THE MARKETING RESEARCH APPLICATIONS OF FACIAL RECOGNITION TECHNOLOGY

(A White Paper for the NTIA Multistakeholder Process)

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CONTENTS

INTRODUCTION

In anticipation of the National Telecommunications and Information Administration (NTIA) multistakeholder process on facial recognition privacy, [1] the Marketing Research Association (MRA) [2] examined how the survey, opinion and marketing research profession uses (or could use) facial recognition, including interviews and discussions with technology providers, research practitioners, and users.

Our overview found that researchers are already using facial recognition for facial coding and eye tracking and measuring and tracking demographics and consumer traffic flow. We also found potential marketing research uses, such as increasing the accuracy of audience ratings measurement, or fraud and error prevention.

The NTIA multistakeholder process for facial recognition privacy is only looking at commercial applications, and survey, opinion and marketing research is recognized as inherently non-commercial. However, since the research profession is almost inevitably drawn into discussions about marketing, advertising and sales, MRA offers this overview to help inform our fellow stakeholders and improve the chances of a sensible code of conduct being produced by the multistakeholder process.

Founded in 1957, MRA is the leading and largest association of the survey, opinion and marketing research profession, which delivers insights and intelligence to guide the decisions of companies providing products and services to consumers and businesses.

FACIAL CODING / EYE TRACKING

Facial recognition appears to be used most often in survey, opinion and marketing research to help measure emotional reactions, and measure attention span and the intensity of a respondent's interest. The two main tools are facial coding, which allows researchers to identify emotional reactions through even subtle facial expressions, and eye tracking, which can track a respondent's gaze.

Facial coding focuses on "subterranean muscle activity going on around the eyes and mouth that reveals true emotion. The science of reading facial expressions is based on years of psychological, sociological, and forensic study. These scientific studies have revealed the exact nature of that muscle movement, matched it up to the basic human emotional states… since we know most people cannot seem to utter the actual words that describe the seven emotional states, we can now stop asking respondents, 'how does that make you feel?'" [3]

1.   http://www.ntia.doc.gov/other-publication/2014/privacy-multistakeholder-process-facial-recognition-technology
2.   http://www.marketingresearch.org
3.   "Biometrics Communication Research – Using Brain Science to Reveal Human Emotions in Marketing Research." By Peggy Moulton-Abbott. Alert! Third Quarter 2013. http://www.marketingresearch.org/alert-magazine-third-quarter-2013-biometrics-communication-research-%E2%80%93-using-brain-science-to-reveal

VisualEmotion LLC further explains some of the applications of facial coding[4], which:

- Can identify the slightest movements in facial musculature uncovering even the subtlest emotional reactions in subjects;
- Can identify the exact emotion felt as well as the time frame including start/peak/end and duration of an emotional reaction;
- Can identify all facially expressed emotional reactions across a given sequence or stimulus duration;
- Can capture emotional reactions during both speaking and non-speaking occurrences; and
- Is a non-invasive tool allowing for subjects to remain unaware/impervious to the behavioral analysis.

Facial recognition also plays a key role in eye tracking. Rather than being used to personally identify an individual or to connect them to other personally identifiable data, facial recognition is necessary for cameras to identify where a respondent is in space so that, for example, infrared cameras can be properly positioned and manage to track corneal reflections.

Eye tracking can provide "objective data on how consumers perceive brands and insights into the implicit factors of decision-making can complement traditional research methods." [5] Combining eye tracking techniques with mobility, such as Google Glass, allows researchers to measure "everything which is perceived by the shopper, labeling the exact point of regard in the environment on a video recorded by the glasses. In addition, semi-automated analysis solutions enable researchers to aggregate data across several participants and visualize this data in the form of heat maps or key performance indicators" [6] and to combine such data with biometric measurements (e.g., EEG, or galvanic skin readings), to produce a more complete data set and more accurate and useful insights. Eye tracking can even be integrated into research in virtual three-dimensional simulations.

Some of the areas where such techniques could prove useful include:

- Retail: Where do people look when walking down the aisle of a store? Top shelf or middle shelf? What products and offerings attract the most attention? What gets the first glance and what receives sustained attention?
- Consumer goods: Which product packaging attracts the most positive attention? How does that benchmark against the competition's product?
- Website or app usability testing: Where do visitors look and for how long?

The applications of facial coding and eye tracking can also go beyond simple marketing research.

The European Commission, for instance, "is testing the use of mobile eye tracking and mobile EEG data to inform policy-making in the field of consumer protection." [7]

4. VisualEmotion LLC: http://www.facscodinggroup.com/about/areas-of-application
5. "Keeping an Eye on Key Trends in Market Research." By Stefanie Gehrke. Alert! First Quarter 2014. http://www.marketingresearch.org/alert-magazine-first-quarter-2014-keeping-an-eye-on-key-trends-in-market-research
6. Gehrke.http://www.marketingresearch.org/alert-magazine-first-quarter-2014-keeping-an-eye-on-key-trends-in-market-research
7. Gehrke. http://www.marketingresearch.org/alert-magazine-first-quarter-2014-keeping-an-eye-on-key-trends-in-market-research

In the realm of social and health research, VisualEmotion has outlined some underreported applications of their Facial Action Coding System (FACS), which has already "successfully": [8]

- Predicted coping with traumatic loss;
- Predicted the onset and remission of depression, schizophrenia, and other psychopathology;
- Discriminated suicidal from non-suicidal depressed patients;
- Predicted transient myocardial ischemia in coronary patients; and
- Identified patterns of facial activity in alcohol intoxication.

Eye tracking can even be used for research on research, by measuring respondent involvement in a survey. Is the respondent simply telling the researcher what they think the researcher wants to hear? Did they actually look at the answer they chose, and did they look at other answers and consider them? [9] Facial coding can have similar research-on-research uses. For instance, do a respondent's facial expressions convey the expected emotional reaction expressed by their survey answers? If a respondent gives strange facial expressions compared to their answers during a research interview, researchers can adapt on-the-fly to ask different lines of questions.

According to iMotions' CEO Peter Hartzbech, such techniques allow researchers to "peak through the layers of truth."

Video demonstrations of eye-tracking, courtesy of iMotions:
- Cadbury TV ad testing: http://www.youtube.com/watch?feature=player_embedded&v=-IUM-vZaWhc
- Amazon website usability study: http://www.youtube.com/watch?feature=player_embedded&v=tFTY_JigSWE
- Hitman video game usability testing: http://www.youtube.com/watch?feature=player_embedded&v=Uug9JUbPWrc
- ANGLE Labs' "Facebook Project," to study how to make education more engaging: http://vimeo.com/64852896

Affectiva offers a free online demo of facial coding for ad research: (http://www.affdex.com/technology/affdex-demo/)

MEASURING DEMOGRAPHICS AND TRAFFIC FLOW

Video analytic software company 3VR offers a system that "allows retail, banking and hospitality end-users to count their customers and identify these customers by age and gender." The company suggests that such technology helps retailers "better understand what merchandise to stock." It also may allow them to compare estimated counts of foot traffic against point-of-sale transactions to "understand foot traffic conversion," track the "lines at registers, door entry points, or return counters, and gather metrics for different times of day at different locations," including how long consumers dwell in what area. [10] 3VR also can combine its services with those of facial coding to include data on consumers' moods while in a store. [11]

8.   http://www.facscodinggroup.com/about/facs
9.   Video interview with University of Memphis PhD candidate Philip Hart - http://imotionsglobal.com/portfolio_entries/student-research/
10.   http://www.3vr.com/products/videoanalytics/demographics
11.   "Store Cameras Can Tell If Shoppers Are Pissed Off Or Happy." By Sapna Maheshwari. BuzzFeed. January 15, 2014. http://www.buzzfeed.com/sapna/store-cameras-can-tell-if-shoppers-are-pissed-off-or-happy

Systems like this need not be run through eye-in-the-sky video surveillance cameras. Almax offers them in the form of mannequins. Cameras in the mannequins' eyes can identify, at consumer eye level, "age range, gender, race, number of people and time spent."[12] The mannequins can also be "rigged to recognize employees so they don't muddy the picture of customer behavior." A news report suggests that future uses of the technology could extend loyalty rewards to shoppers in exchange for opting into such surveillance.[13]

British grocery store chain Tesco has planned to "install screens at their fuel pump kiosks" that use facial recognition to measure customers' "gender and approximate age bracket." While targeted advertising is a key purpose, marketing research measurement will also play a role.[14]

Marketing consultant Carl Gohringer sees potential for facial recognition to understand consumer traffic flow through an establishment, accurately measuring peak and quiet times. "Face recognition applied to CCTV can timestamp when individuals are detected at known camera locations, thereby providing highly accurate information on people flows such as: How long on average does it take to move between two or more points? (such as from the entrance of a store to a checkout or exit) What are the average flow times across the day and when are the peaks? How does this vary with the time of day? This can be used to determine how people typically move through the premises, and how long on average they linger in specific areas." [15]

FACIAL RECOGNITION TO PERSONALLY IDENTIFY RESPONDENTS

Nielsen has discussed adding facial recognition to its TV ratings panels. How it would be used is unclear: Brian Fuhrer, Nielsen's senior vice president for national and cross-platform television audience measurement, said last year that it was only "a lab discussion." [16] However, given the dynamics of such an opt-in research panel, it is likely that respondents would be asked to agree to be individually identified (and their facial data stored) for purposes of the panel, so that Nielsen could measure who exactly watched what show or advertisement, when, and for how long.

Another potential use for facial recognition in a marketing research context would be for fraud or error prevention (but that is more in the realm of security, and thus may not belong in the NTIA discussion).

12.   http://www.almax-italy.com/pdf/progettispeciali/en-US/eye_see_mannequin.pdf
13.   "Bionic Mannequins Spy on Shoppers to Boost Luxury Sales." By Andrew Roberts. November 21, 2012. http://www.bloomberg.com/news/2012-11-19/bionic-mannequins-spy-on-shoppers-to-boost-luxury-sales.html
14.   "Tailored advertisements or intrusive annoyance?" By Daniel Somerset. SSI KnowledgeWatch. November 7, 2013. http://ssiknowledgewatch.com/2013/11/07/tailored-advertisements-or-intrusive-annoyance/
15.   "Face Recognition in Retail: Profit, Ethics and Privacy." By Carl Gohringer. Allevate Blog. January 7, 2013. http://allevate.com/blog/index.php/2013/01/07/face-recognition-in-retail-profit-ethics-and-privacy/
16.   "Nielsen Explores Facial Recognition Tech For Ratings." By Steve McClellan. MediaDailyNews. January 22, 2013 http://www.mediapost.com/publications/article/191651/nielsen-explores-facial-recognition-tech-for-ratin.html

WHERE MARKETING RESEARCH APPLICATIONS FALL IN THE NTIA MULTISTAKEHOLDER PROCESS

Granting that survey, opinion and marketing research are not commercial in nature, where do such applications of facial recognition technology belong in the NTIA multistakeholder process? Do facial coding measurements and eye tracking data constitute personally identifiable information (PII)? Does it make sense to treat demographic measurement and traffic flow analysis the same way as other aspects of facial recognition under discussion in the NTIA's multistakeholder process?

Some aspects of facial coding can be used in other applications of facial recognition technology, to assist in personally identifying actual individuals. However, marketing researchers code facial expressions and eye movements in order to identify emotional reaction, not to recognize or personally identify individual respondents.

Almax, for instance, claims that its mannequin surveillance system "processes the data without the aid of a computer and without having to record and transmit sensitive information (images or biometric data), and so without leaving any trace of the face analyzed."[17] IMRSV, meanwhile, says that their Cara facial recognition system collects only the demographic information measured (gender, age within four groups, emotions, and coordinates/distance) [18] and that no images or video are stored.[19]

Rana el-Kaliouby, founder and chief science officer of Affectiva, pointed out in a New York Times interview that "The software uses its algorithms to read your expressions… but it doesn't store the frames."[20]

Except for the case proposed by Nielsen to potentially use full facial recognition to personally identify and track respondents who have opted in to a research study, the facial recognition applications we've covered focus on aggregate or non-identifiable data, and do not involve attempts to personally identify actual individuals.

The scope of the definition of facial recognition developed by the NTIA multistakeholder process should be limited to the technology's use to identify individuals. Then we can get into debates over defining "commercial," the purposes of using facial recognition to personally identify individual consumers, and how to handle those purposes.

17.   http://www.almax-italy.com/pdf/progettispeciali/en-US/eye_see_manneqin.pdf

18.   https://www.imrsv.com/learn

19.   "AVA analyzes millions of pixels per second and anonymously detects general traits of viewers, along with demographic and engagement data from multiple people simultaneously. Data is extracted and stored as a numerical log file with no images or video being stored, recorded or transmitted." http://static-misc.imrsv.com/AVA_Technology_and_Privacy.pdf

20.   "When Algorithms Grow Accustomed to Your Face." By Ann Eisenberg. The New York Times. November 30, 2013. http://www.nytimes.com/2013/12/01/technology/when-algorithms-grow-accustomed-to-your-face.html