

Social Intelligence in Conversational UI, a Botlibre case study.

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bheemaiaha@yopmail.com, 8/15/2018 2.04 pm

Abstract

This publication is a mathematical model of social intelligence and knowledge management in chat conversational UIs. The paper defines one model of social intelligence as defined in the design of machine learning for conversational UIs, and explores the use of this intelligence in conversational UI training and knowledge inheritance. A case study of Botlibre conversational UIs, which we use in our healthcare and education research is presented. A study of Botlibre's knowledge inheritance and the expansion to social intelligence like Facebook Messenger is presented.

Keywords: SNA, Social Intelligence, Emotional Intelligence, Conversational UI

Introduction.

Social Intelligence

Social intelligence(Contributors to Wikimedia projects 2006) is the capacity to know oneself and to know others is an inalienable part of the human condition as is the capacity to know objects or sounds, and it deserves to be investigated no less than these other "Less charged" forms.

conversational UIs are inherently social and they are created to interact with a vast network of humans, in various divisions and categories.

Social scientist Ross Honeywill believes social intelligence is an aggregated measure of self- and social-awareness, evolved social beliefs and attitudes, and a capacity and appetite to manage complex social change.

Psychologist, Nicholas Humphrey believes that it is social intelligence, rather than quantitative intelligence, that defines who we are as humans. Machine intelligence has an inherent definition of social intelligence apart from inbuilt computational and emotional

intelligence(Humphrey 2007, 2002, 2012)

Some authors have restricted the definition to deal only with knowledge of social situations, perhaps more properly called social cognition or social marketing intelligence, as it pertains to trending socio-psychological advertising and marketing strategies and tactics.

According to Sean Foleno, social intelligence is a person's or machine's competence to optimally understand one's environment and react appropriately for socially successful conduct.(Albrecht 2006)

The social intelligence hypothesis states that social intelligence, that is, complex socialization such as politics, romance, family relationships, quarrels, collaboration, reciprocity, and altruism, was the driving force in developing the size of human brains , the degree of A.I research today and today provides our ability to use those large brains and complex M.L in complex social circumstances.

Archaeologist Steve Mithen believes that there are two key periods of human brain growth that contextualize the social intelligence hypothesis.

It is directly related to social intelligence because we mainly use language to mediate our social relationships. NLP is thus the major contributor to

conversational UI intelligence. We have seen the rise of many new paradigms of A.I including deep learning and emergent learning as compared to the older rule and heuristic systems, but NLP and translator technology has made great strides partially due to its use in social media.

Although easy to administer, there is some question as to whether self-report social intelligence measures would better be interpreted in terms of social self-efficacy.

George Washington University Social Intelligence Test : Is one of the only ability measure available for assessing social intelligence and was created in June 1928 by Dr.Thelma Hunt a psychologist from George Washington University.

The test is designed to assess various social abilities which consisted of observing human behavior, social situation judgement, name & face memory and theory of mind from facial expressions.

We extend these tests to evaluate machine intelligence and will describe the design of these tests for chat bot social intelligence evaluation.

Nicholas Humphrey points to a difference between intelligence being measured by IQ tests and social intelligence.

Both Nicholas Humphrey and Ross Honeywill believe that it is social

intelligence, or the richness of our qualitative life, rather than our quantitative intelligence, that makes humans what they are.

Social intelligence is closely related to cognition and emotional intelligence.

Research psychologists studying social cognition and social neuroscience have discovered many principles in which human social intelligence operates.

Babu defines social intelligence as, "The ability to deal efficiently and thoughtfully, keeping one's own identity, employing apposite social inputs with a wider understanding of social environment; considering empathetic co-operation as a base of social acquaintance." The same definition can be extended to define social machine intelligence.

More recently, popular science writer Daniel Goleman has drawn on social neuroscience research to propose that social intelligence is made up of social awareness and social facility.

An appropriate introduction contains certain hypothetical assumptions about social structure and function, as it relates to intelligence defined and expressed by groups, constrained by cultural expectations that assert potential realities, but make no claims that there is an "Exterior" social truth to be defined.

Most references to social intelligence relate to an individual's social skills.

Daniel Goleman's blog and current research Social Intelligence, John Kihlstrom and Nancy Cantor, in R.J. Sternberg, Handbook of intelligence, 2nd ed.

Knowledge Management

Knowledge management is the process of creating, sharing, using and managing the knowledge and information of an organisation or of machine learning artificial intelligence systems.

In 1999, the term personal knowledge management was introduced; it refers to the management of knowledge at the individual level.

Key lessons learned include people and the cultural norms which influence their behaviors are the most critical resources for successful knowledge creation, dissemination and application; cognitive, social and organisational learning processes are essential to the success of a knowledge management strategy; and measurement, benchmarking and incentives are essential to accelerate the learning process and to drive cultural change.

One proposed framework for categorizing the dimensions of knowledge distinguishes tacit knowledge and explicit knowledge.

In machine learning terms, tacit knowledge refers to the knowledge base that the conversational UI has which can be in a SQL database, a knowledge data structure and a NoSQL database. The explicit knowledge is the use and application of this knowledge to 'skills' and NLP of conversation generation.

In this model, knowledge follows a cycle in which implicit knowledge is 'extracted' to become explicit knowledge, and explicit knowledge is 're-internalised' into implicit knowledge.

The internalisation of explicit knowledge in a feedback is a topic of further research into conversational UI designs.

The content perspective suggests that knowledge is easily stored; because it may be codified, while the relational perspective recognises the contextual and relational aspects of knowledge which can make knowledge difficult to share outside the specific context in which it is developed.

Early research suggested that KM needs to convert internalised tacit knowledge into explicit knowledge to share it, and the same effort must permit individuals to internalise and make personally meaningful any codified knowledge retrieved from the KM effort.

Subsequent research suggested that a distinction between tacit knowledge and explicit knowledge represented an

oversimplification and that the notion of explicit knowledge is self-contradictory.

A second proposed framework for categorizing knowledge dimensions distinguishes embedded knowledge of a system outside of a human individual from embodied knowledge representing a learned capability of a human body's nervous and endocrine systems.

In such an instance, individuals strive to explicitly encode their knowledge into a shared knowledge repository, such as a database, as well as retrieving knowledge they need that other individuals have provided.

KM is inherent in the healthcare and education domains, in which our conversational UIs work, our education conversational UIs, inherently disseminate the creation of explicit knowledge, into portals by the generation of MOOC courses and the teaching of these courses in classroom settings. The healthcare conversational UIs disseminate the assimilated tacit knowledge, to disseminate it as explicit knowledge in tele-clinics.

Knowledge management (KM) technology (Contributors to Wikimedia projects 2002) can be categorised:

- [Groupware](#)—Software that facilitates collaboration and sharing of organisational information. One of the earliest

successful products in this category was [Lotus Notes](#): it provided tools for [threaded discussions](#), [document sharing](#), organisation-wide uniform email, etc.

The shared white board is an example of social intelligence and brain storming, it integrates the use of RPA type conversational UIs with human KM, in the integrated S.I of machines where there is an emergent intelligence in the automated workforce[(Nishida 2010; Willcocks and Lacity 2016; Blokdyk 2018)].

- [Workflow systems](#)—Systems that allow the representation of processes associated with the creation, use and maintenance of organisational knowledge. For example, the process to create and utilise forms and documents.
- [Content management](#) and [document management](#) systems—Software systems that automate the process of creating web content and/or documents. Roles such as editors, graphic designers, writers and producers can be explicitly modeled along with the tasks in the process and validation criteria. Commercial vendors started either to support documents (e.g. [Documentum](#)) or to support

web content (e.g. [Interwoven](#)) but as the Internet grew these functions merged and vendors now perform both functions.

- [Enterprise portals](#)—Software that aggregates information across the entire organisation or for groups such as project teams (e.g. [Microsoft SharePoint](#)).
- [eLearning](#)—Software that enables organisations to create customised training and education. This can include lesson plans, monitoring progress and online classes. Our teaching conversational UIs perform this function.
- Planning and [scheduling software](#)—Software that automates schedule creation and maintenance (e.g. [Microsoft Outlook](#)). The planning aspect can integrate with [project management software](#) such as [Microsoft Project](#).^[22]
- [Telepresence](#)—Software that enables individuals to have virtual "face-to-face" meetings without assembling at one location. Videoconferencing is the most obvious example.

[reprinted from [3]]

Social Network Analysis

Social network analysis("Social Network Analysis - Wikipedia" n.d.) (Blokdyk

2018; Saqr and Alamro 2019; Rowe et al. 2007; Yang, Keller, and Zheng 2016) is the process of investigating social structures through the use of networks and graph theory.

Examples of social structures commonly visualized through social network analysis include social media networks, memes spread, friendship and acquaintance networks, collaboration graphs, kinship.

Social network analysis has its theoretical roots in the work of early sociologists such as Georg Simmel and Émile Durkheim, who wrote about the importance of studying patterns of relationships that connect social actors.

Visual representation of social networks is important to understand the network data and convey the result of the analysis.

Especially when using social network analysis as a tool for facilitating change, different approaches of participatory network mapping have proven useful.

Social networking potential is a numeric coefficient, derived through algorithms to represent both the size of an individual's social network and their ability to influence that network.

Some common network analysis applications include data aggregation and mining, network propagation modeling, network modeling and sampling, user attribute and behavior analysis,

community-maintained resource support, location-based interaction analysis, social sharing and filtering, recommender systems development, and link prediction and entity resolution.

In the private sector, businesses use social network analysis to support activities such as customer interaction and analysis, information system development analysis, marketing, and business intelligence needs.

After the initial mapping of the social network is complete, analysis is performed to determine the structure of the network and determine, for example, the leaders within the network.

Large textual corpora can be turned into networks and then analysed with the method of social network analysis.

Although many studies have demonstrated the value of social network analysis within the computer-supported collaborative learning field, researchers have suggested that SNA by itself is not enough for achieving a full understanding of CSCL. The complexity of the interaction processes and the myriad sources of data make it difficult for SNA to provide an in-depth analysis of CSCL. Researchers indicate that SNA needs to be complemented with other methods of analysis to form a more accurate picture of collaborative learning experiences.

The International Workshop on Social Network Analysis and Mining - An annual workshop on social network analysis and mining, with participants from computer science, social science, and related disciplines.

George Washington University Social Intelligence Test for social intelligence in conversational UIs.

The test is designed to assess various social abilities which consisted of observing human behavior, social situation judgement, name & face memory and theory of mind from facial expressions.

We quantize the conversational UIs ability, to

1. Observe human behavior.: Botlibre conversational UIs use the camera and microphone as sensors and can perform a variety of mining actions on this sensor data, to observe human behavior. This includes sentiment analysis of text and voice input, emotives of text and voice input, and a similar extension to input images, by the integration of camera input to create heuristics of emotives from facial expressions, similar to firebase ML software on google cloud or AWS functionality.
2. Judge social situations: Social situations are a form of emergent social intelligence, which can be quantized, to create events, actions and habits similar to personalities.

Social network analysis, defines the data structures for the actors and the events and actions and the social situation is an emergent event, which has a data structure and the efficacy

of the conversational UI IVS in handling the situation can be access by a evaluation criteria which we define later. We call this the social situation evaluation index.

3. Name and face memory, voice memory : Bot libre is directly empowered through IVS to store the name and voice on data structures, with camera integration it can store the facial information too.
4. Theory of mind from facial expressions and voice sentiments.:

A theory of mind from facial expressions needs to be developed to define social intelligence, this is material for future work.

Persuasion as a quality of social Intelligence.

Samira Shaikh in a publication [4] (“Website” n.d.) proves by demonstration the actual performance in persuasion By a conversational UI on a generic subject. The paper quantitatively proves the success of the persuasion by evaluating the responses of the conversational UI and statistically proving the persuasion success. On application of social intelligence skills to BotLibre conversational UIs, much training can be done in Self scripts, on the emergence of social intelligence by using state and DNN models integratable into the open source code for the conversational UI engine to learn to recognise social situations, engineer heuristic based responses and also evaluate the conversational UIs performance based on

quantitative criteria which will be described in a future publication.

BotLibre conversational UIs in KM, SNM and SI.human psyche based on sensor input

We have trained and deployed many Botlibre conversational UIs in healthcare and the education industry. Amongst them are Dr Minnie, a conversational UI trained to do image analysis of diagnostic data and work with a clinical decision support system. This is KM at its pinnacle, with a huge body of tacit KM in expert systems and actual explicit KM in its inheritance by general physicians and duty doctors, using Digital Tele-medicine.

Another timeless contribution is Eliza the e-psychiatrist,(Paphus Solutions Inc n.d.) now enhanced with the Julie engine, which actually provides therapy and is successful in clinical use. We are evaluating her clinical performance with a clinical study on KM and SI.

In Education, we have several conversational UI that use A.I programs under development to design and teach by presentation several professional courses in Software Engineering, including Computer Aided Software Engineering and Vedic Management.

We are using AWS Sumerian for this.(“Website” n.d.)(“UOL: ONLINE MS/PHD/CORPORATE TRAINING” n.d.)

Conclusions,

We have presented quantitative models of SI, KM and SNM as applied to the design

of Chat conversational UIs and their performance evaluation.

Future work with respect to Bot Libre conversational UIs, includes integration of the camera as a sensory input, adding the understanding of social situations, response to these situations and creating models of human psyche based on sensor inputs. This being particularly useful in e-psychiatry.

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