

**DIPARTIMENTO DI INGEGNERIA  
CORSO DI DOTTORATO IN INGEGNERIA INDUSTRIALE E  
DELL'INFORMAZIONE -  
PHD COURSE IN INDUSTRIAL AND INFORMATION ENGINEERING -  
35TH CYCLE**

Title of the research activity:	<b>Business Intelligence in the Era of Big Data</b>
State of the Art:	<p>Unconscious social signals complement the conscious language and can be studied to understand the intentions, goals and values of employees and customers. Honest Signals cannot be measured through time-consuming and costly surveys: they are subtle patterns in how we interact with other people (Pentland, 2010).</p> <p>In the last years, computer algorithms have become capable of reading emotions from emails and through body sensors, and to recommend interventions to team members for better collaboration, which have never been possible before. Virtual mirroring of digital communication dynamics makes social actors aware of their behavior, beliefs and emotions; improves collaboration; and nudges change and work-commitment within organizations ("A Novel Way to Boost Client Satisfaction," 2019; Gloor, Fronzetti Colladon, Giacomelli, Saran, &amp; Grippa, 2017).</p> <p>To face the complexity and unpredictability of today's business and social systems, innovation and rapid adaptation of emerging technologies are a key imperative. The advent of machine learning, natural language processing (NLP), and artificial intelligence allows humans to collaborate and communicate in new ways. Research on "Words and Networks" has led to eminent work, e.g., on language change, recommender systems, collaborative work, semantic computing, and the diffusion and adoption of (mis)information offline and online. In addition, the study of social networks has emerged as a major trend of research in management science. Methods and tools from these disciplines can serve the business in new radical ways.</p> <p>While text mining, social network analysis and machine learning have evolved into mature yet still quickly advancing fields, work at their intersection lags behind in theoretical, empirical, and methodological foundations.</p>
Short description and objectives of the research activity:	<p>PhD students are expected to extend the research on the advantages of combining social network analysis, machine learning and text mining for business intelligence (e.g., Fronzetti Colladon &amp; Vagaggini, 2017; Gloor et al., 2017). For example, actions meant to support successful interactions with clients and employees' come from a better understanding of the impact that language use has within, and across, organizations (Fronzetti Colladon, Saint-Charles, &amp; Mongeau, 2018; Gloor, Fronzetti Colladon, Grippa, &amp; Giacomelli, 2017; Saint-Charles &amp; Mongeau, 2018). Analogously, text mining can help brand managers identify (virtual) consumer tribes (Gloor, Fronzetti Colladon, de Oliveira, &amp; Rovelli, 2019) and develop customized marketing strategies.</p> <p>New applications of social network analysis are advocated, to support decision-making processes in medium and big enterprises – for example, in the fields of innovation management, human resource management, brand management, knowledge management and organizational communication. Social network analysis should be complemented with methods and tools of other disciplines – such as semantic analysis, big data analysis and machine learning.</p>

Students are also encouraged to explore new applications of advanced analytics – such as the Semantic Brand Score (SBS), which uses a methodology for the assessment of brand importance that combines text mining and social network analysis (Fronzetti Colladon, 2018). Indeed, brand-management tools should provide answers in almost real time and take into account the ‘spontaneous’ discourse of brand stakeholders’. Gaining a deeper understanding of brand importance and textual brand associations can change the way executives make decisions and manage organizations in the era of big data.

Working on this project requires enthusiasm and competence, a good knowledge of English, the ability to work as part of a team, and full-time commitment.

#### Bibliography:

- A Novel Way to Boost Client Satisfaction. (2019). *Harvard Business Review*, (March-April), 17–21. Retrieved from <https://hbr.org/2019/03/a-novel-way-to-boost-client-satisfaction>
- Allen, T. J., Gloor, P., Fronzetti Colladon, A., Woerner, S. L., & Raz, O. (2016). The power of reciprocal knowledge sharing relationships for startup success. *Journal of Small Business and Enterprise Development*, 23(3), 636–651. <https://doi.org/10.1108/JSBED-08-2015-0110>
- Antonacci, G., Fronzetti Colladon, A., Stefanini, A., & Gloor, P. (2017). It is rotating leaders who build the swarm: social network determinants of growth for healthcare virtual communities of practice. *Journal of Knowledge Management*, 21(5), 1218–1239. <https://doi.org/10.1108/JKM-11-2016-0504>
- Bucuvalas, J., Fronzetti Colladon, A., Gloor, P. A., Grippa, F., Horton, J., & Timme, E. (2014). Increasing interactions in healthcare teams through architectural interventions and interpersonal communication analysis. *Journal of Healthcare Information Management*, 28(4), 58–65. Retrieved from [http://www.jhimdigital.org/jhim/fall\\_2014?pg=58#pg58](http://www.jhimdigital.org/jhim/fall_2014?pg=58#pg58)
- Elshendy, M., Fronzetti Colladon, A., Battistoni, E., & Gloor, P. A. (2018). Using four different online media sources to forecast the crude oil price. *Journal of Information Science*, 44(3), 408–421. <https://doi.org/10.1177/0165551517698298>
- Fronzetti Colladon, A. (2018). The Semantic Brand Score. *Journal of Business Research*, 88, 150–160. <https://doi.org/10.1016/j.jbusres.2018.03.026>
- Fronzetti Colladon, A. (2019). Forecasting Election Results by Studying Brand Importance in Online News. *International Journal of Forecasting*, in press.
- Fronzetti Colladon, A., Guardabascio, B., & Innarella, R. (2019). Forecasting Tourism Demand: A Social Network Analysis and Text Mining Approach. In *Abstract presented at the XXXIX Sunbelt Conference of the International Network for Social Network Analysis*. Montréal, Québec, Canada: INSNA.
- Fronzetti Colladon, A., Saint-Charles, J., & Mongeau, P. (2018). Studying employees’ digital communication through social network and semantic analysis. In *Paper presented at the XXIX RSA AiIG 2018 - The Challenge of Management Engineering in a Changing Manufacturing World*. Castellanza (VA), Italy. Retrieved from <http://www.convegnoaiig.it/2018/>
- Fronzetti Colladon, A., & Vagaggini, F. (2017). Robustness and stability of enterprise intranet social networks: The impact of moderators. *Information Processing & Management*, 53(6), 1287–1298. <https://doi.org/10.1016/j.ipm.2017.07.001>
- Fronzetti Colladon, A., & Remondi, E. (2017). Using social network analysis to prevent money laundering. *Expert Systems with Applications*, 67, 49–58. <https://doi.org/10.1016/j.eswa.2016.09.029>
- Gloor, P., Fronzetti Colladon, A., Giacomelli, G., Saran, T., & Grippa, F. (2017). The impact of virtual mirroring on customer satisfaction. *Journal of Business Research*, 75, 67–76. <https://doi.org/10.1016/j.jbusres.2017.02.010>
- Gloor, P. A., Fronzetti Colladon, A., de Oliveira, J. M., & Rovelli, P. (2019). Put your money where your mouth is: Using deep learning to identify consumer tribes from word usage. *International Journal of Information Management*, in press. <https://doi.org/10.1016/j.ijinfomgt.2019.03.011>
- Gloor, Peter A., Colladon, A. F., Grippa, F., Budner, P., & Eirich, J. (2018). Aristotle Said “Happiness is a State of Activity” — Predicting Mood Through

	<p>Body Sensing with Smartwatches. <i>Journal of Systems Science and Systems Engineering</i>, 27(5), 586–612. <a href="https://doi.org/10.1007/s11518-018-5383-7">https://doi.org/10.1007/s11518-018-5383-7</a></p> <p>Gloor, Peter A., Fronzetti Colladon, A., Grippa, F., &amp; Giacomelli, G. (2017). Forecasting managerial turnover through e-mail based social network analysis. <i>Computers in Human Behavior</i>, 71, 343–352. <a href="https://doi.org/10.1016/j.chb.2017.02.017">https://doi.org/10.1016/j.chb.2017.02.017</a></p> <p>Gloor, Peter A., Woerner, S., Schoder, D., Fischbach, K., &amp; Colladon, A. F. (2018). Size does not matter - in the virtual world. Comparing online social networking behaviour with business success of entrepreneurs. <i>International Journal of Entrepreneurial Venturing</i>, 10(4), 435–455. <a href="https://doi.org/10.1504/IJEV.2018.093919">https://doi.org/10.1504/IJEV.2018.093919</a></p> <p>La Bella, A., Fronzetti Colladon, A., Battistoni, E., Castellani, S., &amp; Francucci, M. (2018). Assessing perceived organizational leadership styles through twitter text mining. <i>Journal of the Association for Information Science and Technology</i>, 69(1), 21–31. <a href="https://doi.org/10.1002/asi.23918">https://doi.org/10.1002/asi.23918</a></p> <p>Pentland, A. (2010). <i>Honest Signals: How They Shape Our World</i>. Cambridge, MA: MIT Press.</p> <p>Saint-Charles, J., &amp; Mongeau, P. (2018). Social influence and discourse similarity networks in workgroups. <i>Social Networks</i>, 52, 228–237. <a href="https://doi.org/10.1016/j.socnet.2017.09.001">https://doi.org/10.1016/j.socnet.2017.09.001</a></p> <p>Wen, Q., Gloor, P. A., Fronzetti Colladon, A., Tickoo, P., &amp; Joshi, T. (2019). Finding top performers through email patterns analysis. <i>Journal of Information Science</i>, in press. <a href="https://doi.org/10.1177/0165551519849519">https://doi.org/10.1177/0165551519849519</a></p>
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