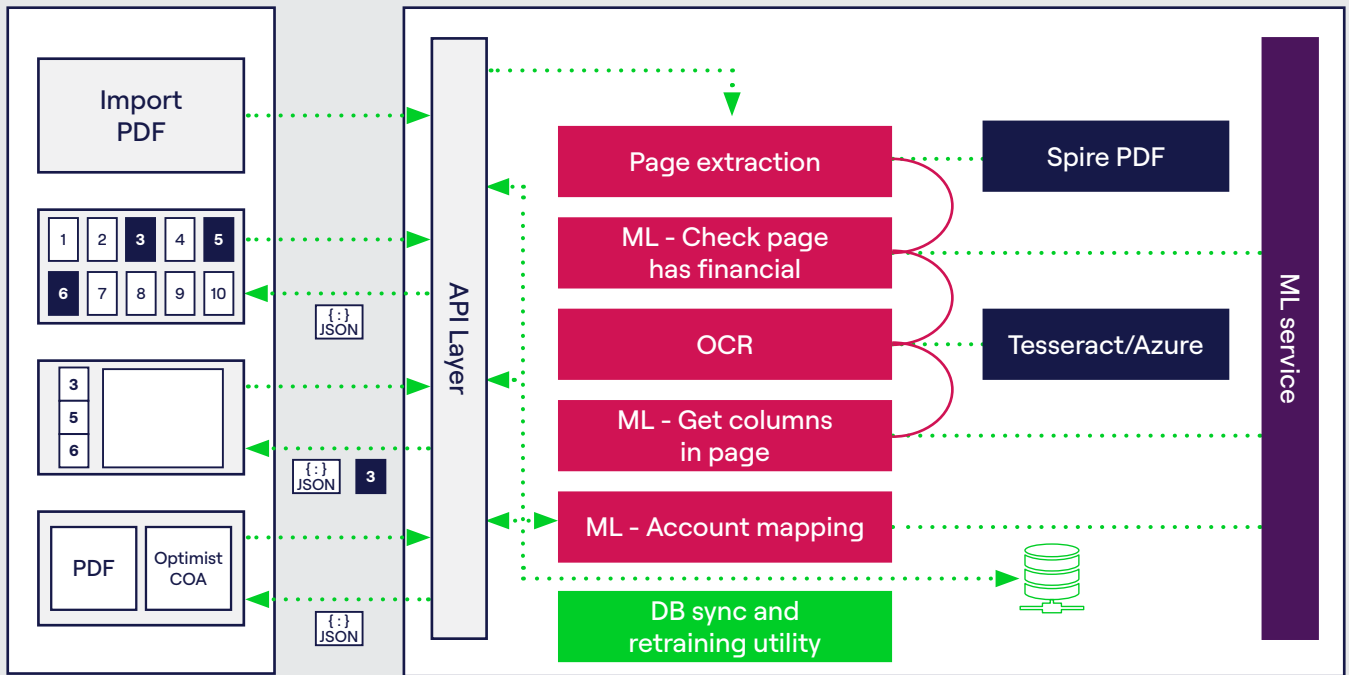


Figure 3. Automated Spreading – Logical Architecture

The following explains how AI automates this process.

## Step 1 – Page detection

- System classifies the pages into two classes/categories: financial or non-financial.
- A custom CNN architecture has been engaged for this classification purpose.
- The model is trained on a curated, labelled dataset of over 25,000 financial and non-financial images, achieving more than 94% accuracy in identifying financial pages.

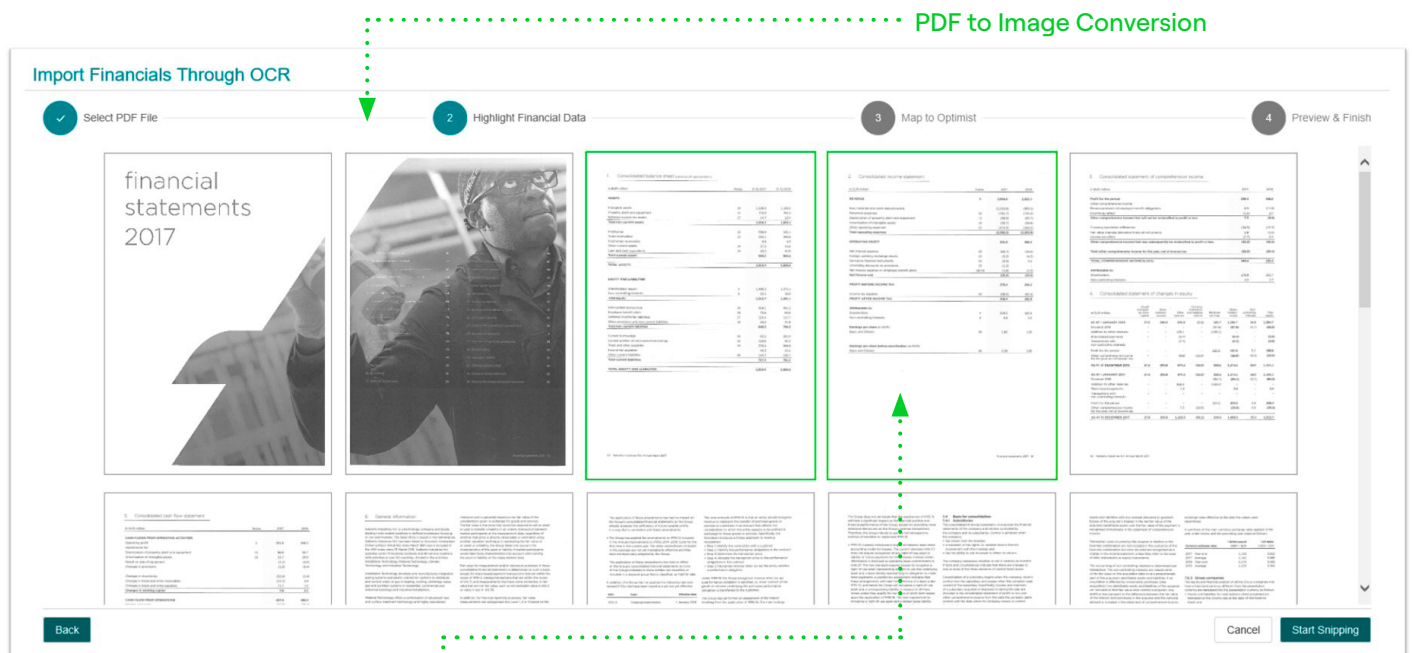


Figure 4. Page Detection process

Image comprised of financial data auto detected through Machine Learning Model using pattern recognition algorithm

## Step 2 – Layout analysis and data extraction

- Data extraction plays a crucial role in this process, involving the retrieval of information from both textual and scanned PDFs. AFS effectively manages both formats, even addressing poor-quality images (such as noisy, distorted or tilted ones) with notable accuracy. The FIS automated spreading module further enhances this capability by utilizing specialized data extraction and OCR libraries to extract text from scanned images.
- AFS leverages the cutting-edge, deep-learning-based object detection technique to detect areas on the page containing financial information.
- Once the area of interest is identified, AFS utilizes custom-built algorithms to extract the relevant columns. The system relies on coordinate data and content analysis to determine the nature of these columns.
- AFS is able to extract the information of interest with an accuracy rate of more than 90%.

..... Image preprocessed  
• Scale to the right size      • De skew  
• Increase contrast              • Remove noise and scanning artefacts

**Import Financials Through OCR**

1 Select PDF File      2 Highlight Financial Data      3 Map to Optimist      4 Preview & Finish

Information to highlight: Accounts 1/31/2020

in EUR million	Notes	31-12-2017	31-12-2016
<b>ASSETS</b>			
Intangible assets	30	1,126.6	1,128.2
Property, plant and equipment	31	774.9	761.6
Deferred income tax assets	37	54.7	15.4
<b>Total non-current assets</b>		<b>1,956.2</b>	<b>1,905.3</b>
Receivables	32	558.8	521.1
Trade receivables	33	353.1	346.6
Income tax receivables		5.6	4.5
Other current assets	34	87.3	42.6
Cash and cash equivalents	35	45.3	40.9
<b>Total current assets</b>		<b>994.2</b>	<b>950.5</b>
<b>TOTAL ASSETS</b>		<b>2,950.4</b>	<b>2,855.8</b>
<b>EQUITY AND LIABILITIES</b>			
Shareholders' equity	4	1,480.3	1,371.1
Non-controlling interests	4	22.4	18.0
<b>Total equity</b>		<b>1,502.7</b>	<b>1,389.1</b>
Non-current borrowings	38	434.1	481.2
Employee benefit plans	39	71.6	84.6
Deferred income tax liabilities	37	133.4	122.7
Other provisions and non-current liabilities	38	44.2	17.8
<b>Total non-current liabilities</b>		<b>643.3</b>	<b>706.3</b>
Current borrowings	36	61.2	202.5
Current portion of non-current borrowings	36	134.8	90.5
Trade and other payables	39	124.4	204.6
Income tax payable		40.3	32.2
Other current liabilities	39	246.7	136.7
<b>Total current liabilities</b>		<b>757.4</b>	<b>761.2</b>
<b>TOTAL EQUITY AND LIABILITIES</b>		<b>2,950.4</b>	<b>2,855.8</b>

..... Co-ordinate Analysis for Snipping

Figure 5. Layout Analysis and Data Extraction

## Step 3 – Mapping financials

- Once financial information is extracted, the next step is to match extracted terms with system definitions or with the internal chart of accounts (COA).
- AFS is powered with a NLP-based approach, which uses semantic similarity to find the closest matching account for a given selection term.
- Semantic similarity involves measuring how closely two sentences align in meaning and can be applied to a set of documents or selected terms, where the concept of “distance” between items reflects the similarity of their meanings.
- In FIS Dev Labs, we test the models on hundreds of financial statements on the curated data set of financial terms, continuously enriching the data set to support higher model accuracy.

Rules configured by Admin, are reflected on Business Portal . . . . .

**Import Financials Through OCR**

1. Consolidated balance sheet (before profit appropriation)

in EUR million	Notes	31-12-2017	31-12-2016
<b>ASSETS</b>			
Intangible assets	10	1,126.6	1,128.2
Property, plant and equipment	11	774.9	761.5
Deferred income tax assets	17	34.7	13.4
<b>Total non-current assets</b>		<b>1,936.2</b>	<b>1,903.1</b>
Inventories	12	556.8	521.1
Trade receivables	13	353.1	346.6
Income tax receivables		3.5	4.3
Other current assets	14	37.3	42.6
Cash and cash equivalents	16	43.5	40.9
<b>Total current assets</b>		<b>994.2</b>	<b>955.5</b>
<b>TOTAL ASSETS</b>		<b>2,930.4</b>	<b>2,858.6</b>
<b>EQUITY AND LIABILITIES</b>			
Shareholders' equity	4	1,490.3	1,373.1
Non-controlling interests	4	22.4	38.0
<b>Total equity</b>		<b>1,512.7</b>	<b>1,391.1</b>
Non-current borrowings	16	434.1	461.2
Employee benefit plans	18	71.6	84.6
Deferred income tax liabilities	17	116.4	122.7
Other provisions and non-current liabilities	18	44.2	37.8

Map to Optimist

From Financials	To Optimist	In Use	Ignore	1/31/2020
In EUR million		<input checked="" type="checkbox"/>	<input type="checkbox"/>	0
<b>ASSETS</b>		<input type="checkbox"/>	<input type="checkbox"/>	
Intangible assets		<input type="checkbox"/>	<input type="checkbox"/>	1126.6
Property, plant and equipment	Land	<input type="checkbox"/>	<input type="checkbox"/>	774.9
Deferred income tax assets	Deferred Income Tax	<input type="checkbox"/>	<input type="checkbox"/>	14.7
<b>Total non-current assets</b>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Inventories	Inventory	<input type="checkbox"/>	<input type="checkbox"/>	556.8
Trade receivables	Non Trade Receivables	<input type="checkbox"/>	<input type="checkbox"/>	353.1
Income tax receivables	Tax Receivable	<input type="checkbox"/>	<input type="checkbox"/>	3.5
Other current assets	Other Curr Assets	<input type="checkbox"/>	<input type="checkbox"/>	37.3
Cash and cash equivalents	Land	<input type="checkbox"/>	<input type="checkbox"/>	43.5
<b>Total current assets</b>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>TOTAL ASSETS</b>		<input type="checkbox"/>	<input type="checkbox"/>	<b>2910.4</b>
<b>EQUITY AND LIABILITIES</b>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Shareholders' equity		<input type="checkbox"/>	<input type="checkbox"/>	1490.3
Non-controlling interests		<input type="checkbox"/>	<input type="checkbox"/>	22.4
<b>Total equity</b>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Non-current borrowings		<input type="checkbox"/>	<input type="checkbox"/>	414.1
Employee benefit plans		<input type="checkbox"/>	<input type="checkbox"/>	71.6

0% Accounts Mapped

Back Cancel Next

Figure 6. Mapping of Financials



## Benefits at a glance

### AI/ML enablers

- Pattern recognition and robust classifiers of images by using training algorithm
- Ability to make decisions based on imprecise input data

### Operational excellence

- Less time to spread
- Transparency and traceability
- Removal and retrieval cost

### Single, unified interface

- Single interface to analyse, prepare the proposal and underwriting credit analysis for review and approval
- Standardize financial spreading and ensure data integrity across multiple templates

### Better customer service

- Quantum jump in productivity
- Quick decision making
- Ready to use
- Improve due diligence



## What makes AFS unique?

- AFS contributes to a great user experience of the product, ensuring accurate information is extracted efficiently.
- The feedback is captured transparently, and models are retrained periodically to improve accuracy.
- AFS is bundled with pretrained ML models that can help automate the financial spreading process from the first day of implementation.

## Return on investment

- AFS has been a phenomenal success in market, which added on to the existing product capabilities.
- One of our biggest customers in the APAC region is using AFS and realizing the benefits of time efficiency and error reduction.
- Within one year of MVP being released, the product was accepted by financial institutions around the world including ANZ, SEA, MENA, Europe, the U.S. and LATAM.

## Conclusion

FIS systems and processes endeavor to simplify by introducing process efficiency through automation that helps money work harder. With FIS solutions, businesses can realize immense operational standardization and cost savings. FIS automated spreading module combines the power of OCR and ML to extract the financial information and map it to system definitions/COAs.

Powered by FIS' extensive financial expertise, the ML models are trained on industry-relevant data to ensure higher accuracy in the process. The system also incorporates a feedback and retraining loop, capturing user interaction data to continuously enhance the mapping recommendation model. These advanced technologies are seamlessly integrated into FIS Automated Spreading. The automated financial spreading road map includes expanding the module to integrate with other ML solutions that address credit, like determining covenant breach.

## References

An Introduction to Convolutional Neural Networks  
SSD: Single Shot MultiBox Detector for object detection and layout analysis

FIND YOUR UNLOCK

FIS Credit Assessment helps lenders put money to work more efficiently.

Our **technology** powers the global economy across the money lifecycle.

### Money at rest

Unlock seamless integration and human-centric digital experiences while ensuring efficiency, stability, and compliance as your business grows.

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### Money in motion

Unlock liquidity and flow of funds by synchronizing transactions, payment systems, and financial networks without compromising speed or security.

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### Money at work

Unlock a cohesive financial ecosystem and insights for strategic decisions to expand operations while optimizing performance.

## About FIS

FIS is a financial technology company providing solutions to financial institutions, businesses and developers. We unlock financial technology that underpins the world's financial system. Our people are dedicated to advancing the way the world pays, banks and invests, by helping our clients confidently run, grow and protect their businesses. Our expertise comes from decades of experience helping financial institutions and businesses adapt to meet the needs of their customers by harnessing the power that comes when reliability meets innovation in financial technology. Headquartered in Jacksonville, Florida, FIS is a member of the Fortune 500® and the Standard & Poor's 500® Index. To learn more, visit FISglobal.com. Follow FIS on LinkedIn, Facebook and X (@FISglobal).

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