



Parent Category	Category	Category Description
<b>Agent identity</b>		The identity of this chatbot: this virtual agent focussed on conversations.
	Personality	How is the personality of the agent shaped? Hard coded, evolved, learned, or through a combination of those? Based on Big Five personality model?: Extraversion, agreeableness, conscientiousness, neuroticism and openness.
	Cultural values & rituals	As soon as a third party enters a dialogue between an agent and a human, social rules apply It's all about social values, culturally bounded. Power distance, human territoriality elements, gestures and rituals. What are the cultural characteristics? What is 'normal'. An agent should know how to survive and how to be credible.
	Life experience	Personal stories and experiences that have happened in the agent's life so far.
	Knowledge	What does our agent already know and how does it learn? From previous experiences, conversations, from general sources or specific sources on the Internet? Or through real human, acting as the agent's superiors, entering the knowledge manually?
	Looks	How does our agent look? Is it a static picture? An animated 3d life-like character or a creepy alien? It's all about computer graphics in this category.
	Sensors	Sensors of agents: The traditional 5 senses of human beings classified by Aristotle: visual, audio, touch, smell, taste,, other human senses, non-human sense though biological senses and extraordinary senses like body sensors for mind reading.
<b>Human identification</b>		How can an agent recognize a human being by observing through its sensors and identifying them by comparison with personal knowledge
	Face recognition	Identify human beings by distinguishing faces in images and (live) video from other objects and then identify who they are.
	Fingerprint recognition	Identify human beings via their fingerprints.
	Gait analysis	Identify human beings by their walking patterns; it's the study of animal locomotion.
	Iris recognition	Identify human beings via an iris scan.
	Odor/Scent recognition	Identify human beings by their smell.
	Speaker recognition	Identify human beings by their voice characteristics.
	Typing rhythm recognition	Identify a human by their typical way of typing.
<b>Perception</b>		Once an agent has identified a human being, how can an agent interpret the expressions of these humans based on previous knowledge and experiences with humans.
	Gesture recognition	Sensing a human's body language by visually watching its gestures
	Speech recognition	Sensing audio signals which a human being created via microphones and trying to extract words from these signals?
	Neuroscience	Mind reading. What parts of the brains are active: what are these human thinking about, what their state-of-mind, what do they feel? Based on neuro patterns.
	Physiognomics	Visually sensing and interpreting human character, intelligence, and virtue by analyzing physical appearances like geometry of a human beings.
	Facial coding	Visually sensing human facial skin and muscular changes in the face, which are directly related to emotions.
	Text recognition	Sensing codes as send by human beings remotely via a computer. Also referred to as 'typing' :-).
	Understanding	Once filters have been applied, does the agent truly understand the human? I.e. referring expressions: <i>this</i> car or <i>that</i> car? Especially in virtual worlds where agents or human beings have the ability to point at objects. Or: are all perceptions congruent? Do a head say 'yes' while the body says 'no'.?

	Context	How does the context, the environment bias the perceptions of the agent? Is the human not interested in us or is something happening in the background the agent didn't notice?
	Contact	Is there any feeling of contact between the identified human being and the virtual agent, i.e. via eye contact?
<b>Processing</b>		How can intelligent agents respond to input out of their environment as human-like and as natural as possible?
	Emotion	What's the current emotion and/ or state-of-mind of the agent and how does this new observation influence its emotional state? Similar to human beings, their processing time should be extremely fast.
	Cognitive	How does the agent process the observation cognitively? Similar to human beings, this process happens in their context and processing of these observations might take a while, at least longer than the emotional response.
	Creativity	How does the agent associates the perceived input to its knowledge and comes up with creative ideas? Being creative is actually a cognitive process, however the emotional state is a huge influencer. Humour is also part of this category.
	Relations	Once an agent has processed all information and has come up with creative ideas and associations, the agent needs to respond by taking the current state of the conversation and the relationship to this human being into account.  Empathy and asking questions is part of this category.
	Intention	Define the intention of the agents , the meaning of the response of the agent. It's not about choosing words or behaviour, it's about just meaning and how it fits the (life) goals of the agent.
<b>Expression</b>		
	Lexical formulation	Once the agent has defined its intention, knows what to express, and has chosen for verbal expressions, how to choose word to express our intention? What to say, what words should the agent use?
	Speech synthesis (TTS)	Synthesised speech for agents based on the intended words, emotions and characteristics of the voice.
	Facial expression	The expression of an agent's head and face: Muscular facial changes, skin changes, gazing and head movements.
	Body posture	How to express an action by postural expressions?
	Gestures	Expressing the intended action by animating gestures and sign language.
	Body motion	How should the body of the agent move? Body motion through the 3D space and locomotion.
	Smell	Scents produced by humanoids, in line with all of its other expressions. Humans can't control this, so human behaviour of virtual agents is by definition producing scents in line with their behaviour.
<b>Skills</b>		What can the agent do for us? We believe in its conversational skills and it's great cognitive knowledge, but is the agent of helping us right here, right now?
	Coach	Agents such as coaches, guides, trainers, teachers, consultants, advisors, sales people, customer services, and mentors.
	Role playing	Playing a role in a situation where real human beings are too expensive, which is too dangerous, or simply not available. I.e. virtual actors: playing patients. In addition, autonomous behaviour of virtual agents, living a life, is part of this category.
	Translation	Trying to understand the meaning/ connotation of a sentence and trying to find the intention and to formulate this lexically.
<b>Appearance</b>		Where do virtual agents show up?
	Screens	New screens through which agents enter the world of human beings.
	Augmented Reality	Agents, which are dynamically added to screens displaying the real world via a camera. Everything is real, with the agent as the only exception.
	Virtual reality	When virtual agents appear on screens or via projection in a multiple screens setup, with moving floors and chairs and sound everywhere.
	Humanoids	A humanoid: a human-like robot has an agent as its soul.
	Holographic projection	Virtual agents projected in the real world
	Virtual worlds	Virtual agents in virtual worlds.

<b>Societal impacts</b>		The impact of the rise of the virtual agents in our world.
	Psychology	What will be the impact on our brains when living with virtual agents, robots and humanoids? Evaluation studies are also part of this category: how do human beings perceive communication with agents?
	Sociology	How will behaviour of human beings change in a world full of virtual agents, robots and humanoids?
	Philosophy	How will virtual agents, robots and humanoids contribute to the ultimate Utopia? What will be the impact of a society full of agents, robots and humanoids? Could virtual agents rule the human world?
	Ethics	Robots' ethics: Will a robot have its own fundamental rights? Will a robot be allowed to get married? Can a robot be thrown away after its death or will a proper funeral be necessary?
<b>Integration</b>		In order to facilitate agent to enter our lives, how could technology facilitate their entrance?
	User Client Technology	New communication platforms used by consumers and employees in which agents can be integrated. I.e.: Instant Messaging platforms.
	Consumer products	Standard DIY products for consumers and small businesses to develop agents.
	Consultants	Consultants and consulting firms helping to implement (aspects of) professional agents in large corporations, governments and NGO's.
	Products	Of the shelf products to be used by large organisations in order to make virtual agents work operationally.
	Tools	Tools to develop, test and deploy virtual agents.



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