Pricing models for cognitive automation systems – API-as-a-Service (AaaS)

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Cognitive Automation (CA) systems are built using the power of an Artificial Intelligence (AI) platform, which offers a rich set of cognitive services[i]. Microsoft Azure AI, Google Cloud AI, IBM Watson and Wipro HOLMES™ are some of the top competitive AI platforms in the marketplace[ii]. Business and IT/Infrastructure applications adopting CA, harness the cognitive services of the AI platform as relevant for their use cases. For accelerated development of cognitive applications, many of these AI platforms have abstracted their cognitive services as Application Programming Interfaces (APIs) and published them for quick integration with the customer ecosystem, while continuing to own the platform intellectual property (IP) rights. This API framework has simplified the pricing into an API-as-a-Service (AaaS) model where customers can be charged based on their usage (every invocation of the APIs) along with a licensing fee for using the IP. I shall further elaborate on this through a case study from a real customer data and illustrate the attractiveness of the AaaS pricing model.

API-as-a-Service (AaaS) – Price per API call

A very large electric company U embarked on a Configure Price and Quote (CPQ) transformation program to improve the quote productivity, win rate, and top line (revenue) and bottom line (profit) growth. A key milestone in this journey was to achieve differentiated level of business performance by embedding run-time actionable cognitive intelligence within the application to empower price managers (PMs) to improve decision making across the "opportunity to order" process by generating and delivering on-demand, actionable, context-rich, data-driven insights. Specifically, the cognitive solution provider V had to build a CA system to enable PMs to search for the most relevant comparable quotes for a new quote that needs pricing decision, using a large set of strategically priced historic quotes. Every search for comparable quotes run by the PM will incur an expense and the cumulative expense over the year will be invoiced to U. The following describes a mathematical approach for this AaaS pricing model. Let's begin by defining the variables and equations to compute the price per API call and the yearly expense for U (also the revenue for V) realized from the total volume of API calls invoked in that year.

Cost of development (one time) = C

Licensing fee (fixed cost every year) = L

Cost margin = m%

Project timeline (months) = T $6 \leq T < 12$

Operation and support cost for year n = S_n $n \geq 1$

AWS hosting charges for year n = A_n $n \geq 1$

Revenue realized for year n = R_n $n \geq 1$

Number of quotes handled by PM for year n = Q_n $n \geq 1$

Year-over-year increment in operation and support cost = s%

Year-over-year increment in AWS hosting charges = a%

Year-over-year increment in number of quotes = q%

Partial factor for year n = α_n, $\alpha_1 = \left(1 - \frac{T}{12}\right) 0 < \alpha_1 \leq 0.5, \alpha_n = 1 \; \forall \; n > 1$

Cost margin is given by:

$$m = \left(\frac{\text{Revenue-Costs}}{\text{Revenue}}\right) 100 \qquad \ldots. (1)$$

Price per API call is given by:

$$P = \frac{\text{Revenue}}{\text{Number of quotes}} \qquad \ldots. (2)$$

The following relationships exist for $n \geq 1$:

$$S_n = S_1\left(1 + \frac{s}{100}\right)^{n-1}$$

$$A_n = A_1\left(1 + \frac{a}{100}\right)^{n-1}$$

$$Q_n = Q_1\left(1 + \frac{q}{100}\right)^{n-1} \qquad \ldots. (3)$$

Using equations (1), (2) and (3), the revenue and price per API call for year $n \geq 1$ is given by:

$$R_n = \frac{a_n \left(S_n + A_n + L \right)}{\left(1 - \frac{m}{100}\right)} = \frac{a_n \left(s_1 \left(1 + \frac{s}{100} \right)^{n-1} + A_1 \left(1 + \frac{a}{100} \right)^{n-1} + L \right)}{\left(1 - \frac{m}{100}\right)}$$

$$P_n = \frac{R_n}{Q_n} = \frac{S_1 \left(1 + \frac{s}{100} \right)^{n-1} + A_1 \left(1 + \frac{a}{100} \right)^{n-1} + L}{Q_1\left(1 + \frac{q}{100}\right)^{n-1}\left(1 - \frac{m}{100}\right)}$$

Table 1 gives the commercials for revenue and price per API call for the first 5 years assuming m = 30%, S_1 = 50000 USD, A_1 = 30000 USD, L = 20000 USD, Q_1 = 82250, α_1=0.5, s = 3%, a = 10%, q = 20%

Year	Number of quotes	Revenue (USD)	Price per API call (USD)
Y_1	41125	71429	1.74
Y_2	98700	149286	1.51
Y_3	118440	156207	1.32
Y_4	142128	163666	1.15
Y_5	170554	171712	1.01

Table 1: Projected price per API call and revenue over 5 years

The price per API call shows a progressive decline for U while the revenue shows a progressive increase for V in spite of a year-over-year increase in operation and support cost, AWS hosting charges and volume of quotes, making it an attractive pricing strategy. Further, the exact revenue realized will depend on the actual number of API calls made in a production system. The cost of development C will be invoiced as a one-time charge to U at the end of first year.

Conclusion

The above case study can be used as a pricing guideline for customers with similar requirements. Characterizing licensing fee for different cognitive services can be an interesting direction for future work.

About the author

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Sridharan is a technologist with over 17 years of diverse experience in software research and development (R&D), communication technologies, data science and machine learning. He has created several intellectual property (IP) assets at the intersection of business and technology.

At Wipro, he is primarily responsible for accelerating the cognitive automation transformation journey for customers through use case ideation, building minimum viable products (MVPs) and proof-of-concepts (POCs) using Wipro HOLMES™, Wipro's artificial intelligence platform. In addition, he supports targeted go-to-market (GTM) initiatives for strategic customers.

References

[i]https://www.forbes.com/sites/gilpress/2017/01/23/top-10-hot-artificial-intelligence-ai-technologies/

[ii]https://www.predictiveanalyticstoday.com/artificial-intelligence-platforms

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