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AIC – An AI-system for Combination of senses

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Abstract

AI-complete systems developed today, are commonly used for solving different artificial intelligence problems. A problem is a typical image recognition or speech recognition, but it can also be language processing, as well as, other complex systems dealing with general problem solving. However, no AI-complete system, which models the human brain or behavior, can exist without looking at the totality of the whole situation and, hence, incorporating an AI-computerized sensory systems into a totality that constitute a combination of senses. This paper proposes a combination of sensory systems to form a comprehensive AI-system by combining the different senses, called AIC –AI-system for a combination of senses. The AIC-system is not a complete system in the sense that it contains a total set of information or uses all kinds of digital sensory systems. Nonetheless, it is a system under self-development. It develops its own knowledge base, as experiences, which will be based on the different characteristics: images, sounds, smells, tastes, touches with emotions/feelings and expressions. The result is a kind of perception of the surrounding environment.

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1. Introduction

AI-complete, informally, refers to the most difficult problems and sub-problems in artificial intelligence [1]. These problems include all complex issues that arise when dealing with real world problems, such as, natural language understanding, problem solving, knowledge representation and reasoning, and vision and image understanding [2].

Solving the problems with AI-complete system is equal to creating artificial general intelligence [2]. These problems include dealing with unexpected circumstances while solving real world problems. It is commonly about computerized senses, such as, vision or smell but it also includes natural language understanding, and decision-making. However, to model the brain and behavior, an AI-complete system needs to work with totality of senses to perceive impressions of the surrounding environment and, hence, incorporates all AI-computerized sensory systems into a totality that constitutes a combination of senses.

The brain uses the senses of sight, hearing, taste, smell, and touch to collect information about the surrounding environment. Those senses are connected, together, to expand the memory. The brain also uses previously captured information together with the existing feelings that are attached to the specific memories. Some memories are in the consciousness and easy to access and some are in unconsciousness and less easy to access but the feelings, connected to the unconscious memories, can still be present. Consciousness is the knowledge, insights or apprehensions of the owners personality, the thoughts and the perceptions of the surrounding environment. It is the knowledge about what is perceived so far, i.e., up to the age of the person, which is learned by interacting with the environment using the senses. Hence, it is possible to claim that consciousness is the product of perceiving, apprehending and learning through senses.

According to Aleksander [3], consciousness depends on, at least, five axioms [4]. The first axiom is *sense of place* where people can represent how they experience the environment and they place themselves within it. The second axiom is *imagination* where a person can recall what have been perceived before and can modify the experience by fusion. The third axiom is *directed attention* where a person is able to focus the attention. The forth axiom is *planning* where the person has the ability to image what will happen. Axiom five is *decision/emotions* where emotions guide the person to recognize what is good and what is bad for the person. The AIC system applies the axioms by 1) representing the environment by facts and rules to place itself into the environment, 2) recalling earlier learnt by using data, information and knowledge without restrictions, 3) only having one focus at the time by interacting with one person, animal or thing at the time, 4) based on earlier facts, it can guess coming interaction and insertion of data, and 5) starting making decisions about what is good and what is bad by using the negative and positive emotionally charged feelings.

The AIC system is not a complete system in the sense that it does not have every sense involved all the time nor uses all the sensory systems and features of a human being. But it is a system under self-development. It will develop its own knowledge base, which will be based on the different characteristics: images, sounds, smells, tastes, touches, and feelings. It should not mistakenly be considered as a cerebral cortex, with includes perceptions, emotions, thoughts, planning, and motor activities, since it does not have all the features for handling complexity of the cerebral cortex. The AIC system is built for perceptions and strives to handle emotions and, finally, thoughts.

2. The AIC system - AI combination of senses system

The AIC system is an AI system that combines different senses to constitute perceptions. The senses are all the senses human beings use to interact with the surroundings. The senses are the sight, hearing, taste, smell and touch. But the AIC system also builds on emotions, feelings, or reactions, and expressions. Emotions and feelings are all based on primitive feelings and consciousness comes from this source [5]. Expressions are primitive feelings, which are used when interacting with the surrounding environment, such as, expression of pain, glad, happy, and hungry. Sometimes these expressions are conscious, and can be made up, while other are unconscious, e.g., smile when other people smiles.

To handle the senses, the AIC system use images, sounds, smells, tastes, touches, and feelings that people sense with associations to specific words. Also expressions, which are the interpretations of others behavior, are included in the AIC system. This is moving from the conceptual model to the mental model of the environment that is surrounding the individual.

The human brain has several areas that record the different senses. Those areas are located at specific centers in the brain, see Figure 1. The sight center is in the in the back of the brain, where the information from the eyes passes horizontally through the brain and is stored in the back. The sound center and the taste center are both in the middle of the brain, nearby their sensors, ears and mouth. The center for smell is in temple in the brain and, hence, rather close to the nose. Touches is also in the middle of the brain and rather high up in the

brain where the impulses pass, vertically through the brain. Emotions and feelings are stored in the brain not far from the touch.

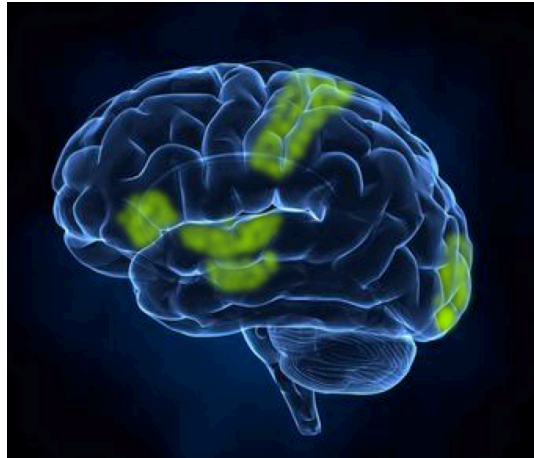


Fig. 1. Brain with senses. Source photo: CLIPAREA.com, <http://www.scienceclarified.com/Bi-Ca/Brain.html> [6]

To create a kind of perception of the surrounding environment, following senses are combined: sight, hearing, taste, smell, touch, emotion, feeling and expression.

2.1. Sight

The most important part, which is also the largest, is the sight or vision. The human brain is said to pick up 90% of the information through the eyes. Sight can operate on different levels ranging from objective to subjective with more or less complexity. This information is stored in the brain as “active and significant” or as “idle and less important”. The active information consists of the things that are directly in sight’s focus whereas the idle is present but not noticeable before needed. The intensity and granularity of information depends on the manner the environment is being studied by, for example, looking at, regarding, observing, inspecting or scrutinizing the environment. The visual sense captures objects, colors and/or scales (grey from white - black), shapes, depths, and movements, which is stored as images, sensation and sequential information.

What is needed for this sight system is storing images, image matching and sequences of motions. The images are captured, processed and stored, in the AIC system, as three-tuples with depictures (portrayed in picture), colors/scales, and, when possible, sharpness (amplitude/intensity). Commonly, the image matching includes face recognition and facial expression. The first version of AIC system only includes images and movies, without matching between the images, but distinguishes between some roughly described features, for example distinguishing a human being from an animal, or distinguish some animals from each other. The information is the set of

$$\forall \text{ Sight}(x) = \{ \exists D(x) \wedge \exists CS(x) \wedge \exists S(x) \}$$

Where D is depictions, which is an object, CS is colors/scales that can be any color or scale, and S is sharpness that can be anything from blurred to sharp. The sharpness is used for matching function when different images are matched and the sharpness of the image become important.

The sequential part is for learning behavior and the order of actions. To become a more human-alike decision-making system, motions of the particular object are important. Watching and studying other people and animals is a way of learning behavior and actions. This is recorded as sequences of pictures but not used for matching between the sequences.

2.2. Hearing

The second part that is less important than vision but is still significant is hearing. Hearing is the possibility to capture sounds in a form of signals and is said to be used for 10% of our information collecting. The sounds that can be heard are either vocalizations, i.e., vocal exercise without words (tunes, animal sounds, and bangs) or human voices (speech sounds) expressed in natural language. The human voice can be separated into speech, giving substantial information, and phonation.

Sound is connected to the image of a human. Hence, there is a sound connected to the human, which, in the first place, is the voice, but there are often other sounds connected to a particular person, like footsteps and walking rhythm. For AIC, only the sound of the voice will be connected to a certain person, not the contents of the words. AIC will store sound as 2-tuple string

$$\forall \text{ Sound}(x) = \{ \exists \text{ VL}(x) \wedge \exists \text{ V}(x) \}$$

with VL is vocalization and V is voices, where voices letters that constitute names or statements. Besides these sounds, other sounds are, for example, laugh, cry, sneeze, cough, ruckle, and snore.

2.3. Taste

Taste is an important connection to the human brain. Human being's taste is different, i.e., between people and on time bases, even on daily bases, e.g., defects or sicknesses can change or destroy the taste. The differences make it difficult to store with the same characteristics and compare tastes and, hence, taste is not a solely and stand-alone feature. Associations and experiences can cause the taste to be different. Good examples are wine tasting groups, colds and culture and growth. It is, so far, not possible to explain all the tastes of all humans but since taste is a part of completeness, it is included in AIC system.

The taste is an enormous challenge for the AI community and a lot of researchers conduct research on computer tasting systems. Since the AIC system, does not use any tasting device, it is hard to record taste into the AIC system. However, it will still be in the AIC by storing the taste as simple strings. The taste is a combination temperature, texture, and flavors and is represented as 3-tuples, which contain the set of Texture and Flavor:

$$\forall \text{ Taste}(x) = \{ \exists \text{ OT}(x) \wedge \exists \text{ T}(x) \wedge \exists \text{ F}(x) \},$$

Where OT is Object Temperature, T is Texture and F is flavor.

Temperature is the current of temperature of the object that is in the mouth, texture is hard to soft, and flavor is sweet, salt, sour, bitter, umami, mineral, metal, oil, where umani [7] is the glutamates and nucleotides used to describe broth and meat. Mineral and metal are the taste of the minerals and metals that can appear in medicine and in radiation.

Temperature is and the perception of temperature, also important for taste, for example, the feeling of being “cold”, i.e., if ≤ 37 and “warm”, i.e., if > 37 . However, since the perception of temperature is strongly connected to touch and feel, a combination of taste, touch and feel will constitute the perception of temperature.

The description of taste is over-simplified, with rough categories, and should contain many more characteristics. However, for now AIC uses tuples to store and match tastes rather than distinguish tastes.

2.4. Smell

Smell reacts with substances in the environment. It can distinguish several thousands of different substances with olfactions and pheromones. Olfactions are detecting the presence of smell and can detect chemicals [8] whereas pheromones are the smell of fluid-phase smells like hormones. Olfactions can, for example, pick up the smell from the presence of persons and pheromone is used for smelling the persons, who have different smells where some people's smell attracts some people more than others.

Smell is sometimes used together with taste because it is tightly linked to taste. The reason is that inhaled air is passing through the mouth cavity and the smell and taste can be evaluated together. Still, the smell is different from taste since something can smell different that it tastes.

The smell of human beings can change on a daily bases, which is difficult to pick up, but it is interesting to use in AIC system. However the smell is not captured by a sniffing AI-nose, but will be stored as text strings for a smelling an object, which explains the smell. AIC records 2-tuples

$$\forall \text{ Smell}(x) = \{ \exists O(x) \vee \exists P(x) \}$$

Where O is olfactions, and P is pheromones.

2.5. Touch

Touch is the recognition of pressure on the skin. Touch information comes from the whole human body, as signals, and is actually largest part of incoming information of the human body. It uses touch receptors to record contact, pressure and hardness, as well as, temperature [9]. Touch is sensed by a vast network of nerves and is individual experiences. Some people are extremely sensitive to contiguity and the nerves are highly active. These people feel everything and light touch can feel harsh. Hence, touch has a strong connection to feelings, which records information about temperature, the hardness of contact that can be anything from smooth to rough, textures of materials, skin problems with itches and pain, and vibrations.

With touch, the different parts of the body are registered, their positions and relations to each other parts, and the surrounding environment [9]. This includes muscle movements.

The AIC system does not have a touch device but it has the feature ready to record touches. It records touches as 4-tuples and contain the set:

$$\forall \text{ Touch}(x) = \{ \exists C(x) \wedge \exists T(x) \wedge \exists P(x) \}$$

Where C is Contact to the body and face including eyes, mouth, nose, and ear, T is temperature of the object, P is pressure is hardness. Hardness is ranging from light to hard. The normal temperature is about 37 degree C a case, which is for the tongue but not for the body. The body can perceive 37 C as cold.

2.6. Emotions, Feelings and Expressions

Emotions are conscious experiences that are from psycho-physiological expressions, biological expressions and mental states. Feelings are the subjective representation of emotions. One good example of an emotion is the psycho-physiological expression balance. Being balanced or unbalanced is both connected to physical and psychological issues. Physical is, for example, the feeling of loose balance due to taking wrong step or being

pushed. Psychological is, for instance, the feeling of the body being unbalanced and that something feels wrong.

Emotions and feelings are interlocked with the senses. For every piece of information a certain kind of emotion and feeling is involved, which is developed by combining images, sounds, tastes, smells and touches. A feeling is a learned behavior, which is recorded from the first acquaintance with, e.g., an object, person, and/or animal and, thereafter, developed for each confrontation with the same thing.

Since emotions and feelings are connected to all other parts, it is the central connection in AIC. Hence, in AIC, it is the part that connects the other processing parts of AIC, i.e., combining all senses.

Feelings are the personal impressions of emotions. Hence, feelings are conscious experience that is modeled on emotions. Emotions are in the body and, thus, are physical reactions to surroundings. The number of emotions is large, which have been studied and illustrated in Plutchik's wheel of emotions [10].

Among the emotions, there are several different basic emotions. Different researchers categorize these emotions, often as six basic emotions, like: happy, excited, tender, scared, angry and sad, or as: happiness, sadness, surprise, disgust, fear and anger [11], which have also been expanded with 11 other emotions: amused, content, contempt, embarrassed, excited, guilt, pride, relief, satisfied, sensory pleasure, and shame [12].

Although these are the most famous categorizations of emotions, in this paper, the emotions that are based on basic or primitive emotions from senses, muscles and, to some extent, body chemicals. These primitive emotions arise from seeing, hearing, touching, smelling, and tasting and are 15 different, but not exclusive, emotions: *Nourished*, *Hunger*, *Rested*, *Tired*, *Balanced*, *Relaxed*, *Pain*, *Fear*, *Warm*, *Cold*, *Well*, *Ill*, *Sick*, *Energy*, and *Exhausted*. *Nourished* comes from filling the stomach and *hunger* that comes from the feeling of an empty stomach. *Rested* and *tired* comes from time of sleeping or being awake but can also come from the time of using different senses, which impacts the mind and makes it tired. *Balanced* is when the body is in balance without any directly positive or negative feedback from the senses and *Relaxed* is when the muscles are unstrained or and mind is calm and unwound. *Pain* comes from hard touches, organs or intestines and exhausted from hard work with muscles and *Fear* that comes from something that is suddenly appears in the vision or sudden noises. Moreover, *warm*, *cold*, and *sick*, as well as, *well*, and *ill* comes from the body and the temperature of the body. The feeling of warm and cold, is the body temperature, which is the feeling of being “warm or” “cold”, which is warmer or colder depending on the temperature of the touch, where the temperature is cold, warm or just pleasant and congenial. *Energy* is built from a lot of red corpuscle or high adrenaline and *exhausted* is the release of high adrenaline or hard work.

Beside the primitive emotions, primary feelings are also representation of emotions that are learned from communication with others and, hence, become feelings. Those primary feelings are happy, sad, secure, and angry. *Happy*, which comes from smile or *sad* that comes from crying. Also, the feeling of being *secure* that is from feeling safe and the belief of nothing bad can happen, and *angry* is something gets wrong, which can be learnt from communication.

AIC system uses the primary feelings, which are also referred to as single-valued feelings, are built on primitive emotions and learned feelings. The set of primary feelings is:

$$\forall \text{ Emotions-Feelings-single-valued}(x) = \{ \exists \text{ Nourished}(x) \vee \exists \text{ Hunger}(x) \vee \exists \text{ Rested}(x) \vee \exists \text{ Tired}(x) \vee \exists \text{ Balanced}(x) \vee \exists \text{ Relaxed}(x) \vee \exists \text{ Pain}(x) \vee \exists \text{ Fear}(x) \vee \exists \text{ Energy}(x) \vee \exists \text{ Exhausted}(x) \vee \exists \text{ Warm}(x) \vee \exists \text{ Cold}(x) \vee \exists \text{ Well}(x) \vee \exists \text{ Ill}(x) \vee \exists \text{ Sick}(x) \vee \exists \text{ Happy}(x) \vee \exists \text{ Sad}(x) \}$$

The single-valued feelings are either positive emotionally charged or negative emotionally charged. The positive emotionally charged are nourished, rested, balanced, relaxed, energy, well, and happy; the negative emotionally charged are hunger, tired, pain, fear, exhausted, ill, sick, and sad. The feeling of being warm and cold may be either positive or negative valued depending on the situation. Nonetheless, the believe is that all the feelings together constitute a neutralized situation, that is the number of positive (+) and negative (-) emotionally charged feelings be equal to ± 0 .

Other emotions and feelings

Sometimes a feeling launches a chain of primitive emotions and primary feelings, which trigger each other. In some cases, this chain triggers the emotions or feelings in the same set of emotionally charged primary feelings. For example, hunger often triggers fear that may make a person, especially baby, to cry that in its turn makes the person warm. All in the set of negative emotionally charged.

Moreover, many emotions and feelings are not stand-alone experiences and are based on several primitive emotions and primary feelings and, hence, become compound emotions and feelings. This kind of meta-emotions or meta-feeling, can be combinations of primary feelings, so-called, or secondary feeling. Examples of meta-level secondary feelings are, for example, content, joy, angry and panic. *Content* is based on happy (primary), nourished (primary), rested (primary), balanced (primary), well (primary) and secure (primary). *Joy* can be based in happy (primary), nourished (primary), and energy (primary). *Angry* can be a combination of sad (primary) and fear (primary) and *panic*, if related to sickness, can be based on pain (primary), warm (primary), ill (primary), and fear (primary).

$\forall \text{ Emotions-Feelings-compound-valued}(x) = \{ \exists \text{ content}(x) \vee \exists \text{ joy}(x) \vee \exists \text{ angry}(x) \vee \exists \text{ panic}(x), \text{ uneasiness}(x), \dots \}$

The list of compound feelings can be extended with a numerous of emotions and feelings. For example = { discomfort(x), unenthusiastic(x), confused(x), confident(x), calm(x), amused(x), anxious(x), refreshed(x), expectations(x), surprise(x), enjoy(x), pleasure(x), like(x), love(x), aware(x) }

Besides being a combination of primary feelings, these compound feelings can also be based on other meta-level feelings, consisting of several compound feelings, or be a mix of primary and meta-level feelings. These different feelings are on different meta-levels of abstractions. For example, *panic* can be a feeling of discomfort (secondary). Discomfort is, then, on a higher meta-level since it can be based on being embarrassed (secondary). Embarrassment (4th meta-level) is an emotional state from distress (3rd meta-level or “meta-secondary meta-level) can be anxiety (second meta-level) that can be from uneasiness (second meta-level) caused by fear (primary). Hence, it is a hierarchy of meta-levels of emotions and feelings.

Expressions

Expressions of body language are something people notice when interacting with others. These expressions are, commonly, connected to a person's personality. The expressions, for humans, are divided into facial expressions and body expressions. For animals, expressions are mostly body expressions.

If a person acts hostile, the surrounding people believe that this person has a nasty personality and may treat the person accordingly, either with hate and disrespect or with fear and shyness. These expressions are very interesting for AIC and the following set for expressions are:

$\forall \text{ Expression}(x) = \{ \exists \text{ facial}(x) \vee \exists \text{ body language}(x) \}$

Since AIC does not pick up picture sequences, it will not be able to use expressions in body language but will have a feature ready to be used for expressions.

3. Perceptions as the spinal of AIC

To model the AI-combination sense system, called AIC, several components are needed. AIC is a parallel system, which processes each human feature separately but will combine these features to constitute feelings and expressions. The reason is to resemble the stored information of the brain. A model of the content of the AIC system is presented in Figure 2.

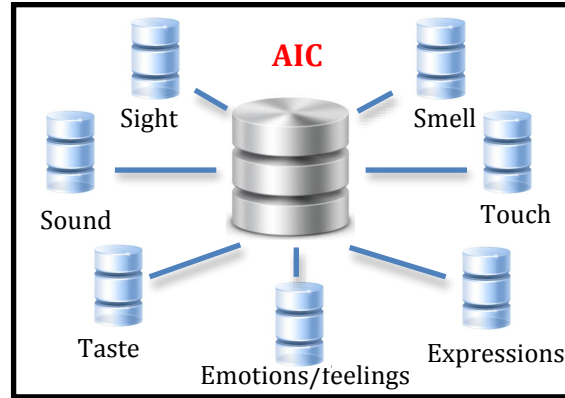


Figure 2. System model of AIC-system

In AIC, each sense has its own database. The system records the information it has for the sense, in the form of facts. Then, the combinations of senses are stored in a knowledge base to keep all the facts together to develop and expand the memory. Thus, the AIC system develops its knowledge base, as experiences, which constitute perception of the surroundings. These are a combination of each part to constitute the knowledge about the surrounding environment. To tie the information in the database together and become the combination of senses, the rules in the knowledge base are utilized to make cross-references to the data in the databases.

For every perception, it is a connection of sight, sound, taste, smell, touch, emotions/feeling, and expressions, where the following data is recorded and used. The knowledge is build with rules, which combines all the senses that are represented in the rule. If some values of the senses are missing, the rule records a blank value. This blank can be filled with information, whenever AIC learns more about that particular sense. The perception is a follows:

Perception = {Sight, Sound, Taste, Smell, Touch, Emotion/Feeling, Expression} where

Sight = {Depicture, Colors/scales, Sharpness} where depictures is the <object> in sight, colors/scales is the <color> of the object or <grey scales>, and, sharpness is either <blur, sharp>

Sound = {Vocalization, Voice}, where vocalization is <tunes, animal sounds, bangs>, and voice is <vocal, pitch, phoneme>.

Taste = {Temperature, Texture, Flavour}, temperature is <cold, warm>, texture is <hard, soft>, and <flavour is sweet, salt, sour, bitter, umami, mineral, metal, oil>

Smell = {Olfactions, Pheromones}, where olfactions is <presence of smell >, and pheromones is < fluid-phase smells >

Touch = {Contact, Temperature, Pressure} where contact is any contact with <body, face, eye, mouth, nose, ear> and temperature of the object with <less than normal, normal, warmer than normal>, pressure is and < hard, soft>

Emotions-Feelings-single-valued = {Nourished, Hunger, Rested, Tired, Balanced, Relaxed, Pain, Fear, Energy, Exhausted, Warm, Cold, Well, Ill, Sick, Happy, Sad} where each part has a value of 0 or 1.

Emotions-Feelings-compound-valued = {content, joy, angry, panic, uneasiness, discomfort, unenthusiastic, confused, confident, calm, amused, anxious, refreshed, expectations, surprise, enjoy, pleasure, like, love, aware} where each part has a value of 0 or 1. In AIC-system the single-valued and compound-valued emotion and feelings are stored in the same database.

Expression = {facial, body language} where it is either facial or body language that is recorded.

All databases are empty from the beginning. The purpose is to let AIC-system learn from scratch without any prior knowledge. However, the knowledge base contains some rules to be able to start functioning. These rules are used for communication with the users. Also, a general structure for perception rules is represented in the knowledge base. This perception rule includes sight, sound, taste, smell, touch, emotion/feeling, and expression where each part has a more complex structure stored in the respective database.

As mentioned above, not all facts (or senses) are present all the time but that is also the case of for the human brain. Nonetheless, it will not affect the perception AIC-system has. The system can expand prior knowledge and facts whenever it gets more details.

3.1. The five axioms

The AIC system applies the five axioms of Aleksander [3]. The first axiom is representing the environment by facts and rules to place itself into the environment. AIC uses texts and, to some extent, pictures to communicate with the user. The system generates some questions to record and store data. It checks earlier stored data to decide if the data has been inserted before. Of course, this is low-level communication and can be easily improved by using devices for visual, smelling and hearing senses.

AIC learns from the users. They decide what AIC learns by giving the system data. AIC forms the facts and inference rules, which are used to communicate with the users. When the data is provided for the first time, it stores the data. The second time something is provided, the system reuses the data and asks about it.

The AIC-system is a rather rich and ambitious system with a lot of communication rules. It starts to learn through interaction with the users. It focus on one user at the time, hence, the third axiom about focusing on one person, animal or thing at the time is fulfilled.

The basic knowledge about conversation procedures are: *human conversation*, *animal conversation*, and *thing conversation* where each part triggered a conversation for learning about humans, animals and things. For every of these parts, the system asked about name, sounds, looks like, taste and characteristics. However, since in a normal situation, a human, for example, learns from scratch without any prior knowledge. But without any learning directions at all, it is hard to get any information that makes sense.

The second axiom is recall earlier learning by using data, information and knowledge without restrictions. Besides storing, AIC is able to use the existing data, information, and knowledge. It must apply correct data about each person, animal or thing (object). From a request, AIC uses the perception to get the information about the senses that are connected to the request.

For the forth and fifth axiom, the AIC system, by reasoning with the content, can guess coming interaction and insertion of data, which is based on earlier inserted data. AIC can also start making decisions about what is good and what is bad since it is using negative and positive emotionally charged feelings in the system.

4. Evaluation of AIC system

Letting the AIC system learn from the beginning is an interesting feature. However, if only one teacher is used, the system will drive the user crazy. The current version of the system, asks many questions about the object at hand, i.e., person, animal or thing. It asks about characteristics of the person, of the animal or thing. AIC also can present what it knows for the moment. AIC system can be used of anyone that is interesting to interact with it. It learns whatever the user gives it, without any evaluation from the beginning. Hence, AIC system trusts the user to give correct information.

5. Conclusions and further work

This paper presents AIC system – the AI combination of senses system. It is a system under self-development and develops its own knowledge base, as experiences. These experiences are based on the different characteristics, such as images, sounds, smells, tastes, touches, emotions/feelings and expressions. The result of the work is a combination of senses that can be seen as perception of the surrounding environment.

The current AIC-system needs a lot of testing. For every time the system learns something, the databases and the knowledge base need to be checked so the system learns accordingly. Also, the combination of data must make sense. Furthermore, AIC-system uses texts as communication means. This must be expanded with devices such as cameras, microphones, and speakers to be able to resemble the human senses and communicate through the devices.

Moreover, for the moment, AIC-system uses a lot of communication rules to initially communicate with the user. This amount should be decreased to resemble how humans learn from the scratch. Hence, AIC-system only knows about “I” – that is itself. Then, the system should records everything it gets from the users. A complex problem for the system is that how much it must start with before it can start to use anything.

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