DAVID TAYLOR
Human-Computer Interaction | Product Design | Ethnographic Research

CASE STUDY

Enabling Smarter Skin Care with Machine Learning

ROLE
Principal Designer
Principal Ethnographer

PARTNER
Olay

INDUSTRY
Skin care

OBJECTIVE
Develop a platform that enables smarter, more personalized skin care

SOLUTION
A product recommendation platform utilizing deep learning analysis of selfie photos

FOCUS AREA
AI and Human-Machine Collaboration

COMPETENCIES
User Experience Design (Innovation Services)
Computer Vision
Machine Learning

Olay, the Procter & Gamble (P&G) skin care leader, is committed to the science of skin care. Olay collaborated with PARC to develop a deep learning–powered skin analysis and recommendation platform to enable smarter, more personalized skin care for women.

OBJECTIVE

Develop a platform that enables smarter skin care choices

Making the right skin care choices can be difficult. For many women today, an overabundance of products on the market, together with a lack of deep scientific skin care knowledge, can result in uninformed experimentation with skin care products. This can lead to frustration, wasted money, and undesirable results. Olay wanted to develop an easy-to-use platform that would make skin care smarter and more personalized for everyday consumers.

WHY PARC?

Deep capabilities in building advanced machine learning systems and user experience design

How do you take the knowledge found inside a lab or behind a counter to personalize product selection for every woman's unique face? The answer is machine learning. Machine learning uses algorithms to learn from and make predictions from large amounts of data, in this case, skin features.

Olay partnered with PARC because of their deep experience and capabilities in building advanced machine learning systems across industries. Using PARC's user experience design capability, PARC and Olay could co-develop the right platform to effectively communicate that skin care knowledge and create a sustained relationship with its users.

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Design-led, Rigorous Exploration Of Accessible Markets (DREAM)

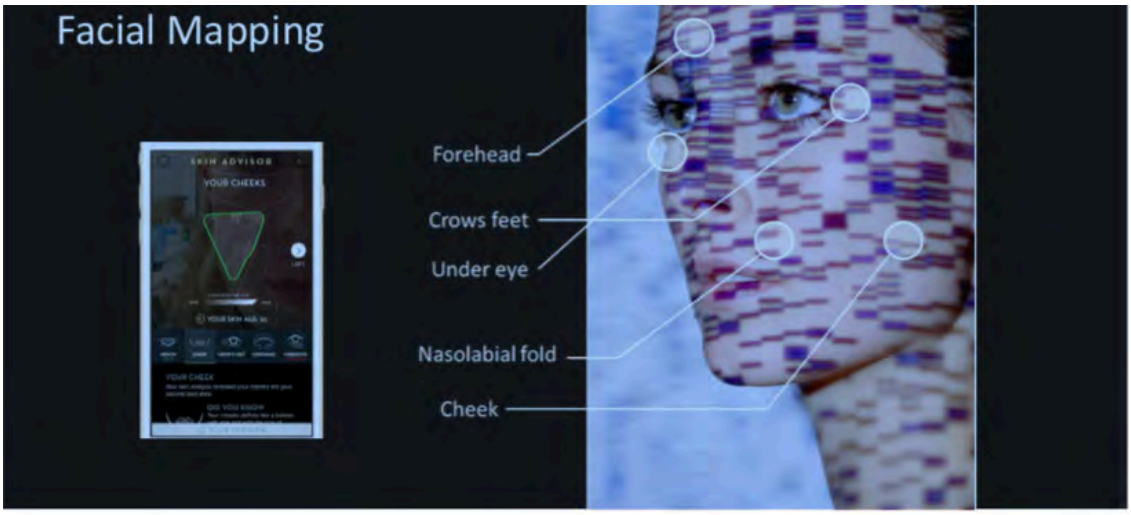

Image provided courtesy of Olay

User Experience Probes:
To address complex audience needs, new business models, and emerging technologies, PARC developed an iterative, hypothesis-driven research technique to explore the value of skin care advice solutions based around sensors and selfies.

PARC interviewed and observed Olay's target consumers to better understand:

- Attitudes toward personal appearance and skin care
- How and when users took and shared selfies
- User expectations and reactions around a skin care advice solution
- How to foster user trust when presenting advice with the intent to sell

PARC worked with Olay to co-construct a strategic roadmap for creating a technology-based solution to address the unique needs of the customer.

Technology Development:
Working closely with PARC's user experience design team, PARC's computer vision scientists developed software to guide the user to capture selfies under optimal conditions by controlling variables such as lighting, camera distance and facial expression.

PARC's machine learning scientists:
- Developed deep learning algorithms to make predictions of skin condition from selfies
- Trained models to detect the presence of target skin features, using human-graded image databases as ground truth

To ensure that the deep learning algorithms could robustly classify what was most valuable to consumers, PARC worked with Olay to design the annotation requirements for the image datasets that were being built.

Prototype Design:
PARC designed and built increasingly higher fidelity "looks-like" and "works-like" prototypes for Olay, enabling further user validation to occur while the platform was being developed. Prototypes were shown to Olay customers to evaluate their overall experience.

To optimize the user experience and minimize disengagement, PARC:

- Designed an interface that guides customers through taking a selfie to maximize the quality of input data for deep learning analysis (rather than simply being a good-looking selfie to the user)

- Explored the optimal way to deliver key information back to the user with personalized, easy to understand recommendations

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"Working with PARC, we were able to utilize machine learning to develop a platform that can both inform and delight Olay customers."

– Dr. Frauke Neuser, Associate Director Scientific Communications, Olay, Procter & Gamble

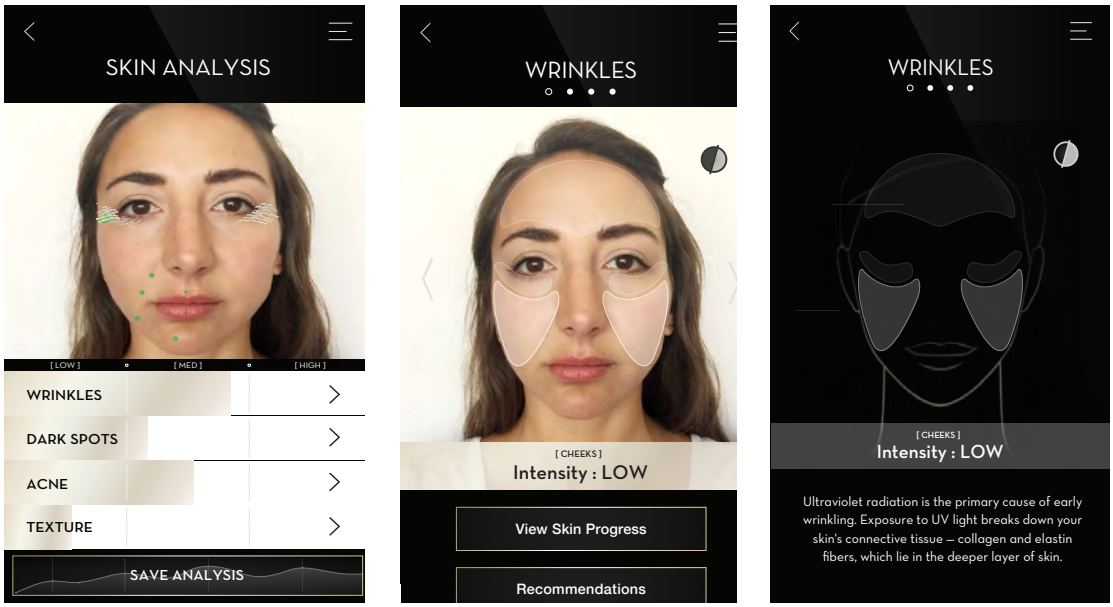

Image by PARC

SOLUTION

Olay Skin Advisor machine learning-powered platform

After an initial round of user studies and experience probes, PARC and Olay agreed to start with a web-based platform with three forms of artificial intelligence—computer vision, deep learning, and adaptive recommendations—that could deliver personalized skin diagnosis using selfies, and recommend individualized product and regimen changes. Repeated use would improve results and provide deeper insights, as well as deepen the sustained relationship between each user and Olay.

RESULTS

Over 4 million site visits and continued co-development

PARC delivered to Olay a suite of algorithms and user experience elements and, in September of 2016, the Olay Skin Advisor platform was released. The platform enabled accurate analysis of users' skin, informed users of what was happening with their skin, suggested product and regimen changes, and provided a compelling user interaction flow.

Since launch, the platform has reached several notable milestones for Olay, including:

- Over 4 million site visits worldwide
- Users of the platform exhibited 2x the conversion rate and 40% larger basket size upon checkout as compared to regular Olay.com visitors. They also yielded 3x lower bounce rate and 4x time spent as engagement measures.
- Local versions in ten countries

Today, PARC and Olay continue to explore how to grow and expand the feature set of the Olay Skin Advisor platform, extending the strategic roadmap established at the start of the partnership.

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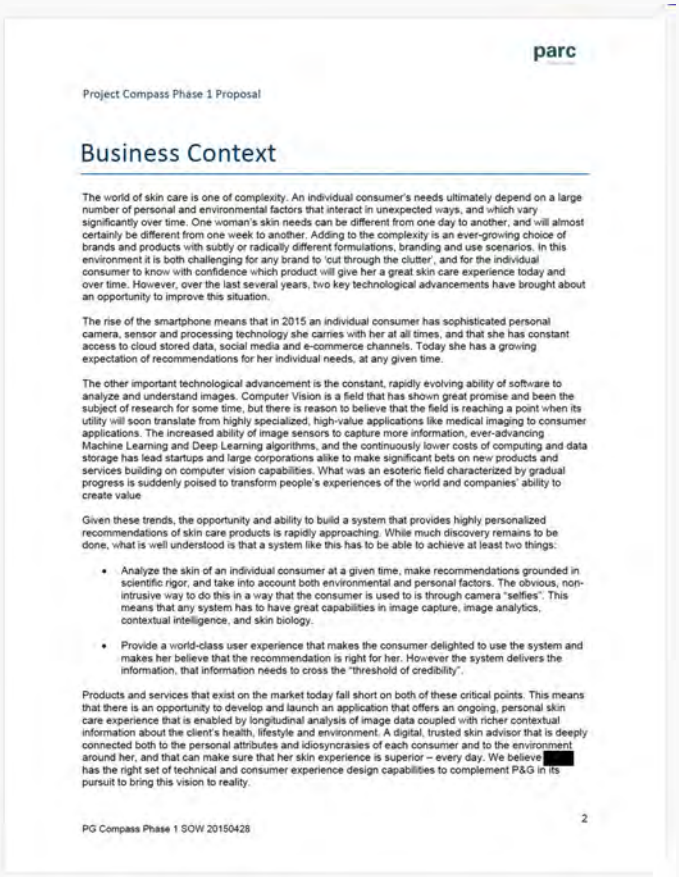

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Project Compass Phase 1 Proposal

Business Context

The world of skin care is one of complexity. An individual consumer's needs ultimately depend on a large number of personal and environmental factors that interact in unexpected ways, and which vary significantly over time. One woman's skin needs can be different from one day to another, and will almost certainly be different from one week to another. Adding to the complexity is an ever-growing choice of brands and products with subtly or radically different formulations, branding and use scenarios. In this environment it is both challenging for any brand to 'cut through the clutter', and for the individual consumer to know with confidence which product will give her a great skin care experience today and over time. However, over the last several years, two key technological advancements have brought about an opportunity to improve this situation.

The rise of the smartphone means that in 2015 an individual consumer has sophisticated personal camera, sensor and processing technology she carries with her at all times, and that she has constant access to cloud stored data, social media and e-commerce channels. Today she has a growing expectation of recommendations for her individual needs, at any given time.

The other important technological advancement is the constant, rapidly evolving ability of software to analyze and understand images. Computer Vision is a field that has shown great promise and been the subject of research for some time, but there is reason to believe that the field is reaching a point when its utility will soon translate from highly specialized, high-value applications like medical imaging to consumer applications. The increased ability of image sensors to capture more information, ever-advancing Machine Learning and Deep Learning algorithms, and the continuously lower costs of computing and data storage has lead startups and large corporations alike to make significant bets on new products and services building on computer vision capabilities. What was an esoteric field characterized by gradual progress is suddenly poised to transform people's experiences of the world and companies' ability to create value

Given these trends, the opportunity and ability to build a system that provides highly personalized recommendations of skin care products is rapidly approaching. While much discovery remains to be done, what is well understood is that a system like this has to be able to achieve at least two things:

- Analyze the skin of an individual consumer at a given time, make recommendations grounded in scientific rigor, and take into account both environmental and personal factors. The obvious, non-intrusive way to do this in a way that the consumer is used to is through camera "selfies". This means that any system has to have great capabilities in image capture, image analytics, contextual intelligence, and skin biology.
- Provide a world-class user experience that makes the consumer delighted to use the system and makes her believe that the recommendation is right for her. However the system delivers the information, that information needs to cross the "threshold of credibility".

Products and services that exist on the market today fall short on both of these critical points. This means that there is an opportunity to develop and launch an application that offers an ongoing, personal skin care experience that is enabled by longitudinal analysis of image data coupled with richer contextual information about the client's health, lifestyle and environment. A digital, trusted skin advisor that is deeply connected both to the personal attributes and idiosyncrasies of each consumer and to the environment around her, and that can make sure that her skin experience is superior – every day. We believe [redacted] has the right set of technical and consumer experience design capabilities to complement P&G in its pursuit to bring this vision to reality.

PG Compass Phase 1 SOW 20150428 2

Case Study Artifacts

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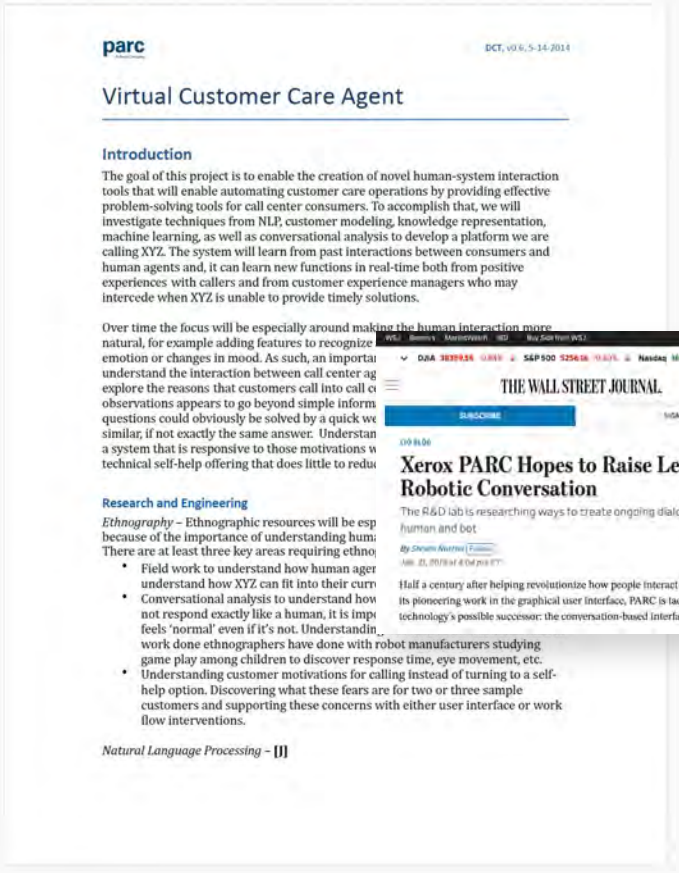


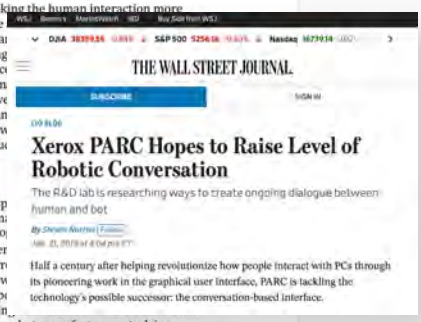
parc DCT, v0.6, 5-14-2014

Virtual Customer Care Agent

Introduction

The goal of this project is to enable the creation of novel human-system interaction tools that will enable automating customer care operations by providing effective problem-solving tools for call center consumers. To accomplish that, we will investigate techniques from NLP, customer modeling, knowledge representation, machine learning, as well as conversational analysis to develop a platform we are calling XYZ. The system will learn from past interactions between consumers and human agents and, it can learn new functions in real-time both from positive experiences with callers and from customer experience managers who may intercede when XYZ is unable to provide timely solutions.

Over time the focus will be especially around making the human interaction more natural, for example adding features to recognize emotion or changes in mood. As such, an importa understand the interaction between call center ag explore the reasons that customers call into call c observations appears to go beyond simple inform questions could obviously be solved by a quick we similar, if not exactly the same answer. Understan a system that is responsive to those motivations w technical self-help offering that does little to redu



THE WALL STREET JOURNAL.

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Xerox PARC Hopes to Raise Level of Robotic Conversation

The R&D lab is researching ways to create ongoing dialogue between human and bot

By Steven Norton

Half a century after helping revolutionize how people interact with PCs through its pioneering work in the graphical user interface, PARC is tackling the technology's possible successor: the conversation-based interface.

Research and Engineering

Ethnography – Ethnographic resources will be esp because of the importance of understanding huma There are at least three key areas requiring ethno

- Field work to understand how human ager understand how XYZ can fit into their curr
- Conversational analysis to understand how not respond exactly like a human, it is imp feels 'normal' even if it's not. Understandin work done ethnographers have done with robot manufacturers studying game play among children to discover response time, eye movement, etc.
- Understanding customer motivations for calling instead of turning to a self-help option. Discovering what these fears are for two or three sample customers and supporting these concerns with either user interface or work flow interventions.

Natural Language Processing – [1]

Call Center Agent

GO