

Documentation: Sales Insights Automation with n8n + LangChain

Why n8n + LangChain?

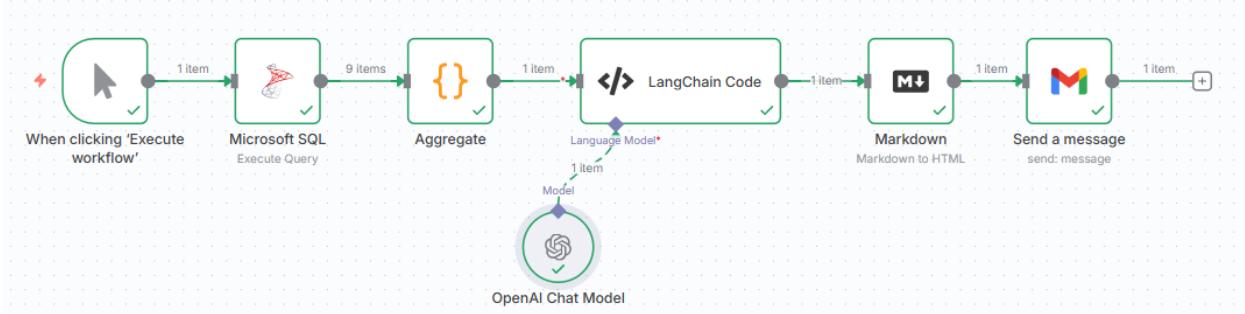
Business users often need quick **executive insights** from raw data, not just numbers, but **summaries, highlights, and trends**.

- **n8n** makes it easy to connect data sources (SQL Server, APIs, CSV, etc.), process data, and automate workflows without heavy coding.
- **LangChain** enables the integration of an **LLM (Large Language Model)** into the workflow to transform raw data into narrative **insights, summaries, and Q&A bots**.

Together, this creates a **no-code + AI-powered data pipeline**:

1. **n8n** handles the data extraction and orchestration
2. **LangChain** handles intelligent summarization & reasoning

Workflow Overview for Sales Insights demo



1. Trigger Node (Manual / Scheduled)

- Start the workflow manually or via a cron schedule.
- Useful for daily/weekly reporting.

2. Microsoft SQL Node

- Connect to the Sales dataset with 200 rows (via SQL database).
- Executes the query:

```
SELECT
    Region,
    Product,
    SUM([Revenue]) AS TotalRevenue,
    SUM([Units Sold]) AS TotalUnits
FROM Sales
WHERE Date BETWEEN '2025-01-01' AND '2025-03-31'
GROUP BY Region, Product
ORDER BY TotalRevenue DESC;
```

- Outputs aggregated metrics by **region** and **product**.

3. Aggregate Node (Code)

- Combine all SQL rows into a **single item** for the AI.
- Prepare a **datasetText** string that's easy for an LLM to understand.
- Example code:

```
const allData = items.map(item => ({
    Region: item.json.Region,
    Product: item.json.Product,
    TotalRevenue: parseFloat(item.json.TotalRevenue),
    TotalUnits: parseInt(item.json.TotalUnits)
}));

return [
    json: {
        completeDataset: allData,
        totalRecords: allData.length,
        datasetText: allData
            .map(row => `${row.Region} | ${row.Product} | Revenue: ${row.TotalRevenue} | Units: ${row.TotalUnits}`)
            .join('\n')
    }
];
```

- Instead of 9 separate rows to the AI, **one consolidated input** with structured text is produced.

4. OpenAI Chat Model Node

- Provide the LLM (e.g., GPT-4-mini).
- Connected to LangChain Code as the “AI engine”.

5. LangChain Code Node

- This is the module responsible for **intelligence operations**.
- Uses LangChain’s PromptTemplate + SummarizationChain.
- Example workflow:

```
// Get aggregated sales data from previous node
const salesData = $input.item.json.completeDataset;

if (!salesData || salesData.length === 0) {
  throw new Error("No sales data provided to the node.");
}

// Convert data into a readable string for the LLM
const salesText = salesData
  .map(row => `${row.Region} | ${row.Product} | Revenue: ${row.TotalRevenue} | Units: ${row.TotalUnits}`).join("\n");

// Prepare summarization prompts
const { PromptTemplate } = require("@langchain/core/prompts");
const { loadSummarizationChain } = require("langchain/chains");

// Get the AI model connected to this LangChain Code node
const llmSummary = await this.getInputConnectionData('ai_languageModel', 0);

const summaryTemplate = `
You are a sales analyst. Analyze the following sales data and write an executive summary for management:
- Highlight top-performing regions by revenue
- Highlight best-selling products by units
- Identify any interesting trends or anomalies

Sales data:
-----
{text}
-----
Provide a concise executive summary and also suggest 2-3 actionable insights or recommendations for the management team.
`;

const SUMMARY_PROMPT = PromptTemplate.fromTemplate(summaryTemplate);

const summaryRefineTemplate = `
You are a sales analyst. You have an existing summary: {existing_answer}
Use the new data below to refine the summary, ensuring the key insights and recommendations are clear and concise.

Sales data:
-----
{text}
-----
If the new data does not change the insights, keep the original summary. Return the refined summary and actionable recommendations.
`;

const SUMMARY_REFINE_PROMPT = PromptTemplate.fromTemplate(summaryRefineTemplate);

// Load summarization chain (refine type)
const summarizeChain = loadSummarizationChain(llmSummary, {
  type: "refine",
  verbose: true,
  questionPrompt: SUMMARY_PROMPT,
  refinePrompt: SUMMARY_REFINE_PROMPT,
});

// Run the chain
const summary = await summarizeChain.run([{ pageContent: salesText }]);

// Return summary
return [{ json: { summary } }];
```

- Step-by-step breakdown:

1. Import LangChain chain & prompt tools.

- const { PromptTemplate } = require("@langchain/core/prompts");
- const { loadSummarizationChain } = require("langchain/chains");

2. Access the LLM connection from the OpenAI node.

- const llmSummary = await this.getInputConnectionData('ai_languageModel', 0);

3. Define a **prompt template** with clear business instructions.

- const summaryTemplate = `...`;
- const SUMMARY_PROMPT = PromptTemplate.fromTemplate(summaryTemplate);
- const summaryRefineTemplate = `...`;
- const SUMMARY_REFINE_PROMPT = PromptTemplate.fromTemplate(summaryRefineTemplate);

4. Run the summarization chain on the aggregated dataset.

- const summarizeChain = loadSummarizationChain(llmSummary, {
 type: "refine",
 verbose: true,
 questionPrompt: SUMMARY_PROMPT,
 refinePrompt: SUMMARY_REFINE_PROMPT,
});

- const summary = await summarizeChain.run([{ pageContent: salesText }]);

5. Return the structured summary as JSON.

- return [{ json: { summary } }];

6. Markdown & Email Nodes

- Convert output from LangChain Code node to HTML to send via **Gmail**.

Key Takeaways

- **n8n** automates the pipeline (data → processing → AI → delivery).
- **LangChain** turns structured numbers into **business insights & narratives**.
- This setup is reusable for:
 - Sales reports
 - Customer support insights
 - Operational dashboards

Example: AI Output

Data Insights



Executive Summary:

The EMEA region leads in total revenue generation, primarily driven by strong sales of Widget C, which achieved the highest revenue at 113,081 and the greatest units sold in that region (3,580 units). The Americas region shows solid performance with Widget A as the best-seller by revenue (108,757) and a healthy volume (3,177 units). APAC, while generating the lowest revenue among the regions, exhibits balanced sales across Widget A and Widget B, with notable unit sales for Widget B (2,722 units).

Key Highlights:

- **Top-performing region by revenue:** EMEA, led by Widget C.
- **Best-selling product by units:** Widget C in EMEA (3,580 units) and Widget A in Americas (3,177 units).
- **Trends/Anomalies:** Widget C commands the highest revenue overall, yet in APAC its revenue and units are notably lower than in other regions, suggesting regional preferences or distribution challenges. Americas shows higher revenue but fewer units sold for Widget C compared to EMEA, indicating potential pricing or product mix variations.

Recommendations:

1. **Expand Widget C marketing and distribution in APAC**, capitalizing on its strong performance in other regions to increase revenue and market share.
2. **Leverage insights from Americas' Widget A sales** by exploring cross-region promotional strategies to boost this product's uptake in EMEA and APAC.
3. **Investigate pricing and inventory strategies for Widget B in EMEA and APAC** to address lower revenue despite moderate sales volume, potentially improving profitability.

These steps will optimize product performance regionally and drive overall revenue growth.

Dataset & SQL Results

<pre>SELECTTOP(1000)[Date] ,[Region] ,[Product] ,[Units_Sold] ,[Revenue] FROM [SalesDemo].[dbo].[Sales]</pre> <p>100 %</p> <p>Results Messages</p> <table border="1"> <thead> <tr> <th>Date</th> <th>Region</th> <th>Product</th> <th>Units_Sold</th> <th>Revenue</th> </tr> </thead> <tbody> <tr><td>184</td><td>2025-03-20</td><td>EMEA</td><td>Widget B</td><td>178</td><td>2136</td></tr> <tr><td>185</td><td>2025-03-12</td><td>Americas</td><td>Widget A</td><td>100</td><td>3000</td></tr> <tr><td>186</td><td>2025-01-24</td><td>APAC</td><td>Widget A</td><td>68</td><td>2108</td></tr> <tr><td>187</td><td>2025-01-06</td><td>EMEA</td><td>Widget A</td><td>135</td><td>4590</td></tr> <tr><td>188</td><td>2025-01-26</td><td>Americas</td><td>Widget A</td><td>80</td><td>4000</td></tr> <tr><td>189</td><td>2025-03-17</td><td>EMEA</td><td>Widget A</td><td>167</td><td>4843</td></tr> <tr><td>190</td><td>2025-01-19</td><td>Americas</td><td>Widget B</td><td>94</td><td>1598</td></tr> <tr><td>191</td><td>2025-02-12</td><td>APAC</td><td>Widget A</td><td>59</td><td>767</td></tr> <tr><td>192</td><td>2025-02-03</td><td>EMEA</td><td>Widget A</td><td>125</td><td>4500</td></tr> <tr><td>193</td><td>2025-01-18</td><td>APAC</td><td>Widget A</td><td>148</td><td>5180</td></tr> <tr><td>194</td><td>2025-03-15</td><td>APAC</td><td>Widget B</td><td>127</td><td>2413</td></tr> <tr><td>195</td><td>2025-01-16</td><td>Americas</td><td>Widget A</td><td>124</td><td>4588</td></tr> <tr><td>196</td><td>2025-03-24</td><td>EMEA</td><td>Widget C</td><td>34</td><td>612</td></tr> <tr><td>197</td><td>2025-03-29</td><td>EMEA</td><td>Widget B</td><td>27</td><td>810</td></tr> <tr><td>198</td><td>2025-01-03</td><td>APAC</td><td>Widget B</td><td>81</td><td>1053</td></tr> <tr><td>199</td><td>2025-02-02</td><td>APAC</td><td>Widget B</td><td>167</td><td>3340</td></tr> <tr><td>200</td><td>2025-02-20</td><td>EMEA</td><td>Widget A</td><td>146</td><td>6424</td></tr> </tbody> </table>	Date	Region	Product	Units_Sold	Revenue	184	2025-03-20	EMEA	Widget B	178	2136	185	2025-03-12	Americas	Widget A	100	3000	186	2025-01-24	APAC	Widget A	68	2108	187	2025-01-06	EMEA	Widget A	135	4590	188	2025-01-26	Americas	Widget A	80	4000	189	2025-03-17	EMEA	Widget A	167	4843	190	2025-01-19	Americas	Widget B	94	1598	191	2025-02-12	APAC	Widget A	59	767	192	2025-02-03	EMEA	Widget A	125	4500	193	2025-01-18	APAC	Widget A	148	5180	194	2025-03-15	APAC	Widget B	127	2413	195	2025-01-16	Americas	Widget A	124	4588	196	2025-03-24	EMEA	Widget C	34	612	197	2025-03-29	EMEA	Widget B	27	810	198	2025-01-03	APAC	Widget B	81	1053	199	2025-02-02	APAC	Widget B	167	3340	200	2025-02-20	EMEA	Widget A	146	6424	<pre>SELECT Product, Region, SUM(Revenue) as Total_Revenue, SUM(Units_Sold) as Total_Units_Sold FROM Sales GROUP BY Product, Region ORDER BY Total_Revenue DESC;</pre> <p>100 %</p> <p>Results Messages</p> <table border="1"> <thead> <tr> <th>Product</th> <th>Region</th> <th>Total_Revenue</th> <th>Total_Units_Sold</th> </tr> </thead> <tbody> <tr><td>1 Widget C</td><td>EMEA</td><td>113081</td><td>3580</td></tr> <tr><td>2 Widget A</td><td>Americas</td><td>108757</td><td>3177</td></tr> <tr><td>3 Widget B</td><td>APAC</td><td>90208</td><td>2722</td></tr> <tr><td>4 Widget A</td><td>APAC</td><td>80429</td><td>2574</td></tr> <tr><td>5 Widget A</td><td>EMEA</td><td>79511</td><td>2416</td></tr> <tr><td>6 Widget B</td><td>Americas</td><td>70883</td><td>2277</td></tr> <tr><td>7 Widget C</td><td>Americas</td><td>70142</td><td>2518</td></tr> <tr><td>8 Widget C</td><td>APAC</td><td>64454</td><td>2016</td></tr> <tr><td>9 Widget B</td><td>EMEA</td><td>54762</td><td>1968</td></tr> </tbody> </table>	Product	Region	Total_Revenue	Total_Units_Sold	1 Widget C	EMEA	113081	3580	2 Widget A	Americas	108757	3177	3 Widget B	APAC	90208	2722	4 Widget A	APAC	80429	2574	5 Widget A	EMEA	79511	2416	6 Widget B	Americas	70883	2277	7 Widget C	Americas	70142	2518	8 Widget C	APAC	64454	2016	9 Widget B	EMEA	54762	1968	<pre>SELECT Region, SUM(Revenue) as Total_Revenue, SUM(Units_Sold) as Total_Units_Sold, CAST(ROUND(SUM(Revenue) * 1.0 / SUM(Units_Sold), 2) AS DECIMAL(10,2)) as Revenue_Per_Unit FROM Sales WHERE Product = 'Widget C' GROUP BY Region</pre> <p>100 %</p> <p>Results Messages</p> <table border="1"> <thead> <tr> <th>Region</th> <th>Total_Revenue</th> <th>Total_Units_Sold</th> <th>Revenue_Per_Unit</th> </tr> </thead> <tbody> <tr><td>1 EMEA</td><td>113081</td><td>3580</td><td>31.59</td></tr> <tr><td>2 Americas</td><td>70142</td><td>2518</td><td>27.86</td></tr> <tr><td>3 APAC</td><td>64454</td><td>2016</td><td>31.97</td></tr> </tbody> </table>	Region	Total_Revenue	Total_Units_Sold	Revenue_Per_Unit	1 EMEA	113081	3580	31.59	2 Americas	70142	2518	27.86	3 APAC	64454	2016	31.97
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