Application of Artificial Intelligence in Insurance Customer Interactions

The strategic initiatives and business decisions of service providers continue to revolve around customer preferences and needs. With both, a profound increase in the expectations of customers and ever evolving technologies, customer interactions have assumed added importance especially with respect to the automated exchange of information in real time. Customers prefer to be in self-service mode with automated help immediately available when problems arise. Human help, however, remains the most desired function whenever there are complex processes in play. A combination of automation and human intelligence is the ideal compromise for both service providers and customers. This is now on the verge of being realized with a new virtual world of customer interactions powered by artificial intelligence.

This paper discusses how artificial intelligence powered virtual agents can be leveraged to create deeper and more engaging customer interactions, and throws some light on the evolution of artificial intelligence and its technology components. This paper also identifies the business challenges in insurance customer service and how a virtual agent solution can be leveraged to address those.
About the Authors

Vinaykumar Patri
Vinay Kumar Patri is a Lead Business Analyst and a Domain Partner with Tata Consultancy Services (TCS) for various engagements in the Life Insurance domain. With industry experience of 20 years in life insurance operations, IT and Consulting, Vinay has actively contributed to innovation and creative proposals. He has authored an asset for which a patent has been filed.

Lakshminarayana B
Lakshminarayana (Lakshmi) is a Property and Casualty Industry Principal with TCS and leads the off-shore unit of the Insurance Domain Group (IDG) and provides domain-led consulting solutions. With an overall experience of 25 years in industry and global consulting spheres, Lakshmi brings deep insights on a range of domain subjects such as Product Development, Distribution, Policy Servicing, and Claims Management.

Reni Parameshwaran
Reni is a solution architect at TCS Innovation Labs - Insurance, with a focus on creating the next generation innovative solutions in the insurance space. He has been instrumental in conceptualizing and creating various futuristic solutions at the lab. Reni has also led multiple architectural engagements for some of the transformation programs for large insurance customers.
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Customer Communications: An Evolving Paradigm

Customer communications in the business world have been undergoing dynamic changes in response to the expectations of tech-savvy customers. There has been an increasing demand from customers to have access to a self-service mode and then, on an as-needed basis, to interact with a live agent or assistant who would provide personalized service and satisfaction.

To achieve optimal levels of customer experience, insurers need to achieve high levels of channel integration. However, the rising cost of hiring, training and retaining a customer care force is a challenge insurers have to grapple with. An organization may find it untenable to provide personal assistance 24 hours a day. At the same time, however rich the IVR solutions may be, they are no substitute for a live agent who could facilitate a better transaction processing experience for the customer.

This challenge is driving organizations to consider deploying technology as a complement to human resources. Technological advances now make it feasible to automate perception-based cognitive data that provides life-like interactions, with intelligence gathered from past interactions assisted by machine learning. A “Virtual Assistant” that operates with Artificial Intelligence delivers a combination of personal touch in response that is enabled by a system based search.

Many insurers have identified that this is the direction in which the online experience is trending. Recent strategic initiatives of insurance companies have been focusing on channel-integrated web strategies to enhance user experience and customer retention. However, the results and return on investments realized have not been equal to the high original expectations. Online interactions often miss a compelling and persuasive edge that closes a deal, even when the correct information is delivered to customers. Online transactions and information sharing has been assuming more and more importance in the daily life of a customer; however, more intelligent assistance with a human face could provide tangible and far-reaching benefits. Virtual Agents or Virtual Assistants can dramatically increase user-engagement in an application.

What is Virtual Assistant in The Context?

Virtual Assistant is a virtual agent, who assists and guides the users of an application or a web site. Displayed as an animated graphic, Virtual Assistant is a programmed interface that quickly identifies the information users are looking for. As the name suggests, Virtual Assistant can take any form, which in this case is a computer-generated human model designed to increase customer confidence in and comfort with the solution. Virtual Assistant is driven by artificial intelligence, and provides automated online customer service. This can be viewed as an extended form of an Interactive Voice Response System that more completely encapsulates the capabilities of your entire system. The query from the user can be in the form of text entered into the system on a computer screen or a voice data capture. The voice is converted into text and a search is initiated on the World Wide Web in real time. The results of the search are collected, sequenced and the closest or most suitable findings are identified. Such text is again converted into voice and is spoken by the animated Virtual Assistant.
Usage of Virtual Assistant

The Virtual Assistant can be projected as an informative and entertaining model that carries itself with business value. User experience is enhanced, as the virtual assistant proffers quality data.

Following features of a Virtual Assistant create a striking difference and value during the customer interactions:

- The Virtual Assistant reacts to a customer comment with additional information that supplements the user comment.
- Virtual Assistant can get into a continuous interactive mode where it guides the user with an online transaction, at times a complex process, which the user hesitates to perform alone. This instills confidence in the users.
- During the interaction, the Virtual Assistant can fetch related information about the subject of the conversation in a pop up and point it out. This functionality is seen in a few smart phone applications such as Google search; however this is limited to a voice to text conversion and not a Virtual Assistant.

Innovative Process Administration LLC (US) provides fully automated “employee self service” enrollment and related administration for employers and benefit administrators through Virtual Agents that offer multi-sensory, multi-lingual employee interaction.

Lake Health enables its patients and visitors to navigate to their destinations quickly and easily, through the medium of Virtual Assistant.

Speechpathology.com helps pathologists to take continuing education by creating training simulations to interact with Virtual Assistants that play a role of patients. Similarly, students of Mount Sinai School of Medicine (US) interact with intelligent Virtual Assistants who deliver life-like simulations that provide a new approach to teaching.

Case Western University

A new study called eSMART-HD is being used on computer kiosks where Virtual Assistants help individuals improve communication skills by achieving required levels of language fluency.
Communication Trends and Relevance of Artificial Intelligence in Insurance Functions

Customer communications have been undergoing transformation in the service sector, including the insurance business. The following table identifies the strategic shift of customer communications in Life Insurance functions.

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<th>Communication / Interactions</th>
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Customers today prefer self-help, and are moving away from conventional methods of communication while still seeking assistance on complex processes such as policy servicing. As a logical sequence this has led to the evolution of virtual assistance, leveraging the emergence of the latest mobile gadgets, tablets, and intelligent web applications.

An insurer’s primary investment considerations as a service provider are now with respect to replacing human interface with humane automation (24x7, 365 days) to:

- Optimize the deployment of resources
- Make the operations cost effective
- Improve the brand image
- Enhance customer experience.
**Scenarios**
The Virtual Assistant can be deployed in Insurance Industry in the following scenarios.

**Welcome/Introduction**
Animated Virtual Assistant or video welcomes the user on a web screen. If the user opts, Virtual Assistant explains various options that the user could utilize, by pointing out to the tabs and hyperlinks on the screen.

**Search Results**
The most closely matching search results are listed in a pop up screen. The Virtual Assistant talks about the listed sites and offers the user the option to navigate to or open up the sites. A live agent could emerge, even taking the form of another Virtual Assistant, if the search fails to provide adequate answers.

**Product Specific Guidance**
The Virtual Assistant helps the user download information on insurance product prospectuses, information brochures, proposal forms, New Business applications, request forms and more. The program asks a set of questions to understand the insurance needs and responds with a suitable product or personalized graphics. By understanding the needs of a client, the Virtual Assistant can help a consumer assess offerings through relevant charts and projections. This type of personalized assistance also reduces frustration and can prevent prospective customers from abandoning website inquiries.

**Virtual Assistance in Filling Out Forms**
The Virtual Assistant can help fill the application form or Client Information Form with validations and suggestions. The filled out application could then be uploaded for further processing. The assistant could read out highlighted information or go through the entire document.

**Virtual Tour with Guided Assistance**
The Virtual Agent welcomes the user and briefs them on Virtual Locations that the campaign is packaged with. The Virtual Agent leads the user from one location to another or points out various options available to tour.

During the virtual tour the Virtual Assistant helps download material, helps in filling up forms, and helps in providing additional routine information.
Relevance of Virtual Assistant in Insurance Processes

The presence of virtual assistance to the customers backed up with Artificial Intelligence can be exciting as the complexity of interactions increase. The customer experience is enriching and the customer realizes the value add created for him in the processes and transactions which would otherwise feel complex.
Technology Enabling the Virtual Assistants

A Virtual Assistant is powered by artificial intelligence providing automated online assistance. This is achieved through a dialogue system providing specific expertise and specialized information to the users.

Artificial Intelligence in its early stages contained algorithms that imitated the sequential, step-by-step, reasoning that humans often assumed while solving puzzles or making logical deductions. At a later stage successful methods were developed to deal with uncertain and incomplete information, which unfortunately resulted in enormous computing and memory requirements. In order to overcome this, step-by-step deduction is replaced by an intuitive judgment model similar to what humans adopt when arriving at conclusions based on complex scenarios. This expert system is embedded in the Virtual Assistant.

Dialog System
The dialog system translates the human generated input into a digital format. This is further processed, interpreted and searched before it returns data that is understood by the human user. This makes the entire event as natural and user friendly as possible. One of the key technologies that support this ability is Natural Language Processing, and Virtual Assistant contains a cutting-edge version of this software.

Natural Language Processing
Natural Language Processing (NLP) is a form of human-to-computer interaction wherein the computer can perform value-added tasks based on human interaction that formalizes the elements of human language, be it spoken or written. NLP branches off from traditional artificial intelligence with an ability to manipulate data and produce human-like responses based on the specific set rules that are coded. The capability for higher levels of manipulation can be increased with input of more complex rules. This was often identified as a limitation, as responses were inaccurate and repetitive if the questions were beyond the limits of rule definition.

Automatic Learning
In order to mitigate this limitation, automatic learning based on learning rules was used to make the responses more accurate by supplying more input data. Handwritten, rules-oriented systems can be made more accurate only by increasing the complexity of the rules. Systems, however, become unmanageable if the complexity crosses a limit on handcrafted rules.

Because of this realization, Natural Language Processing has shifted from conventional direct hand coding of large sets of rules to a machine-learning paradigm that uses general learning algorithms. Here automatic learning of rules through analysis of large sets of documents, referred to as “Corpora,” is carried out. Many classes of machine learning algorithms have been applied to NLP tasks that identify the word that is being processed and the words that are to the left and right with a part of speech tags. This is a process of marking up the words in a text (corpus) as corresponding to a particular part of speech, based on both its definition, as well as its context — for example, the relationship with adjacent and related words in a phrase, sentence, or paragraph.
Ontology
Ontology with reference to computer sciences refers to a set of concepts within a domain and relationships between concepts. It renders shared vocabulary and taxonomy that model a domain. Ontology forms Certain Structural frameworks which are used in Artificial Intelligence.

TCS Offerings and Capabilities
TCS Innovation labs - Insurance has developed a Virtual Assistant to meet the specific needs of customer interactions in the insurance industry. The solution can easily be integrated to any website and can be easily configured to provide virtual assistance in numerous business scenarios involving customer touch points.

The solution comprises of an avatar component, which lies in the presentation layer, and a core back end component, which powers the avatar interaction. The avatar front end component is a javascript plugin which can be embedded to any website. The framework for animation of the human-like model resides in JavaScript, and enables the Virtual Assistant to interact and move across the screen. A series of images are used to create continuous motion, syncing the human model in to the functional scenario. The framework also provides for change in Virtual Assistant by the replacement of the background animation.

The framework provides Application Programming Interface (API) for integrating with the web-page contents. Web developers can define the trigger points for avatar interaction, like conditions when the avatar has to be brought up (for instance, if the user activity is low and if there is delay in clicking a link etc) using the API. It also provides additional customization options for positioning the character on a web-page, defining size of the character etc.

The javascript plugin has been designed talking into account of the performance needs of even the heavy and resource hungry web-sites. The javascript will load avatar module only after all the resources required for the application web-page has been loaded. This will ensure negligible impact to the loading time and performance of the web-sites.

The back end or server side component is the brain of the avatar. The server component is a J2EE based application and can be deployed on any J2EE compliant application server on any platform. The server side component need not reside on the same infrastructure as that of the application server of the website. This gives more deployment provisions like off-premise deployment on private or public cloud.

The server side component comprises of the following core modules:

- Avatar Action Controller
- Natural Language Processor and Inference Engine.
- Rules Engine
- Text to Speech Engine
- Knowledge Repository
- Business Application Integration Layer
Avatar Action Controller
The avatar action controller module handles the orchestration of avatar interactions based on the knowledge inferred and commands from the rules engine. This layer also takes care of routing the request to appropriate modules like natural language processor or rules engine.

There are two types of interactions, which the controller will handle
- User interactions inside the webpage, based on the click stream/page views
- User input/query in plain natural language.

In case the solution senses pre-defined patterns of interactions, the action controller passes on the information to rules engine to get details on the scenarios to be played. A typical scenario will include the speech/diologue to the spoken, the behavioral actions/gestures to be performed, and the web page interactions to be performed by avatar.

If the user query is in natural language, the avatar action controller will pass on the request to natural language processor, which does the linguistic understanding, and subsequently an inference engine will identify the knowledge elements in the query. Once the knowledge elements are identified, the control will be passed to rules engine to identify the transactions to be trigged like in the latter case.

Natural Language Processor and Inference Engine
This module interprets and evaluates user input and responds appropriately. This uses Semantic Web based ontology to aid in the retrieval of relevant data and concepts from the application. The application carries out a conversation with the user in order to identify the user’s requirements and accomplish the requested tasks. The main advantage of such a system is that the user is free to enter any information in a raw form, and it is then processed to present the desired response. The approach is based on an explicit domain ontology that is described using Semantic Web technology, namely Resource Description Framework, a framework to describe the application information in subject-predicate-object format, and OWL (Web Ontology Language).

The ontology describes the main concepts of the domain and their interrelationships with a structure for each of the concepts. Semantic Web technology allows seamless integration of different resource definitions that semantically mean the same thing.

This permits easier integration of domain knowledge, which in turn makes the natural language system more robust in answering queries posed by the user, thus enabling a more human like interactions.

Rules Engine
The rules engine stores the business rules of Virtual Assistant that address its behavior. The interaction of avatar in a web page depends on the configuration of rules. The rules are converted to avatar action commands by the avatar action controller. Rules can be configured to provide transactional assistance in complex processes. The rules can be simple ones like validation of user inputs on a webpage or complex ones like transactional assistance with navigation path.
Text To Speech Engine
The Text To Speech engine is primarily responsible for making the Virtual Assistant talk to the user. The engine receives the query response (in text form) from the inference engine as the input. The engine then converts the text to speech and provides output in the form of a speech file.

Knowledge Repository
The knowledge repository stores the interaction rules, business rules and the transactional scenarios that will be leveraged by the afore-mentioned modules.

Business Application Integration
This module enables the solution framework to connect to enterprise applications and retrieve relevant data. One example use case of applicability of this module is retrieval of pending loan amount or account balance from core systems. This layer supports retrieval of data from core enterprise applications via web-services or via direct database queries.

Administration/ Configuration
The solution provides an administration portal where-by business users can configure the behavioral and interaction rules of avatar and define the transactional assistance scenarios for complex processes.

Security and Performance
Numerous security aspects too have been taken into account. The server can be connected via API only using an encrypted key (api key) which will be unique to each website. Websites will have to send the api key along with any HTTP request. The server will regenerate the api key dynamically with the website domain address and other unique parameters for the web site and will cross-check with the key which has been submitted by the website. The keys are generated using strong one-way hash functions. Additionally the javascript modules are encoded and optimized for security and for better performance. Since the interface between the avatar front end and the back end server is chatty, steps have been taken to reduce the bandwidth consumption. The audio, which is being transmitted over the network, is encoded and compressed. The size of audio file has been made minimal (in range of 10-25 KB). This gives a big boost to the performance of avatar front end and the avatar-user interaction is made seamless.

TCS’s Insurance Ontology
A unique library of insurance specific Ontology from TCS enables an easy implementation of Virtual Assistant to any insurance process or product specific guidance. Framework of attributes and relationships between the terms and key words involved in a process or concept facilitates the configuring of the user interaction with Virtual Assistant. This Web Ontology Language that comes with a basic start up could be further enhanced easily to suit and tailor any specific process.
Conclusion

Virtual Assistants powered by artificial intelligence are a concept that has been evolving for a long time. However, solutions incorporating a Virtual Assistant have now matured to the point where they can be a key part of platforms designed to meet the ever-growing demands and requirements of the customer. With its combination of widening technologies, huge functional scope and cost efficiencies, the Virtual Assistant brings both immediate and future earnings potential and business opportunities. With the capability to reduce or supplant human assistance in customer service, Virtual Assistant ensures that you can reduce your reliance on high cost service channels and guide customers to the information they require faster than ever before. Virtual Assistant will continue to evolve from guidance to personal assistance across a variety of functional areas, and the adaption of these technologies sooner rather than later will secure your organization’s continued relevance and success in this demanding area of customer relations.

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Contact
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