



WHITE PAPER SERIES

IPERCEPTIONS' INTENT RECOGNITION ENGINE:
**RECOGNIZING USER INTENTIONS
IN REAL-TIME**

Written by:

Lane Cochrane, Vice President of Research at iPerceptions

Dr Matthew Butler PhD, Senior Data Scientist at iPerceptions

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THE NEXT GENERATION OF CUSTOMER EXPERIENCE

The white paper discusses how iPerceptions' Intent Recognition Engine addresses the challenge of accurately recognizing visitor intent. It examines the unique value provided by representative opt-in Voice of Customer (VoC) research and the benefit of leveraging stated visitor intent rather than simple proxies to personalize the online experience. The paper explains how iPerceptions enriches unlabeled clickstream data with information rich VoC data and scales it to recognize anonymous visitor intent in real-time. iPerceptions' Intent Recognition Engine transforms VoC data into a real-time data set that integrates with existing systems to enhance the performance and return on investment of digital initiatives.

To learn more about iPerceptions' Intent Recognition Engine:
schedule a demo or call **1-866-669-5499**.

INTRODUCTION

In today's era of big data, organizations are continuously collecting data on their customers' from a variety of sources. It's purported that by tracking all these interactions actionable insights can be extracted to improve how organizations make decisions. However, one of the many challenges is how to extract direction from the plethora of data available. It is generally assumed that the more data you have the better it is and thus the size or amount of data, irrespective of other considerations, is a measure of its value. However, collecting more data or merely possessing more data than anyone else, is alone, not a value proposition. **Extracting a 'strong signal' from the noise and using it to inform big data is what provides real value and the actionable insights these big data decision making systems need.**

THE CHALLENGES OF LEVERAGING BIG DATA FOR MARKETING AUTOMATION

In the world of web analytics, the promise of big data is to personalize the experience by extracting actionable insights from the vast array of data collected about users and their interactions with websites. The motivation is that through a better understanding of the user's behavior, the user's online experience can be enhanced. This enhancement is generally seen as being integral to optimizing an economically desirable business objective and is understood to be a function of personalizing the user experience. Personalization of a user experience can be achieved in a variety of ways. Often personalization techniques are dependent on profile information such as age and gender.

For example, take a piece of dynamic content which is intended to focus on a particular persona. To maximize the effectiveness of the targeted content, the message needs to reach the target profile. The delivery mechanism is the easy part since many content management systems are designed to deliver dynamic content to users in real-time. However, **what the content should be and when to deliver it are the current challenges that big data science is tackling.** In the example above, this targeted content could be delivered in a 'logged in' environment where static data about a user is known such as age and gender. However, a shortcoming of a 'logged in' session is that these sessions account for a small fraction of overall traffic thus the overall impact would be low.

FROM VISITOR TO VISIT LEVEL ATTRIBUTES

Another shortcoming of building automated processes from profiles alone is the static nature of the information. While recognizing a certain demographic may provide some important direction on the content or actions that should be presented to a visitor, it is session level context that provides relevance to personalization. For instance, recognizing if a visitor is on a hotel site in the context of leisure or business travel lends itself to personalizing a session relative to visitor needs and desirable business outcomes, such as booking. Understanding if a visitor is researching or seeking support for a product provides significant opportunity for dynamic components such as site search, to provide a more intuitive and seamless experience. This session level context, such as visit intent, is the natural evolution to profile based business intelligence and is necessary in a digital touchpoint such as a website, where a session quickly evolves from wanting to know who the visitor is to figuring out what they need.

THE QUEST FOR VISITOR INTENT

Big data analytics, as applied to web data, seeks to uncover indicators that determine the consumers' state of mind and predict future actions. An example of this is determining visitor intent, which then indicates which action the business should take to optimize the customer experience. Distinguishing someone who is in session to research a product versus a visitor who is there to purchase the product is an important but challenging distinction to make. A purchase intender is significantly more likely to make a purchase that session, by a factor of 10 fold or more depending on the site. A live support system that is optimized to recognize more purchasers than researchers will dramatically increase its conversion. Deciding which users receive which content, which actions to take and when to take them, is a role that big data is trying to fill.

A shortcoming of existing big data approaches attempting to identify visitor intent is that they are based on inference. The only method currently known to extract the intent of a user is to ask them. The most reliable way to access stated visitor intent is through an opt-in survey. **Equipped with intent, a powerful model of user behavior can be constructed which allows for personalization of the web space that cannot otherwise be achieved.**

THE ROLE OF VOICE OF CUSTOMER (VOC) ANALYTICS

The Internet has been called the most measurable medium. Web analytics is a driving force behind this statement as every action online can be tracked, measured and analyzed. Web analytics provides valuable metrics but it's only able to provide one view of the online experience. Clickstream data is incapable of answering the elusive question of why visitors take the actions they do online.

VoC is a market research technique that provides collective insight into customer needs, wants, perceptions, and preferences gained through questioning. In the digital space, conducting surveys in the "Moment of Truth", the moment an individual is interacting with a website, is one of the most direct and efficient ways to gather insights concerning the online experience. Questions like "what is the purpose of your visit" and "were you able to complete your purpose of visit", are a few examples of the unique information that can only be collected through direct questioning.

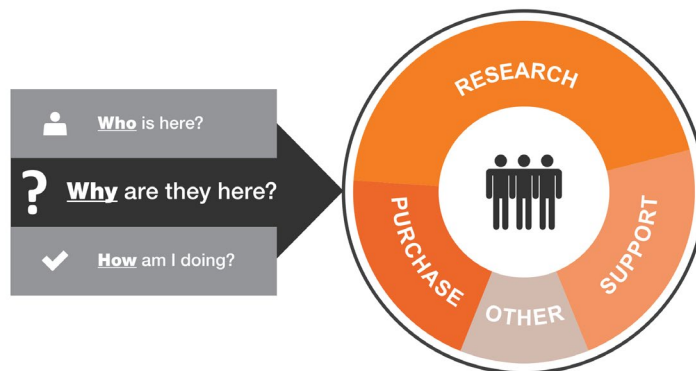


Figure 1 - Digital VoC is a unique data source that brings context to web data by providing the answers to the elusive question of 'why' visitors take the actions they do online.

A critical component of leveraging VoC data in the context of recognizing intent is a structured approach with an associated representative sampling technique. An ongoing stream of structured data is achieved by deploying a consistent research framework on hundreds of sites. This ongoing proprietary iPerceptions data feed of over 15 million data points was key in building the technology and is core to maintaining performance and providing quick adaptation to changing environments.

BEHAVIORAL DATA ENRICHED BY VOC

Access to information which could previously only be inferred is the main advantage to behavioral analysis informed by VoC. However, the most salient challenge to overcome with VoC data is sparseness. In terms of the spectrum of data abundance, clickstream and VoC data are on opposite ends. Survey data will typically represent approximately 1-5% of all unique visits to a website. If one considers the target variable of interest to be a survey attribute then there is one labeled set and one unlabeled set, where the unlabeled data set is several times larger. In this context, **it is possible to leverage the larger unlabeled clickstream data to build superior models with the smaller information rich labeled VoC data.**

INTENT RECOGNITION ENGINE

iPerceptions has significantly invested in developing the Intent Recognition Engine which uses a representative sample of website visitors and proprietary machine learning algorithms that scale efficiently to deliver actionable information from big data. The intent recognition engine can recognize the intent of anonymous website visitors and trigger personalized experiences which provides the intelligence required to enrich marketing campaigns, customer support systems and personalization engines in real-time.

IPERCEPTIONS' INTENT RECOGNITION ENGINE

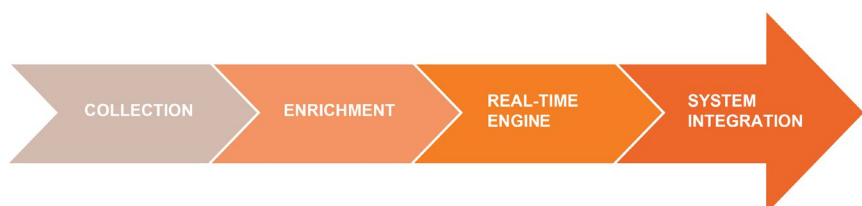


Figure 2 - The process of enriching an unlabeled set of website traffic with VoC data from representative survey respondents.

Collection

Representative survey responses augmented with navigational behavior attributes is the initial core of the Intent Recognition Engine. General feedback or do it yourself surveys cannot provide the necessary structure to develop the model. An ongoing stream of structured data is achieved by deploying a consistent research framework on hundreds of sites. The acquisition of the behavioral data should be carried out such that a sample is produced that is representative of the type of traffic one wishes to model. For example, a large proportion of traffic may be regarded as bounce (only one page view) and may not be useful for model building.

Enrichment and Continuous Learning

The enrichment process includes the live feed from iPerceptions' 15 million standardized customer data points which allows the Intent Recognition Engine to continuously adapt and maximize its efficacy. Once data enrichment is completed the augmented VoC dataset is used to extract patterns associated with the target variable of interest. The process is facilitated through the application of iPerceptions proprietary machine learning algorithms. Finally, the validation stage verifies that the relationships learned between the observed behavioral data and the target variables of interest are reliable. The enrichment phase can also be leveraged offline, for instance to transform the information for alternative use cases (such as association rule mining) and extracting generalized visitor profiles. The outcome of the data enrichment and model building phase is a dataset that represents a much larger proportion of the website traffic.

An additional strength of the iPerceptions enrichment process is the ability to continuously learn. Once the initial enrichment stage is completed the model building and associated procedures become much more fluid. As a website continuously engages customers through a VoC solution, the information rich labeled data set steadily grows and is seamlessly integrated into the enriched data set and the real-time engine.

Real-Time Engine

Derived from this dataset is a real-time pattern recognition algorithm that can be used to sequentially estimate a user's state. For example, when estimating a user's intent the algorithm sequentially builds a profile of the user and once a confidence threshold is breached this information can be used to trigger automated events. Referring to the aforementioned

continuous learning process, the architecture of the real-time algorithm is explicitly designed to accommodate a live feed from iPerceptions' VoC solution. Integrating newly arriving labelled examples promotes steadily increasing performance improvements, where the more the engine is utilized, the better it becomes. This process also allows the engine to be aware of site changes and adapt accordingly. This provides a significant advantage over a system run by rules that need to be continuously updated.

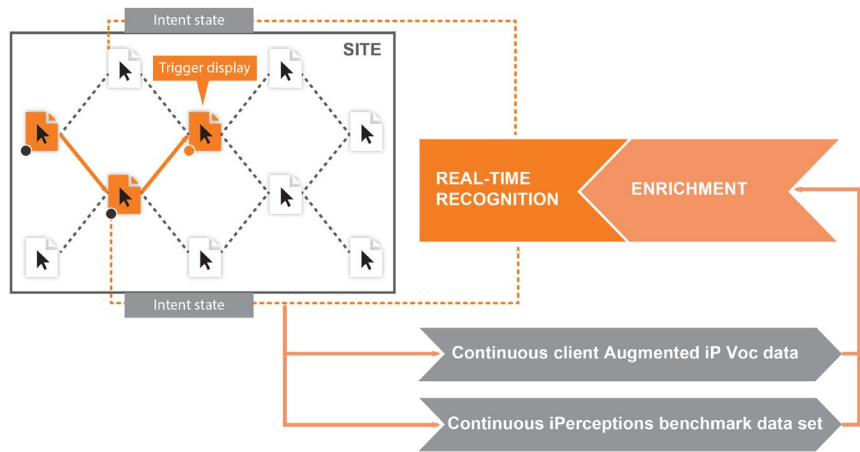


Figure 3 - The process of sequentially estimating the state of an anonymous user of a website. At each page visit the estimate is updated and in this scenario on the third page a decision is made as to which state the user represents.

Integration

The result of iPerceptions' Intent Recognition Engine is manifested through system integrations in which the augmented VoC data provides the missing context, such as visitor intent, to improve the performance of existing business systems and the online experience in real-time. Depending on existing business systems, the enriched data set, which recognizes visitor intent in real-time, can be injected directly into CMS platforms to conduct intelligent real-time personalization. **This allows companies to target users with content that is directly aligned with their intent and continually adapts to ensure a superior experience with individual brands.** The enriched data set also increases the effectiveness of live assistance systems by recognizing the intent of individual visitors and initiating chat sessions with distressed buyers or other identified user groups.

Conclusion

A significant amount of effort and resources is expended to understand the intent of customers and this is typically done with sub-optimal techniques. The ability to label big data with VoC data **provides the missing context for straight forward interpretations of website traffic and enables companies to leverage the plethora of information they collect about their customers' online interactions.** iPerceptions Intent Recognition Engine scales a sample of VoC data through machine learning to an extended portion of website traffic to recognize anonymous visitor intent in real-time thus providing an enhanced solution to identify visitor intent. As a result of iPerceptions' Intent Recognition Engine, VoC data is transformed from a diagnostic data set to a real-time data set and when integrated with existing systems enhances the performance and return on investment of digital initiatives. Companies now can accurately capture the customer's experience in real-time, immediately analyze a combination of behavior and profile information and then offer actions that personalize the experience as it happens.



iPerceptions, Inc. is the inventor of Active Research™, the evolution of Customer Experience Management and Digital Analytics. The company's solutions are powered by the Active Research™ Platform, which addresses specific business objectives by capturing visitor perceptions in the 'Moment of Truth' using advanced engagement technologies and trusted research frameworks to drive actions in existing business processes. Founded in 1999, iPerceptions has more than 3000 brands worldwide that trust iPerceptions for in-depth analysis of real visitor's behavior.

See how iPerceptions can improve the entire customer lifecycle and your bottom line today. Please contact your iPerceptions research expert for more information:

www.iperceptions.com

info@iperceptions.com

1-866-669-5499

