

# Artificial Intelligence Helps Financial Advisors Answer Client Questions Faster



AI helps advisors sort and respond to high volumes of email by automatically defining context and sender sentiment.

Artificial intelligence, including deep learning using neural networks, is increasingly finding use in the financial services industry. One compelling use case is a sophisticated automated system to analyze, manage, and respond to complex emails from clients. The system relies on a convolutional neural network to:

- Understand email content
- Interpret sender intent and emotion
- Accurately weigh “best action” recommendations

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## AI Can Help Advisors Sort and Respond to High Volumes of Email

Today	Tomorrow
Financial advisors serving private banking and asset management clients often spend several hours every day reviewing customer queries and preparing researched, thoughtful responses.	An artificial intelligence application will understand incoming email to find and generate accurate responses, helping agents provide faster, more effective customer service while also compiling data for ongoing sentiment analysis.

### Why the Time is Right

Deep learning technologies have evolved to include capabilities that significantly improve automated processes—like the ability to process unstructured data, correctly interpret intent and emotion, and accurately weigh “best action” recommendations. Plus, deep learning processes generate feedback for system-wide retraining, so the process of automatically analyzing emails and composing suggested responses gets better and better over time.

In the financial advisory business, client service professionals deal with a spectrum of queries, from easy to complex:

**Easy.** *What was the executed price of my last transaction?*  
Many routine questions can be answered via self-service tools online.

**Complex.** *Should I sell some holdings? If so, which ones?*  
Open-ended queries require research and a real dialogue with customers.

**In Between.** *What’s your projection for crude oil inventory in six months? Nine months?*

The answers to these questions exist in the content produced by your research and portfolio strategy teams, but may be time consuming to uncover.

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In-between questions are ripe for AI-based automation because answers can be quickly pulled from an existing library of content—investment research, stock analysis, market insights—using artificial intelligence.

## How We'll Make it Happen

Our goal is to give sales professionals and client advisors a virtual assistant that automatically answers any client question that has an answer in existing research-related content assets.

Questions like:

- *What was the price target for Microsoft at the end of the first quarter?*
- *How did the software sector perform last month? US stocks? Globally?*
- *What's the equity rating on AAPL right now?*
- *What was AAPL's EPS last quarter? Five-year average?*
- *What's your interest rate forecast in America over the next year?*

## Navigating oceans of content

We developed a prototype to test an on-premise solution that will:

1. Automatically categorize incoming email
2. Analyze email content and context to understand intent and emotions
3. Provide targeted recommendations for the response
4. Measure the success of those recommendations
5. Use feedback from manual classification to influence system retraining and improve performance over time

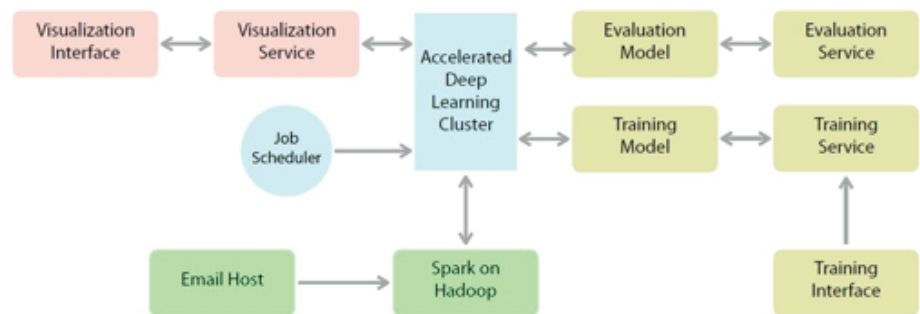
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## Designing a convolutional neural network solution



*Our basic systems architecture for a deep learning-based system to read and understand emails.*

There are no off-the-shelf products available today that can reliably handle the high volumes of text and content analysis we required.

There are no off-the-shelf products available today that can reliably handle the high volumes of text and content analysis we required. We evaluated two deep neural network architectures for our development challenge. A recurrent neural network (RNN) using long short-term memory (LSTM), although more natural and easy to use, was only effective with smaller datasets. The convolutional neural network (CNN) was several magnitudes faster in terms of raw performance and was faster to retrain. We used a graphics processing unit (GPU) to accelerate the learning process and build a declarative training interface.

We designed a solution based on four functional requirements:

### 1. Identify the timeline.

The system must be able to understand if the question refers to a future projection or historical data.

### 2. Identify who's talking to whom.

The system interprets every business email and collates them for automated responses, so it must identify if the email is advisor to client, client to advisor, or advisor to another person within the firm.

### 3. Classify the context of the message.

What product or service is being explicitly or implicitly referenced in the message?

### 4. Define sentiment.

The system should be able to determine if the message is positive, negative, or neutral and declare "unidentified" for anything that can't be reliably pegged.

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Intelligent automation of email management opens many doors for any business with a great deal of back and forth with clients, freeing up massive resources for activities and tasks with higher value.

An exciting extension would be to use an intelligent conversational agent and natural language processing to allow clients to interact with the system vocally and get the answers they need.

### **About Tata Consultancy Services Ltd (TCS)**

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