Chapter 2
Research Challenges

Abstract This chapter sheds light on various research areas of interest for further development of Mind Genomics. Research areas discussed refer to those of interest for the phase ONE of the process (avoiding the relatively high expenses related to market polling) and for the phase TWO of the process (avoiding relatively high expenses related to the estimation of the customer satisfaction level). Research of interest for the first phase is in media mining, while the research of interest for the second phase is in image understanding.

Keyword Mind genomics · Market polling · Estimation of customer satisfaction · Media mining · Image understanding for marketing purposes

From the financial point of view, the major research challenges for researchers in text and image understanding (TIU) and computer science and engineering (CSE) are related to the following two problems:

(a) How to avoid the polling expenses, in the micro science phase?
(b) How to avoid the value exchange, in the customer typing phase?

The first expense could be avoided when customer types are formed under the impact of media, like newspapers, magazines, radio, musical media, TV, or the Internet. The tools and methods from NLP (natural language processing), speech understanding, or image understanding, can help determine what the basic customer types are, and may avoid the payment to polling companies.

The second expense can be avoided when the customer typing is performed using a sentiment detection procedure based on text (via social networks), on voice (via telecoms), or on face understanding (via cameras), respectively.

In the next two subsections of this book, we briefly review the ongoing research in the above mentioned two subjects, and we direct the interested readers to the open literature that we reference. More on the subject will be included into a follow-up book.

V. Milutinovic and J. Salom, *Mind Genomics*, SpringerBriefs in Business,
DOI 10.1007/978-3-319-39733-7_2

2.1 Media Understanding Oriented Research

This section gives an overview of the ongoing research in media understanding, which spans from text understanding and still image understanding, all the way to understanding of moving image, and combinations of all the above. Each research effort is covered with one paragraph and one reference.

2.1.1 Understanding Text

In the article Fan et al. (2006), the authors give an excellent overview of the technology foundations of text mining and text understanding. Wishing also to educate text-mining developers, they cover basic elements that different text-mining applications include: Information extraction, topic tracking, summarization, categorization, clustering, concept linkage, information visualization, and question answering.

2.1.2 Understanding the Still Image

The visual image is a powerful channel to convey crucial information towards e-shoppers and influence their choice. In Di et al. (2014), authors investigate a well-known online marketplace, where over millions of products change hands; most are described with the help of one or more images. They present a systematic data mining and knowledge discovery approach which aims to analyze the role of images in e-commerce quantitatively and in depth. They also study interaction of image data with other selling dimensions by jointly modeling them with data from user behavior.

2.1.3 Understanding the Moving Image

In Jodoin (2013), the author presents a novel method to extract dominant motion patterns (MPs) and the main entry/exit areas from a surveillance video. The method first computes motion histograms for each pixel and then converts the histograms into orientation distribution functions. Given these functions, a novel particle meta-tracking procedure is launched which produces meta-tracks, i.e. particle trajectories. As opposed to conventional tracking, which focuses on individual moving objects, meta-tracking uses particles to follow the dominant flow of the traffic. In the last step, a novel method is used to simultaneously identify the main entry/exit areas and recover the predominant MPs. The meta-tracking procedure is a unique way to connect low-level motion features to long-range MPs. This kind of tracking is inspired by brain fiber tractography which has long been used to find dominant connections in the brain. The method is fast, simple to implement, and works both on sparse and extremely crowded scenes. It also works on highly structured scenes (highways, traffic-light corners, etc.), as well as on chaotic scenes.

2.2 Sentiment Detection Oriented Research

This section covers the research related to sentiment analysis, and is mostly oriented to social networks, and neuro-economy. Again, each research contribution is covered very briefly, only with one paragraph and one representative reference.

2.2.1 Sentiment Analysis on the Social Networks

The rising popularity of online social networks, such as Twitter, Facebook, MySpace, and LinkedIn, in recent years has sparked great interest in sentiment analysis on their data. While many methods exist for identifying sentiment in online social networks such as communication pattern mining and classification based on emoticon and parts of speech, the majority of them utilize a suboptimal batch mode learning approach when analyzing a large amount of real time data. As an alternative in Aston et al. (2014), the authors present a stream algorithm using Modified Balanced Winnow for sentiment analysis on online social networks. Tested on three real-world network datasets, the performance of these sentiment predictions is close to that of batch learning with the ability to detect important features dynamically for sentiment analysis in data streams. These top features reveal key words important to the analysis of sentiment.

2.2.2 Sentiment Analysis Using Neuro-Economy

The past decade has seen a tremendous increase in the use of neuro-physiological methods to better understand marketing phenomena among academics and practitioners. Using a unique experimental protocol to assess subjects' responses to 30-second TV ads, the authors in Venkatraman et al. (2014) capture many measures of advertising effectiveness across six commonly used methods (traditional self-reports, implicit, eye tracking, biometrics, EEG, and fMRI). These measures are shown to reliably tap into higher-level constructs commonly used in advertising research: Attention, affect, memory, and desirability. Using time-series data on sales and Gross Ratings Points for the same TV ads, the authors attempt to relate individual-level response neuro-physiological measures when participants viewed the ads in the lab to their aggregate, market-level elasticities. The experiments show that functional magnetic resonance imaging measures explain the most variance in advertising elasticities beyond the baseline traditional measures. Notably, activity in the ventral striatum is the strongest predictor of real-world, market-level response to advertising. These findings have significant implications for theory, research, and practice.

References

Aston N et al (2014) Sentiment analysis on the social networks using stream algorithms. J Data Anal Inf Process, Scientific Research 2:60–66

Di W, Sundaresan N, Piramuthu R, Bhardwaj A (2014) Is a picture really worth a thousand words?: on the role of images in e-commerce. In: WSDM '14: Proceedings of the 7th ACM international conference on Web search and data mining. ACM New York, USA, pp 633–642

Fan W et al (2006) Tapping the power of text mining. Communications of the ACM—privacy and security in highly dynamic systems, ACM New York, USA, 49(9):76–82

Jodoin PM (2013) Meta-tracking for video scene understanding. In: Proceedings on 10th IEEE international conference on advanced video and signal based surveillance (AVSS), August 2013. IEEE, Krakow, pp 1–6

Venkatraman V et al (2014) Predicting advertising success beyond traditional measures: new insights from neurophysiological methods and market response modeling. In: social science research network, internet. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2498095, 25 Oct 2014

http://www.springer.com/978-3-319-39731-3

Mind Genomics
A Guide to Data-Driven Marketing Strategy
Milutinovic, V.; Salom, J.
2016, XV, 115 p. 142 illus., Softcover
ISBN: 978-3-319-39731-3