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Listening to customer feedback with Azure Machine Learning

MSTravel is using Machine Learning to gain a deeper understanding of our user experience and how we can improve our business. We've partnered with data scientists from our Shared Services Engineering and End User Services Engineering team to apply listening methodologies and deep learning techniques to our user feedback data. With Machine Learning, we've examined years' worth of user feedback for sentiment analysis and key phrase extraction. We've also used Power BI to gain insight into how our people are using our services and how our services can better suit the needs of our people.

Digital transformation at Microsoft

At Microsoft, business changes daily. We're constantly working toward digital transformation—rebuilding and reimagining our technology to empower our users and organization to achieve more. We want our organization to be an agile, dynamic enabler of our business. Microsoft Core Services Engineering and Operations (CSEO) is working hard to transform our business functions and organizations to deliver on our promise of digital transformation.

One important aspect of digital transformation is controlling and understanding our data. Modern engineering practices and data storage give us opportunities to use existing data to better understand our business and create business benefits for our organization.

However, digital transformation is as much about behavior and culture as it is about technology and processes. We are working toward an organization that empowers everyone to achieve more. A big part of our culture is customer obsession—we put humans and their experiences at the center of everything and build our business around them.

MSTravel and Voice of the Traveler

At Microsoft, MSTravel manages the business travel booking and arrangements for our entire organization as well as our vendors and partners. As the primary travel service for all Microsoft, we're there for our travelers, who amass some impressive numbers. Up to 500 Microsoft employees are on planes at any given time. Our travelers:

- Fly the equivalent of 900 times around the world each week.
- Visit more than 1,500 destinations each year.
- Book more than 2,500 hotel rooms each day.

We want our travelers to be true MSTravel fans—informed, engaged users of our travel tools and evangelists of our MSTravel program. We implement programs and initiatives to improve what MSTravel does, and one of those is our Voice of the Traveler (VoT) program.

VoT is designed to understand our travelers and ensure that their voices are heard. VoT helps MSTravel to learn more about the experience of our travelers so that our team, suppliers, and leadership can ensure that investments are made in time and budget to improve the traveler experience.

Using Machine Learning at MSTravel

At MSTravel, we receive user feedback from a variety of sources including Yammer, email, our integrated feedback channels, one-on-one user experience sessions, and our customer relationship management (CRM) systems. Our VoT program is designed to get the most out of that data. Employee feedback stored in our CRM provides our deepest source of data on the problems, escalations, and questions raised by our employees. CRM also makes up a significant portion of our employee feedback on the MSTravel experience.

We asked the Shared Services Engineering (SSE) and End User Services Engineering (EUSE) teams at Microsoft to apply their expertise and listening methodologies to what we were doing with VoT. In many ways, our work with SSE and EUSE inspired the creation of the VoT program as it exists today. We came from a traditional control and cost management perspective at MSTravel, and they helped us not only to look at our data differently, but also how to modify our development and management practices, bringing us in line with the program values being championed by Microsoft. We were able to examine how we do business and put the traveler at the center of what we do in our business. They helped us take a more objective look at what we were doing with VoT and their guidance and best practices led to great changes to our processes that we wouldn't have identified without their partnership.

Because of the sheer volume of data within CRM, we knew that we weren't getting everything we could from the user feedback it contained. We wanted to use the data in the CRM to determine what insights we could gather from machine learning and deep learning. As part of our path to digital transformation, we identified Machine Learning as a foundation to create a more intelligent and dynamic VoT experience.

Performing text analysis

We started our partnership journey by using Machine Learning to extract insights from our largest and most insight-rich data source: Dynamics CRM. Dynamics CRM holds the raw data containing the feedback we've received from our user base. We knew that there was plenty of hidden data within these feedback emails, so it was a logical starting point for Machine Learning. What we really wanted to capture was a sense of how satisfied our travelers were with the MSTravel experience.

Data science workflow

We used Azure Machine Learning to create a mix of machine learning and modern deep learning to meet our requirements for VoT. We brought data into Machine Learning from our Dynamics CRM Email entity, extracting the data using Online Analytical Processing (OLAP). We then processed the data to text, parsing and chunking it before applying clustering using a deep structured semantic model to group emails into categories that suited our purposes and isolated insights.

Our workflow for VoT consists of the following specific steps:

1. Extract the help desk emails from Dynamics CRM using OLAP.

2. Perform HTML parsing to convert HTML-formatted emails to text.

3. Remove unwanted email contents including headers and signatures.

4. Standardize user email format and perform initial analysis in English.

5. Perform text mining and machine learning steps in Azure Machine Learning.

    a. Clustering. We cluster our observations into logical groups based on content.

    b. Deep-structured semantic similarity mapping. This classifies the emails across several metrics, including satisfaction.

    c. Knowledge extraction. We attempt to extract any questions and match them with a known answer. We also identify potential problem areas based on the frequency of similar questions.

    d. Semantic grouping. This subdivides our results into business-based groups such as car, flight, or hotel.

6. Publish insights for consumption.

Our results gave us an opportunity to look at the MSTravel experience through the eyes of the traveler and build a more complete picture of our users and their experiences to truly hear the voice of the traveler.
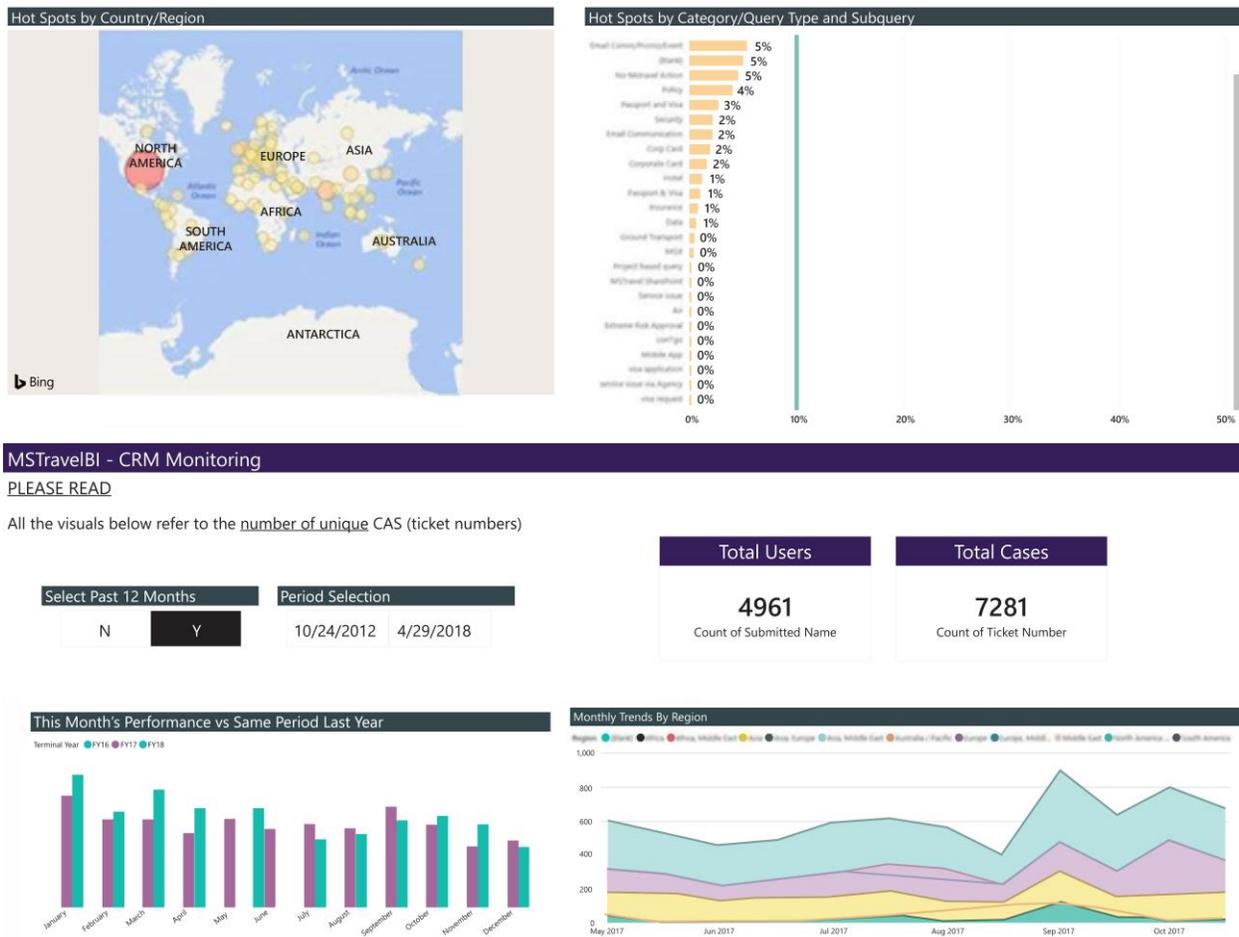
Figure 1. Power BI dashboards from VoT

Transforming data to insights

So much about VoT revolves around taking data we have and transforming it into insights that provide business value. Machine Learning and Power BI combine to provide an engine that allows us to transform our data into insights and then transform those insights into changed user behavior and business benefits. Using Machine Learning and Power BI enables us to:

- Communicate more clearly with our users.
- Create user-centric roadmaps.
- Monitor user satisfaction.
- Understand user behavior and preferences.
- Detect and mitigate issues within the MSTravel experience.
- Further develop our travel personas.
- Create a more positive experience for our travelers.

Developing and using personas

The VoT centers on capturing the user experience as accurately as possible. While all of our users have unique needs as individuals, we need to be able to understand what our larger user base looks like from a user experience perspective. Personas are made up of common use case scenarios and applicable metrics. They allow us to capture the essence of our most common and critical user types.
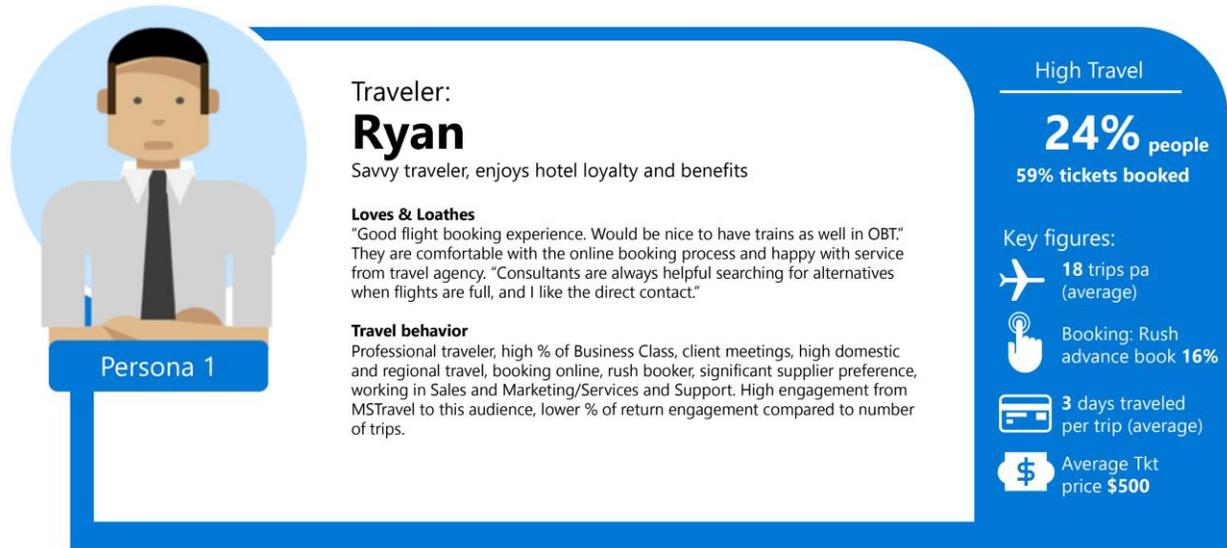

 Figure 2. An example of a persona at MSTravel

Our personas allow us to account for the majority of our travelers and ensure that our services are meeting the needs of our people. Personas are composites of important traveler data such as:

- Frequency and duration of travel.
- Total percentage of travelers represented by the persona compared to our general pool of travelers.
- Spending preferences.
- Booking preferences.
- Airline and seat preferences.

Personas help us tailor our services to meet the greatest needs of the majority of our users and to really look at MSTravel through the lens of the traveler. We analyze text with Machine Learning to capture the most common phrases from each of our persona types and gather general sentiment so we can see satisfaction trends for each persona.

Personas help us not only to gauge the overall satisfaction of our users in the past, but also to identify trends in their feedback and identify the needs of different persona groups in the future or even if a specific persona group changes or becomes irrelevant. We continue to find value in using personas to help us understand our audience, to prioritize planning, and to ensure we stay focused on the employees' needs. Going forward, we'll be building more into our personas by implementing models that allow us to look for variances and differences in behaviors and we're investigating how we can use the persona model to apply automation to deliver more intelligent and personalized services.

Benefits

VoT has provided great benefit to MSTravel. The insights we gained from our work with Machine Learning have driven a better understanding of our business and travelers in general, and it has also created several specific benefits:

- **A cultural shift toward teamwork and a user-experience focus.** Guidance from our Shared Services Engineering and End User Services Engineering teams have led to new ways of thinking about how we can provide the best experience to our users. Our project opened new possibilities for partnering with other business groups within our organization to provide the greatest business value to our travelers.

- **A simplified user survey experience at MSTravel.** Using Machine Learning to examine our data meant that we didn't need complex, segmented forms. We were able to simplify our feedback forms into a single, free text field. Every one of our opinion metrics for the customer experience came back more positive after making these changes.

- **New opportunities to use data.** We have used the data insights gained from VoT in many ways. For example, when we meet and negotiate with our partners, we bring our data with us, which gives the accurate and pertinent data we need to make the best business decisions.

- **Minimized costs.** Azure Machine Learning is saving us money. The processes we are putting in place around VoT and Azure Machine Learning are simplifying our business processes, making our traveler experience more efficient, and reducing the time and capital we spend on providing MSTravel services. We also expect up to 50 percent reduction in email traffic into MSTravel as a result of the improved traveler experience.

Lessons learned and moving forward

We've just begun using Machine Learning to more clearly hear the voice of the traveler at MSTravel. However, we have already learned several valuable lessons from our efforts with Machine Learning, including:

- **Fail fast, learn fast.** We tried several different approaches to working with Machine Learning and our data. We learned important lessons early on because of this and we were able to change our approach to best suit our business needs.

- **Benchmark your environment.** We continually benchmarked our environment and the processes we were running to determine which methods and approaches were most effective and efficient. It helped us to quickly identify when a particular approach was better or worse than what we were doing previously.

- **Know your data source.** It was important to understand our data source before mining it with Machine Learning. We found that the better we know the data, the better we could construct the data request within Machine Learning.

- **Make the results work for your business.** While Machine Learning gave us some very detailed results and insights into the user experience at MSTravel, the real reason we put Machine Learning to work was to improve our business and the user experience. By knowing what we were attempting to accomplish with Machine Learning, we were better able to apply the insights to real business changes and improvements.

Conclusion

We've made Machine Learning an important and effective part of our VoT program. We've gained insights about our business practices and processes that have led to cost savings and a better customer experience. We're working on new ways to bring data intelligence to Voice of the Traveler and use Azure Machine Learning for other data sources. We're also planning to build on our results and create more VoT listening tools using Azure Machine Learning. The partnership with EUSE and SSE has opened up opportunities for us to work with other parts of our organization to truly deliver the best experience to our employees. VoT and Machine Learning are helping to drive digital transformation at MSTravel.

For more information

Microsoft IT Showcase

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