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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
E. S. D.

REF: EXPEDIENTE No. 06032500
FECHA DE LA SOLICITUD: ABRIL 3, 2006
SOLICITANTE: 20Q.net, Inc.
TITULO: MÉTODO Y JUEGO DE ADIVINANZA DE RED NEURONAL
ARTIFICIAL

ASUNTO: CONTESTACIÓN A REQUERIMIENTO OFICIAL

DILIA RODRIGUEZ D'ALEMAN, en mi condición de apoderada de la sociedad solicitante, por el presente escrito doy respuesta a su auto notificado por estado de Abril 27 de 2006, que vence Junio 27, 2006 y me permito presentar los siguientes documentos:

- El documento en el que consta la CESIÓN del derecho a la patente otorgado por los inventores al solicitante, debidamente legalizado.
- Su traducción oficial al Español debidamente avalada por el Ministerio de Relaciones Exteriores.
- Dibujos formales, figura característica en duplicado, arte final.
- Copia certificada de la prioridad canadiense reivindicada N° 2.505.071 de Abril 6 de 2005.

Esta prioridad está siendo presentada dentro del término de 16 meses que exige la Decisión 486 de Diciembre 1 de 2.000, toda vez que la solicitud fue presentada el 6 de Abril de 2005.

Ruego a usted continuar con el presente trámite.

Señor Jefe,



DILIA RODRIGUEZ D'ALEMAN

TLR/srr

P. 763 

TRADUCCIÓN OFICIAL No. 06/233 de un documento escrito en Inglés, el cual para su identificación se sella con el sello del traductor al tiempo con la presente. Esta traducción ha sido preparada por Juan Pablo Piedrahíta Aguilera, Traductor e Intérprete Oficial debidamente reconocido de conformidad con la resolución número 718 de 2003 expedida por el Ministerio del Interior y de Justicia

(Se traduce un documento de Cesión a favor de la compañía 20Q.NET INC. certificado notarial y legalización, escritos en inglés, adjuntos a la autenticación No. 070 del Consulado de Colombia en Ottawa, Canadá, y a la legalización de la firma consular por parte del Jefe de Legalizaciones del Ministerio de Relaciones Exteriores de la República de Colombia No. 441309 de Mayo 8, 2006, escritas en español.)

Clarke, Modet & Cº

COLOMBIA

CORREO-ELECTRÓNICO: clarkemodet@clarkemodet.com.co

SANTAFÉ DE BOGOTÁ, AA. 92397

CESIÓN

El suscrito, (en adelante el CEDENTE), Robin Burgener, inventor/diseñador de Método y Juego de Adivinanza de Red Neuronal Artificial, con domicilio en Ottawa, ON, Canadá, por la presente declara que cede la totalidad de los derechos de propiedad, así como los privilegios que le corresponden, sin excepción alguna, sobre la invención, diseño industrial o modelo de utilidad a 20Q.NET INC., con domicilio en Ottawa, ON, Canadá.

El Cedente y el Cesionario firman este documento como prueba de aceptación de la cesión.

Dada y firmada en Ottawa, ON, Canadá el día 2 de Marzo de 2006.

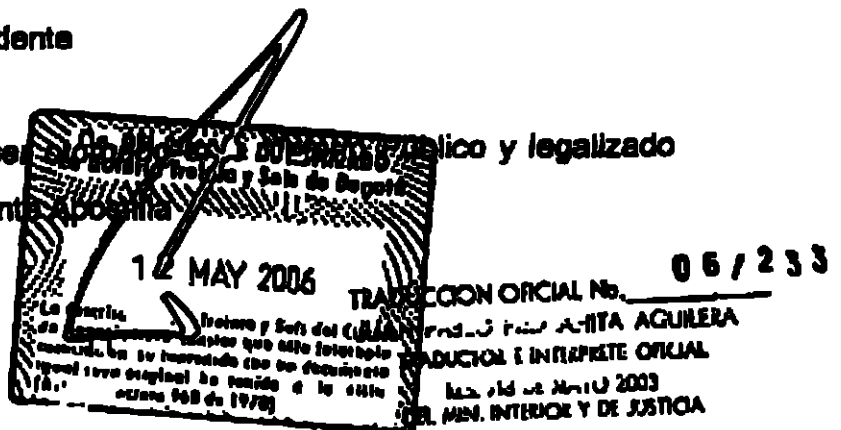
(Firmado) I Robin Burgener

El Cedente

(Firmado) Robin Burgener Presidente

El Cesionario

NOTA: Este documento debe ser sellado por el Consulado de Colombia en Ottawa, Canadá y legalizado por el Cónsul Colombia o mediante Apostilla.



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Certificación de Notario Público

Por la presente certifico que la firma anterior corresponde a la de Robin Burgener, quien está debidamente autorizado para firmar este documento.

(Firma) Ilegible Alain D. Bourassa,

Certificación de Notario Público

Por la presente certifico que la compañía mencionada es una persona jurídica debidamente constituida de conformidad con las leyes del Canadá y que la firma anterior corresponde a la de Robin Burgener, quien está debidamente autorizado para firmar en nombre de dicha compañía.

(Firma) Ilegible Alain D. Bourassa,

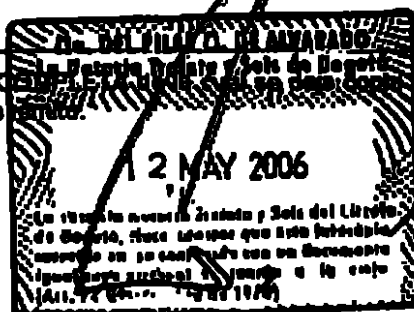
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Al respaldo, en español, autenticación de la firma anterior No. 070 del Consulado de Colombia en Ottawa, Canadá con fecha Abril 7, 2006. Pagados los derechos por US\$ 24.00.

En español, legalización de la firma anterior, por el Jefe de Legalizaciones del Ministerio de Relaciones Exteriores de la República de Colombia No. 441309 con fecha Mayo 9, 2006.

ES TRADUCCIÓN FIEL Y CORRECTA de la firma anterior, la cual se encuentra en los archivos de esta oficina para su confrontación y a la cual me refiero.

Bogotá, Mayo 10, 2006.



TRADUCCION OFICIAL No. 06 / 233
JUAN PABLO ALVARADO AGUIRRE
TRADUCTOR E INTERPRETE OFICIAL
BOGOTÁ, MAYO 10, 2006
DEL MINISTERO DE RELACIONES EXTERIORES Y DE JUSTICIA

p. 7.63

Clarke, Modet & Co

COLOMBIA

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SANTAFÉ DE BOGOTÁ, A.A. 92397 COLOMBIA

CESION

ASSIGNMENT

El (la) abajo firmante (En adelante EL CEDENTE)

The undersigned (Hereinafter THE ASSIGNOR)

Robin Burgener

en su carácter de inventor /diseñador

Inventor /designor of

Artificial Neural Network K Guessing Method & Game

con domicilio en:

domiciled at

Ottawa, ON, CANADA

por el presente documento declara que cede todos y cada uno de los derechos que le corresponden o puedan corresponderle sobre la siguiente invención, modelo de utilidad, diseño industrial

do hereby declares that it assigns all and each of his rights and privileges on the following invention, industrial design, utility model

a:

to 20Q.net Inc.

con domicilio en

with domicile in

Ottawa, ON, CANADA

En prueba de la mutua aceptación de esta cesión ambas partes CEDENTE y CESIONARIO firman el presente documento.

As a proof of the mutual acceptance of this assignment, both parties ASSIGNOR and ASSIGNEE sign the present document.

Dado y firmado en
A los Días de De

Granted and signed at Ottawa, ON, CANADA
on this 25th day of March of 2006

El Cedente /The Assignor

El Cedente /The Assignor

El Cesionario /The Assignee

El Cesionario /The Assignee

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JUAN PABLO NEDERLIN A. ALVARO

TRADUCTOR E INTERPRETE OFICIAL

REG. 1.8 DE MARZO 2300

DEL MIN. INTERIOR Y DE JUSTICIA

Certified at the Department of Foreign Affairs and International Trade for Legalization of the Foregoing Signatures

Certifié au Ministère des Affaires Étrangères et du Commerce international pour la légalisation de la signature ci-dessus

Seigneur ministre des Affaires Étrangères

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TRADUCCIÓN OFICIAL No. 05/234 de un documento escrito en inglés, el cual para su identificación se sella con el sello del traductor al tiempo con la presente. Esta traducción ha sido preparada por Juan Pablo Piedrahíta Aguilera, Traductor e Intérprete Oficial debidamente reconocido de conformidad con el Certificado de Idoneidad Profesional No. 0046 expedido por la Universidad Nacional de Colombia, por el Ministerio de Relaciones Exteriores y autorizado por el Ministerio del Interior y de Justicia, por resolución número 718 de 2009.
(Se traduce un Certificado de la Oficina de Patentes Canadiense y capítulo de reivindicaciones, escritos en inglés)

加拿大 专利局 OFICINA CANADIENSE DE PROPIEDAD INTELECTUAL

Una Agencia de Industria del Canadá

Oficina de Patentes del Canadá

Certificado

Por el presente se certifica que los documentos adjuntos son una copia fiel de los documentos presentados ante la Oficina de Patentes.

Especificaciones y Dibujos, como se presentaron originalmente, con la Solicitud De patente no. de Serie: CA 2505071, el 6 de Abril, 2006, por parte de 20Q.NET INC., CESIONARIO DE Robin Burgener, respecto de "Método y Juego de Adivinanza de Red Neuronal Artificial".

(Firmado) Silvie Gregoire

Funcionario que Certifica

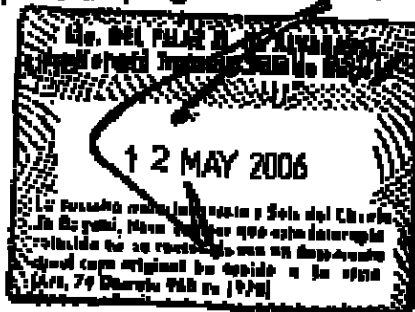
Fecha: Marzo 15, 2006.

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Canadá (CIPO 68) 31-03-04 OPIC CIPO

Lo que se reivindica es:

1. Un método para adivinar, en un juego electrónico, un objeto el cual es pensado por un usuario, entre un conjunto de elementos objetivo, después de preguntarle al usuario por lo menos una pregunta, el método usa



05/234
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elementos-objetivo-por preguntas, donde cada celda de la matriz define una ponderación de conexión entrada-salida, y la red neuronal se puede usar en una modalidad inicial, por medio de la cual las respuestas a las preguntas preguntadas son nodos de entrada y los elementos objetivo son nodos de salida, y en una segunda modalidad, por medio de la cual los elementos objetivo son nodos de entrada y las preguntas nodos de salida; el método comprende los siguientes pasos:

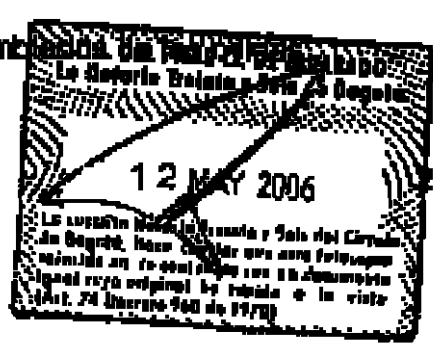
ordenamiento de los elementos objetivo utilizando la red neuronal en la primera modalidad;

ordenamiento de las preguntas utilizando la red neuronal en la segunda modalidad; y suministro de una posibilidad de respuesta de conformidad con el ordenamiento de los elementos objetivo.

2. El método de la reivindicación 1, donde el paso de ordenar los elementos objetivo comprende los siguientes pasos:

Hacer coincidir por lo menos una pregunta con un nivel de ponderación; comparar el nivel de ponderación de la pregunta con los niveles de ponderación de las celdas en la red neuronal correspondientes a esa pregunta y a los elementos objetivos que están siendo ordenados, y temporalmente cambiar las ponderaciones de las celdas correspondientes de conformidad con la concordancia; y

calificar los elementos objetivo de acuerdo con las ponderaciones cambiadas de conformidad con la concordancia;



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3. El método de la reivindicación 1, donde el ordenamiento de las preguntas comprende los siguientes pasos:

Hacer coincidir las respuestas predecibles con las preguntas, con ponderaciones positivas y negativas respecto de los elementos objetivo con alta ponderación;

Totalizar todas las ponderaciones concordantes y no concordantes para cada pregunta, y calcular un margen entre ambos totales para cada una de las preguntas; y calificar las preguntas de acuerdo con dichos márgenes.

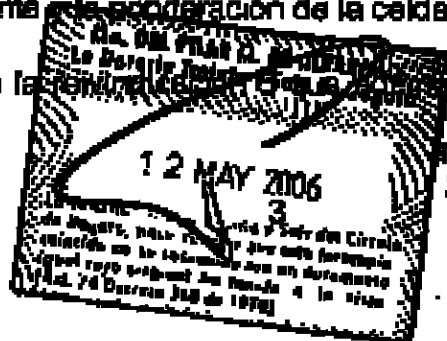
4. El método de la reivindicación 1, donde el paso de ordenar las preguntas comprende los siguientes pasos:

para cada pregunta calcular, los márgenes entre la ponderación de una celda correspondiente al mayor elemento objetivo y dicha pregunta y las ponderaciones correspondientes a otros elementos objetivos con alta ponderación y dicha pregunta; y

calificar las preguntas comparando los márgenes de cada una de las preguntas con los márgenes de las demás preguntas.

5. El método de la reivindicación 1 que además comprende el paso de ajustar la ponderación de las celdas correspondientes a un objeto adivinado de acuerdo con la conformidad entre una ponderación ubicada de una pregunta y la ponderación de la celda antes del ajuste.

6. El método de la reivindicación 5 que además comprende los siguientes



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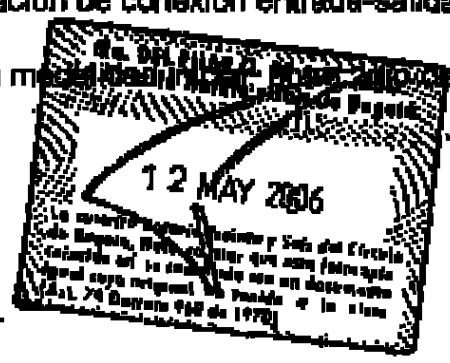
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- en un formato de matriz de elementos-objetivo-por preguntas, donde cada celda de la matriz define una ponderación de conexión entrada-salida, y la red neuronal se puede usar en una modalidad inicial, por medio de la cual las respuestas a las preguntas preguntadas son nodos de entrada y los elementos objetivo son nodos de salida, y en una segunda modalidad, por medio de la cual los elementos objetivo son nodos de entrada y las preguntas nodos de salida; el juego comprende:
- Los medios para ordenar los elementos objetivo utilizando la red neuronal en la primera modalidad;
- Los medios para ordenar las preguntas utilizando la red neuronal en la segunda modalidad; y
- Los medios para proporcionar una respuesta adivinada de acuerdo con el ordenamiento de los elementos objetivo.
11. Un medio legible por computador que incluye representaciones de instrucciones y datos para hacer que un dispositivo portátil o un computador lleven a cabo el método para adivinar un objeto que está siendo pensado por un usuario, entre un conjunto de elementos objetivo, después de preguntarle al usuario por lo menos una pregunta, el método usa una red neuronal estructurada en un formato de matriz de elementos-objetivo-por preguntas, donde cada celda de la matriz define una ponderación de conexión entrada-salida, y la red neuronal se puede usar en una modalidad inicial, por medio de la cual las respuestas a las



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preguntas preguntadas son nodos de entrada y los elementos objetivo son nodos de salida, y en una segunda modalidad, por medio de la cual los elementos objetivo son nodos de entrada y las preguntas nodos de salida; el método comprende:

5 ordenamiento de los elementos objetivo utilizando la red neuronal en la primera modalidad;

ordenamiento de las preguntas utilizando la red neuronal en la segunda modalidad; y suministro de una posibilidad de respuesta de conformidad con el ordenamiento de los elementos objetivo.

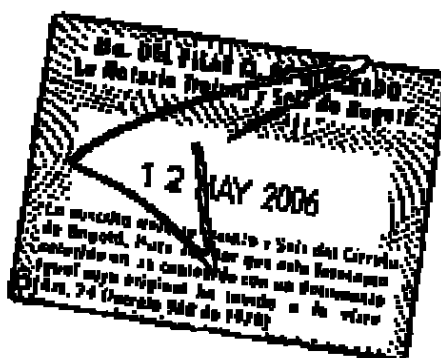
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ES TRADUCCIÓN FIEL Y COMPLETA de la cual se deja copia en los archivos de esta oficina para su confrontación y a la cual me remito.
Bogotá, Noviembre 22, 2005.



Juan Pablo Piedrahita Aguilera

TRADUCCIÓN OFICIAL No. 01512
JUAN PABLO PIEDRAHITA AGUILERA
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R.S. 718 DE 14.10.2003
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Specification and Drawings, as originally filed, with Application for Patent Serial No:
CA 2505071, on April 6, 2005, by 200.NNET INC., assignee of Robin Burgener, for
"Artificial Neural Network Guessing Method and Game"

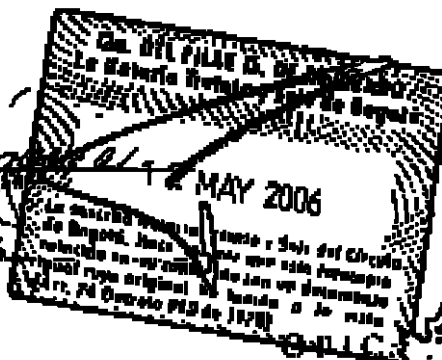
TRADUCCION OFICIAL N.º 9.12.11
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E.S. 116 DE MAYO 2003
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Sylvia [Signature]
Agent certification stamp, dated March 15, 2006

March 15, 2006
Date:

Canada

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31-03-04



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ABSTRACT

A method for guessing, in an electronic game, an object that a user is thinking of, from a set of target objects, after asking the user at least one question, the method utilizing a neural network structured in a target objects-by-questions matrix format, wherein each cell of the matrix defines an input-output connection weight, and the neural network can be utilized in a first mode, whereby answers to asked questions are input nodes and the target objects are output nodes, and in a second mode, whereby the target objects are input nodes and the questions are output nodes, the method comprising the steps of ranking the target objects by utilizing the neural network in the first mode; ranking the questions by utilizing the neural network in the second mode; and providing a guess in accordance with the ranking of the target objects.



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ARTIFICIAL NEURAL NETWORK GUESSING METHOD AND GAME

FIELD OF THE INVENTION

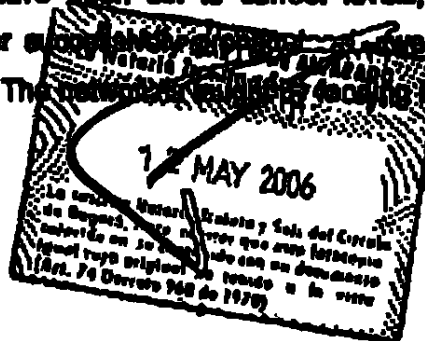
The present invention relates in general to artificial intelligence games and in particular to a new and useful method of using artificial neural networks learning techniques in a "guessing" game.

BACKGROUND OF THE INVENTION

Artificial Neural Networks (ANNs) are well known in the art, and are described in general in U.S. Pat. No. 4,912,654, issued March 27, 1990, to Wood ("Neural Networks Learning Method"), and in U.S. Pat. No. 5,222,184, issued June 22, 1993, to Nishimura ("Neural Network with Modification of Neuron Weights and Reaction Coefficient").

One widely used neural network (a multi-layer perceptron) includes a plurality of processing elements called neural units arranged in layers. Interconnections are made between units of successive layers. A network has an input layer, an output layer, and one or more "hidden" layers in between. The hidden layer is necessary to allow solutions of non-linear problems. Each unit is capable of generating an output signal, which is determined by the weighted sum of input signals it receives and a threshold specific to that unit. A unit is provided with inputs (either from outside the network or from other units) and uses these to compute a linear or non-linear output. The unit's output goes either to other units in subsequent layers or to outside the network. The input signals to each unit are weighted either positively or negatively, by factors derived in a learning process.

When the weight and threshold factors have been set to correct levels, a complex stimulus pattern at the input layer is processed by the hidden layers, to result in an output pattern. The network is used to recognize a



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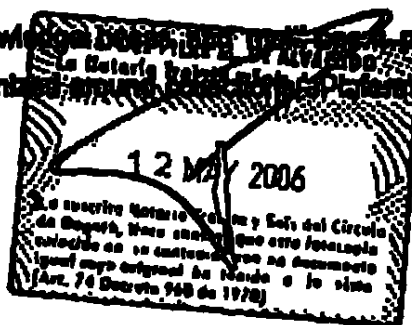
succession of input patterns and corresponding expected output patterns; the network learns by measuring the difference—at each output unit—between the expected output pattern and the pattern that it just produced.

Having done this, the internal weights and thresholds are modified by a learning algorithm to provide an output pattern, which more closely approximates the expected output pattern, while minimizing the error over the spectrum of input patterns. Neural network learning is an iterative process, involving multiple lessons.

Broadly speaking, neural networks have been used in control applications (1) as subsystems used for pattern recognition, diagnostics, sensor fusion, dynamic system identification, and the like; (2) as "clones" which learn to imitate human or artificial experts by copying what the expert does; (3) as "tracking" systems, which learn strategies of action which try to make an external environment adhere to a pre-selected reference model; and (4) as systems for maximizing or minimizing a performance measure over time.

The invention described and claimed herein comprises a neural network system used in a game that "guesses" what the user (player) is thinking of after asking him a number of questions. The concept of such games—guessing games—is not new; however, conventional guessing games use other approaches to Artificial Intelligence (AI), such as "expert systems," where a set of facts and rules is input to an execution device, which will then—in the absence of new inputs—give the same answers to the same questions. These systems use a tree of decision rules to produce the desired outputs. These decision rules, and the tree that the set of rules constitute, must be devised for the particular application. Such AI entities are referred to as "non-learning AI entities."

Non-learning AI entities include knowledge bases and "rule-based" processing schemes: knowledge bases are organized around data structures. Information with



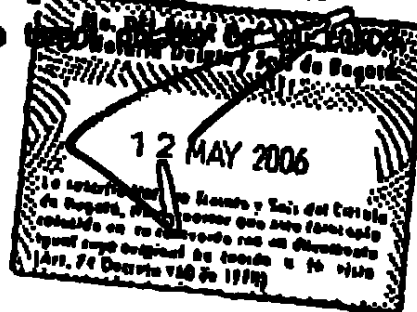
rules for making inferences and answering queries, while multi-agent schemes combine numerous entities operating on fixed algorithms. These aggregations often include convenient methods for people to update the algorithms, inference rules and other recipes that govern their behavior. However, the "learning" is actually happening in their human keepers, but not on the aggregation itself.

Also, another major problem that is readily apparent in such systems is their incapability to handle inaccurate or misleading information: if a player answers one question inaccurately, this will cause the system to pursue the wrong "branch" of the decision tree leading it to the wrong answer (or guess).

- 10 These limitations necessitate the need to replace the use of expert systems in such games with the use of neural networks that possess a higher level of artificial intelligence. The present invention satisfies this need.

SUMMARY OF THE INVENTION

- 15 To overcome the limitations of the prior art described above, and to overcome other limitations that will become apparent upon reading and understanding the present specification, the present invention accordingly provides a method for guessing, in an electronic game, an object that a user is thinking of, from a set of target objects, after asking the user at least one question, the method utilizing a neural network structured in a target object-by-questions matrix format, wherein
- 20 each cell of the matrix defines an input-output connection weight, and the neural network can be utilized in a first mode, whereby answers to asked questions are input nodes and the target objects are output nodes, and in a second mode, whereby the target objects are input nodes and the questions are output nodes, the method comprising the steps of ranking the target objects by utilizing the
- 25 neural network in the first mode and by mapping at least one answer to a weight, comparing the weight of the answer to weights of cells in the neural network corresponding to that question and the target object, and

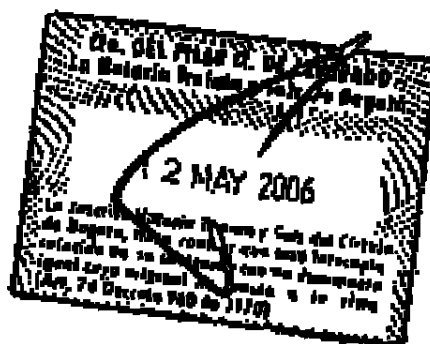


temporarily changing the weights of the corresponding cells in accordance with agreeability, and rating the target objects in accordance with the changed cell weights; ranking the questions by utilizing the neural network in the second mode; providing a guess in accordance with the ranking of the target objects; adjusting weights of cells corresponding to a guessed object in accordance to agreeability between a mapped weight of an answer and the cell weight before adjusting.

According to one aspect of the present invention, the step of ranking the questions is provided by mapping predictable answers to questions to positive and negative weights with respect to target objects highly ranked; totaling the agreeable weights and the disagreeable weights and computing a margin between the two totals for each question; and rating the questions in accordance with the margins.

According to another aspect of the present invention, the step of ranking the questions is provided by computing, for each question, margins between a weight of a cell corresponding to a most highly ranked target object and that question, and weights corresponding to other highly ranked target objects and that question; and rating the questions by comparing the margins of each question with the margins of other questions.

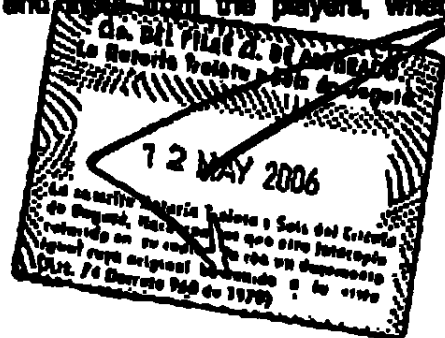
According to yet another aspect of the present invention, there is provided a neural network structured in an X-by-Y matrix format, wherein each cell of the matrix defines an input-output connection weight, and the neural network can be utilized in a first mode, whereby elements of the X-axis are input nodes and elements of the Y-axis are output nodes, and in a second mode, whereby the elements of the Y-axis are input nodes and the elements of the X-axis are output nodes.



According to yet a further aspect of the present invention, there is provided a game for guessing an object that a user is thinking of, from a set of target objects, after asking the user at least one question, the game utilizing a neural network structured in a target objects-by-questions matrix format, wherein each cell of the matrix defines an input-output connection weight, and the neural network can be utilized in a first mode, whereby answers to asked questions are input nodes and the target objects are output nodes, and in a second mode, whereby the target objects are input nodes and the questions are output nodes, the game comprising: means for ranking the target objects by utilizing the neural network in the first mode; means for ranking the questions by utilizing the neural network in the second mode; and means for providing a guess in accordance with the ranking of the target objects.

According to a further aspect of the present invention, there is provided A computer-readable medium bearing representations of instructions and data for causing a computer or hand-held device to perform a method for guessing an object that a user is thinking of, from a set of target objects, after asking the user at least one question, the method utilizing a neural network structured in a target objects-by-questions matrix format, wherein each cell of the matrix defines an input-output connection weight, and the neural network can be utilized in a first mode, whereby answers to asked questions are input nodes and the target objects are output nodes, and in a second mode, whereby the target objects are input nodes and the questions are output nodes, the method comprising the steps of: ranking the target objects by utilizing the neural network in the first mode; ranking the questions by utilizing the neural network in the second mode; and providing a guess in accordance with the ranking of the target objects.

The present invention provides the advantage of allowing the system to change its behavior as a result of experience and input from the players, whether voluntary or not.



The invention also provides the advantage of handling inaccurate or misleading information.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention, its organization, construction and operation will be best understood by reference to the following detailed description taken into conjunction with the accompanying drawings, in which:

Figure 1A is a table that gives a matrix-like, visual illustration of how the initial, unstimulated question stimulates target objects.

Figures 1B and 1C are tables that give matrix-like, visual illustrations of examples where target objects stimulate questions.

Figure 2 shows an example of the mappings of answers to weights.

Figures 3A to 3D are matrix-like tables that illustrate the target object ranking procedure, and the adjustment of the cell weights.

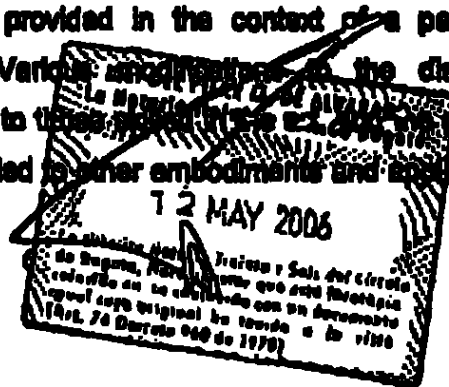
Figure 4 is a matrix-like table that illustrates a question ranking procedure.

Figure 5 is a matrix-like table that illustrates another question ranking procedure.

Figures 6A and 6B are matrix-like tables that show how different cell weights are used for different demographic targets.

DETAILED DESCRIPTION OF THE INVENTION

The following description is presented to enable any person skilled in the art to make use of the invention and is provided in the context of a particular application and its requirements. Various modifications to the disclosed embodiments will be readily apparent to those skilled in the art, and the general principles defined herein may be applied to other embodiments and applications.



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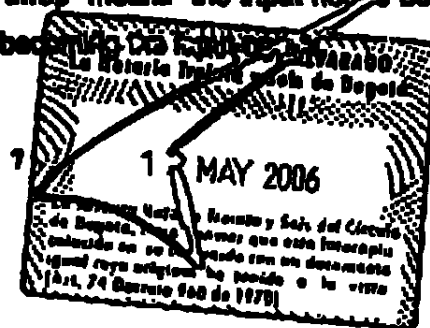
without departing from the spirit and scope of the present invention. Thus, the present invention is not intended to be limited to the embodiments shown, but is to be accorded the widest scope consistent with the principles and features disclosed herein.

5 It will be generally understood that the terms "wrong," "inaccurate," "misleading," and "inconsistent" as used hereinafter are interchangeable. Also, it will be generally understood that terms such as "train," "teach," "learn," "know," and "lesson" as used in this document are used in the neural network sense. In addition, it will be generally understood that the terms "rank" and "prioritize" as
10 used hereinafter are interchangeable.

An ANN is a computational model composed of neurons (or simply nodes) and connections between the nodes. The strength of each connection is expressed by a numerical value called a "weight," which can be modified. The activation of a given node is based on the activations of the nodes that have connections
15 directed at that node and the weights on those connections. In general, a neural network incorporates some special nodes called "input nodes" with their activation external set, while other nodes are distinguished as "output nodes."

In the present invention, the neural network is structured in a matrix format (X by Y), where the cells define the weights, and which may be used with the X's as the input nodes and the Y's as the output nodes or vice versa. Specifically, the
20 neural network of the present invention is a matrix of "questions"/"answers" by "target objects." The cells of the matrix define the relationship between the questions/answers and the target objects, and the matrix may be used with the questions/answers as the input nodes and the target objects as the output nodes, or vice versa.
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In the present description and claims, "swap" means "the input nodes becoming the output nodes and the output nodes becoming the input nodes."



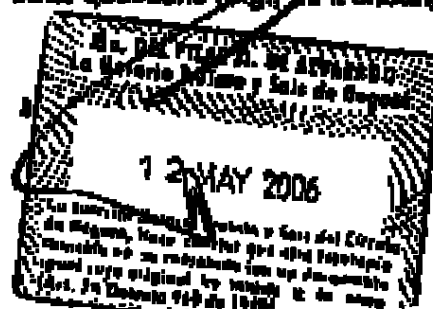
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Since the ANN in the present invention is used for a game that asks the player a number of questions and then guesses what the player was thinking of, the matrix format described above presents the advantage of having the answers stimulate certain target objects at times and, at other times, having the target objects stimulate the acquisition of certain answers—in other words, stimulate certain questions to be asked. If the input nodes are answers to questions, the output nodes are top objects (i.e., probable objects); if the input nodes are top objects, then the output nodes are best questions to be asked. This will be best illustrated by way of example.

The first question is usually to determine if what the player is thinking of is an animal, vegetable, mineral, etc. (Obviously, the initial question cannot be stimulated, since there are no stimulated target objects yet.) If the player answers animal, for example, this will stimulate the target objects that fall within this category, giving them a high priority, while the target objects that fall outside this category are given low priority. This is illustrated in Figure 1A.

Once the target objects that fall within the animal category are stimulated, they, in turn, are more likely to stimulate the question "Would you find it on a farm?" than they are to stimulate the question "Is it found in salad bars?" If, on the other hand, the player was to answer vegetable instead of animal, then "Is it found in salad bars?" would more likely be the next question than "Would you find it on a farm?" This is illustrated in Figure 1B.

Assuming that the player was thinking of an animal that could be found on a farm and answered the first two questions ("Is it an animal, vegetable, mineral, other, or unknown?" and "Would you find it on a farm?") accordingly, the answer to the second question might favor animals like "Pig," "Chicken," and "Dog" over animals like "Lion," "Eagle," and "Whale"; and that, in turn, will favor certain questions (e.g., "Can you eat it?") over other questions (e.g., "Is it endangered?")

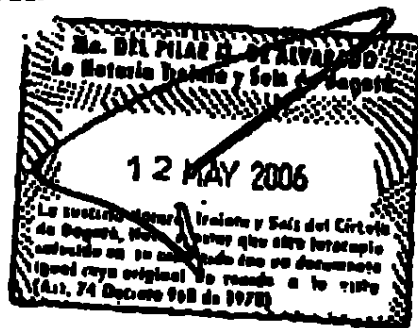


to be asked, while not affecting the likelihood of yet another set of questions being asked—that is, the set of questions that are not relevant to the just-obtained information (e.g., "Is it furry?"). The stimulation of the third question is illustrated in Figure 1C.

- 5 If the answer to "Can you eat it?" is "Yes," this will favor "Chicken" over "Dog," and so on, so forth.

By now, the advantages of having the ANN linked together in a matrix format, where the input nodes and output nodes can swap in the above-described fashion, should be clear. And although the weights of the input-output
 10 connections have not been discussed yet, it is very important at this point to assert that during this process, the target objects get prioritized, not filtered—in other words, target objects are prioritized by giving different weights to the question-target object connections, and these weights can be changed during reprioritization. This is a very important feature that distinguishes the present
 15 invention from other guessing games: it gives it the ability to handle misleading information.

Answering questions misleadingly is not uncommon when playing this game: different people have different perceptions. One might perceive a rabbit to be a rodent while another might not. Obviously, these two persons will answer the
 20 question "Is it a rodent?" differently. A person with certain religious beliefs might be thinking of a "Pig," and answer the question "Can you eat it?" with a "No," where a different person from a different religion might answer with a "Yes." If the ANN is taught that a "Pig" is eatable, it might give "Pig" a low priority when one indicates that what he/she is thinking of is not eatable, and then reprioritize the
 25 target objects at a later time in the game, giving "Pig" a high priority, if one was to answer "Does it have a curly tail?" with a "Yes."



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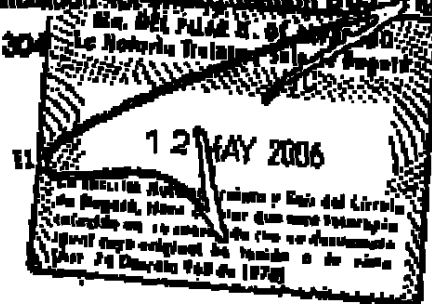


which a player agrees or disagrees with a question) and a cell weight (which is the strength of the input node-output node connection).

Figure 2 shows the current set of answers and the weight associated with each answer. The answer "Unknown" is not counted as an answer and is not used in these calculations. Other mapping schemes are possible including a sliding scale from "Yes" to "No," or the weight of the player's answer could even be based on the perceived inflection from a voice recognition system. (In some of the following examples, the positive (+) and negative (-) connotations are used with the weights to distinguish between positive and negative ones, respectively.)

- 18 For each target object, the algorithm compares each answered question to the corresponding cell in the neural network. The weight of the answer is either added to or subtracted from the pre-adjusted weight of the cell, depending on agreement. "Pre-adjusted" as used here means adjusted from previous implementations. (The adjustment of the cell weights is discussed below.) There
- 19 is "agreement" when the provided answer and the pre-adjusted weight of the cell are either both positive or both negative.

Figures 3A to 3D are matrix-like tables that illustrate the target object ranking method. These figures use hypothetical numbers, chosen accordingly to serve the purpose of illustration. It is given that the player is thinking of a "Dog," and for simplicity, it is assumed that the algorithm, at this point, has narrowed the top target objects to three: "Dog," "Cat," and "Lion." Figure 3A shows the pre-adjusted weights of the cells corresponding to the "Can it bite?" question with respect to the three top target objects 301. Assuming the question "Can it bite?" is asked and the player answered "Yes," the algorithm will temporarily add the weight of the positive answer—namely, 4 (see Figure 2)—to the cells that have positive polarization for that question 302 and subtract the weight of that answer from the cells that have negative polarization for that question 303. Figure 3B illustrates the addition/subtraction step 304.



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The algorithm will then narrow the top objects by removing the target objects that have a value significantly lower than the other top objects from the top objects list. In this example, 'Cat' would be removed.

- 5 Figures 3C and 3D reiterate the above-discussed target object ranking method for a different question—"Can you find it on a farm?"—and for the remaining two top objects—"Dog" and "Lion"—to demonstrate how the algorithm further narrows the top objects to one. After the answer weight is added to the cell weight 305, "Lion" would be removed from the top objects list leaving "Dog"—the one the
10 player was thinking of. Once the target object is guessed, the cell weights for that target object would be adjusted. The cell weight adjustment is discussed below, following the description of the question ranking procedure.

- For simplicity, the question ranking procedure (and the relating figure—Figure 4) will be discussed in terms of "Yes" and "No" factors 408, where in reality, the
15 "Yes" and "No" factors are positive and negative factors with different answer weights (Figure 2), the answer weights, of course, being taken into consideration and affecting the related calculations.

- In ranking questions, the algorithm examines each question and determines how many of the top objects would be answered with "Yes" and how many would be
20 answered with "No." The algorithm examines each question against the top target objects and for each question, it totals the "Yes" and "No" factors. The lower of the two totals is subtracted from the higher of the two, and the question with the lowest total difference would be selected as the best question to be asked next—that is, as the question which is most helpful/telling or unknown.
25 This means that a question may be chosen because it represents a perfect balance between "Yes" and "No" answers. A 50-50 split would be ideal.

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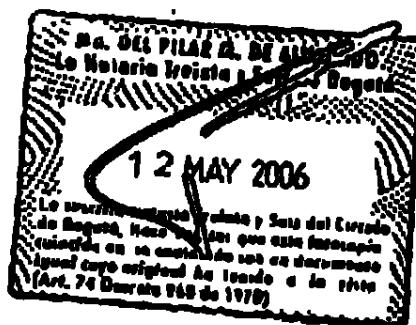


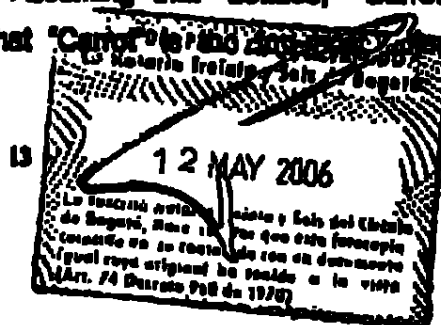
Figure 4 is a matrix-like table that demonstrates that procedure by way of example. For simplicity, it is assumed that there are six top object targets 404 and a totality of ten questions 405. The algorithm examines each of the ten questions 405 against the six top target objects 404, totals the "Yes" factors 401 and the "No" factors 402, subtracts the lower of the two totals from the higher of the two 403, and ranks the questions with lower margins (total differences) over the questions with higher margins as better questions to be asked.

As could readily be seen from the table, the most telling questions would be the second and the fifth, which have a total difference of ZERO; and the least telling questions would be the fourth, the sixth, and the eighth, which have a total difference of 80X. This is not surprising since the fourth, sixth and eighth questions are not related to animals.

As stated above, in reality, the "Yes" and "No" factors are positive and negative answers with different weights. In practice, the algorithm totals the agreeable weights and the disagreeable weights, subtracts the lower of the two from the higher of the two, and the questions with the smaller margins would be ranked higher.

Another periodically used method in selecting a question is to pick a question, the answer of which will confirm whether or not the top-most object—the top object ranked the highest among the other top objects—is correct. For each question, the corresponding cell weight of the top-most object is compared to the corresponding cell weights of the other top objects. The question with the greatest margin is chosen, the margin being calculated by subtracting the lower of the two cell weights from the higher one.

As in Figures 3A to 3D, Figure 5 uses hypothetical numbers, chosen accordingly to serve the purpose of illustration. Assuming that "Lettuce," "Carrot," and "Tomato" are the top objects and that "Carrot" is the top-most object. For

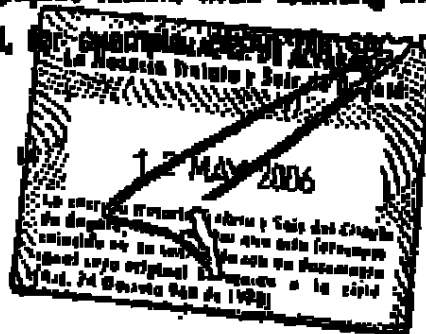


simply, we are considering three questions only which should not be seen as limiting. Since "Carrot" is the top-most object, the algorithm will examine the carrot's cell weights corresponding to each of the three questions 501 against the lettuce's corresponding cell weights 602 and the tomato's 603. For the first question, the carrot-lettuce margin is 1800 ($3500 - 2000$), and carrot-tomato margin is 2100. For the second question the margins are 11500 ($8000 - (-2500)$) and 13000, respectively. For the third question the margins are 4000 and 5800, respectively. The algorithm would pick the second question since it provides the biggest margins. As can be readily seen, asking this question would indeed confirm that "Carrot" is the correct top-most object.

Learning in the neural network is generally accomplished by adjusting the cell weights. Once the target object has been identified—guessed correctly—the cell weights for that target object only would be modified: given the target object, the algorithm looks at each answer, and if the answer is an agreeable one, the weight of the cell is increased (usually, by adding the weight of the player's answer, a value from 1 to 4 in this case). If an answer is a disagreeable one, the weight of the cell is reduced. If the cell has no value (pre-adjusted weight from a previous implementation), a new cell weight is set according to the player's answer.

In the example of Figures 3A to 3D, once "Dog" is guessed, the algorithm would adjust the weight of the cells corresponding to the "Can it bite?" and "Can you find it on a farm?" to 6004 and 7004, respectively. This step should not be confused with the step discussed earlier, where the weights were temporarily added. Once the cell weights have been adjusted in this fashion, the new cell weights would be considered the "pre-adjusted" values the next time the game is played.

The algorithm could consider demographic factors while teaching the neural network. The player could be asked, for example, "Are you a dog owner, and



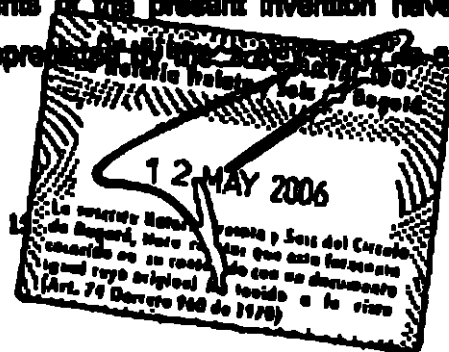
geographic location, and this information would be considered in the teaching process and used the next time a person from the same demographic group is playing the game. This is useful in reducing the number of misleading answers caused by different perceptions as discussed above, since people from the same demographic group tend to have similar perceptions.

In this case, a cell would have different cell weights, each weight associated with a certain demographic. In Figure 8A, the cell corresponding to "Can you eat it?" has a positive weight 601 for "Pig," while in Figure 8B, it has a negative weight 602. If a person belonging to a demographic group that perceives a "Pig" as eatable is playing the game, the algorithm would use the "positive weight" 601 weight with respect to that question; if a person belonging to a demographic group that perceives a "Pig" as non-eatable is playing the game, the algorithm would use the "negative weight" 602 weight with respect to that question.

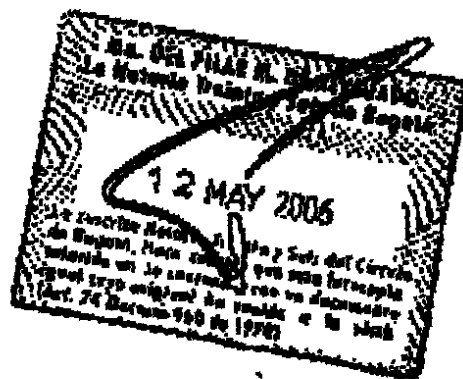
Another way to classify the users into different demographic groups is by guessing which group they belong to. In this case, the algorithm would utilize the neural network a demographic group-by-questions matrix format, and guess the group—instead of the target object—in a similar way as described above.

Generally, the method of the present invention is implemented using a general-purpose computing device or a hand-held device. The computing/hand-held device drives and associated computer-readable media provide nonvolatile storage of computer-readable instructions, data structures, program modules and other data as described herein. The computer-readable medium bears the representations of instructions and data used for causing the computer or device to perform the method of the present invention.

Although various preferred embodiments of the present invention have been described herein in detail, it will be appreciated by those skilled in the art, that



variations may be made thereto without departing from the spirit of the invention
or the scope of the appended claims.

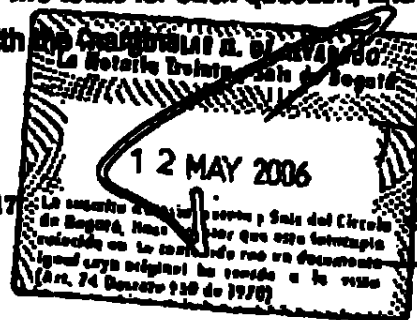


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What is claimed is:

1. A method for guessing, in an electronic game, an object that a user is thinking of, from a set of target objects, after asking the user at least one question, the method utilizing a neural network structured in a target objects-by-questions matrix format, wherein each cell of the matrix defines an input-output connection weight, and the neural network can be utilized in a first mode, whereby answers to asked questions are input nodes and the target objects are output nodes, and in a second mode, whereby the target objects are input nodes and the questions are output nodes, the method comprising the steps of:
 - ranking the target objects by utilizing the neural network in the first mode;
 - ranking the questions by utilizing the neural network in the second mode; and
 - providing a guess in accordance with the ranking of the target objects.
2. The method of claim 1 wherein the step of ranking the target objects comprises the steps of:
 - mapping at least one answer to a weight;
 - comparing the weight of the answer to weights of cells in the neural network corresponding to that question and the target objects being ranked, and temporarily changing the weights of the corresponding cells in accordance with agreeability; and
 - rating the target objects in accordance with the changed cell weights.
3. The method of claim 1 wherein the step of ranking the questions comprises the steps of:
 - mapping predictable answers to questions to positive and negative weights with respect to target objects highly ranked;
 - totaling all agreeable weights and all disagreeable weights for each question, and computing a margin between the two totals for each question; and
 - rating the questions in accordance with the

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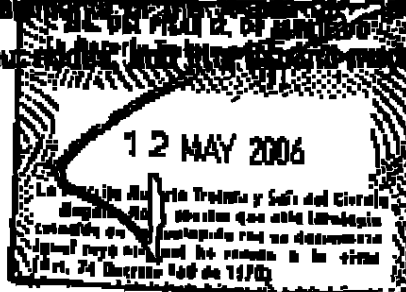


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4. The method of claim 1 wherein the step of ranking the questions comprises the steps of:
 computing, for each question, margins between a weight of a cell corresponding to a most highly ranked target object and that question, and weights corresponding to other highly ranked target objects and that question;
 and
 ranking the questions by comparing the margins of each question with the margins of other questions.
5. The method of claim 1 further comprising the step of adjusting weights of cells corresponding to a guessed object in accordance to agreeability between a mapped weight of an answer and the cell weight before adjusting.
6. The method of claim 5 further comprising the steps of:
 classifying the user according to user-specific information;
 storing the adjusted weights in a database associated with the class of the user; and
 using the associated database with a different user that belongs to the class of the user.
7. The method of claim 6 wherein the user-specific information is acquired from the user.
8. The method of claim 6 wherein the user-specific information is inferred from at least one answer to said at least one question.
9. A neural network structured in an X-by-Y matrix format, wherein each cell of the matrix defines an input-output connection weight, and the neural network can be utilized in a first mode, whereby elements of the X-axis are input nodes and elements of the Y-axis are output nodes; and in a second mode, whereby elements of the X-axis are input nodes and elements of the Y-axis are output nodes.

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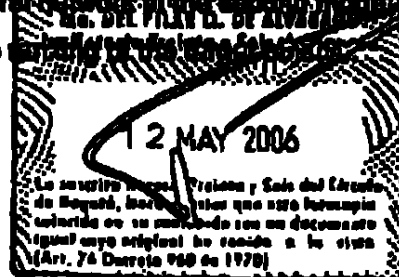
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whereby the elements of the Y-axis are input nodes and the elements of the X-axis are output nodes.

10. A game for guessing an object that a user is thinking of, from a set of target objects, after asking the user at least one question, the game utilizing a neural network structured in a target objects-by-questions matrix format, wherein each cell of the matrix defines an input-output connection weight, and the neural network can be utilized in a first mode, whereby answers to asked questions are input nodes and the target objects are output nodes, and in a second mode, whereby the target objects are input nodes and the questions are output nodes, the game comprising:
- means for ranking the target objects by utilizing the neural network in the first mode;
- means for ranking the questions by utilizing the neural network in the second mode; and
- means for providing a guess in accordance with the ranking of the target objects.

11. A computer-readable medium bearing representations of instructions and data for causing a computer or hand-held device to perform a method for guessing an object that a user is thinking of, from a set of target objects, after asking the user at least one question, the method utilizing a neural network structured in a target objects-by-questions matrix format, wherein each cell of the matrix defines an input-output connection weight, and the neural network can be utilized in a first mode, whereby answers to asked questions are input nodes and the target objects are output nodes, and in a second mode, whereby the target objects are input nodes and the questions are output nodes, the method comprising the steps of:
- ranking the target objects by utilizing the neural network in the first mode;
- ranking the questions by utilizing the neural network in the second mode; and
- providing a guess in accordance with the ranking of the target objects.

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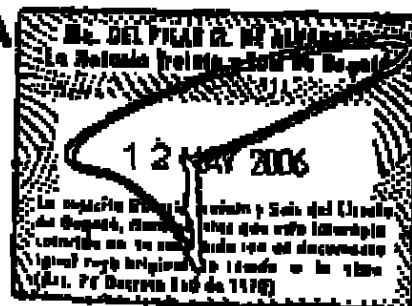


QUESTIONS ANSWERS

TARGET OBJECT

	Q: Is it a vehicle? A: Yes	Q: Is it a weapon? A: No	Q: Is it a building? A: No
PC	HIGH		
Dog	HIGH		
Chair		LOW	
Vehicle	HIGH		
Water			LOW

Figure 1A



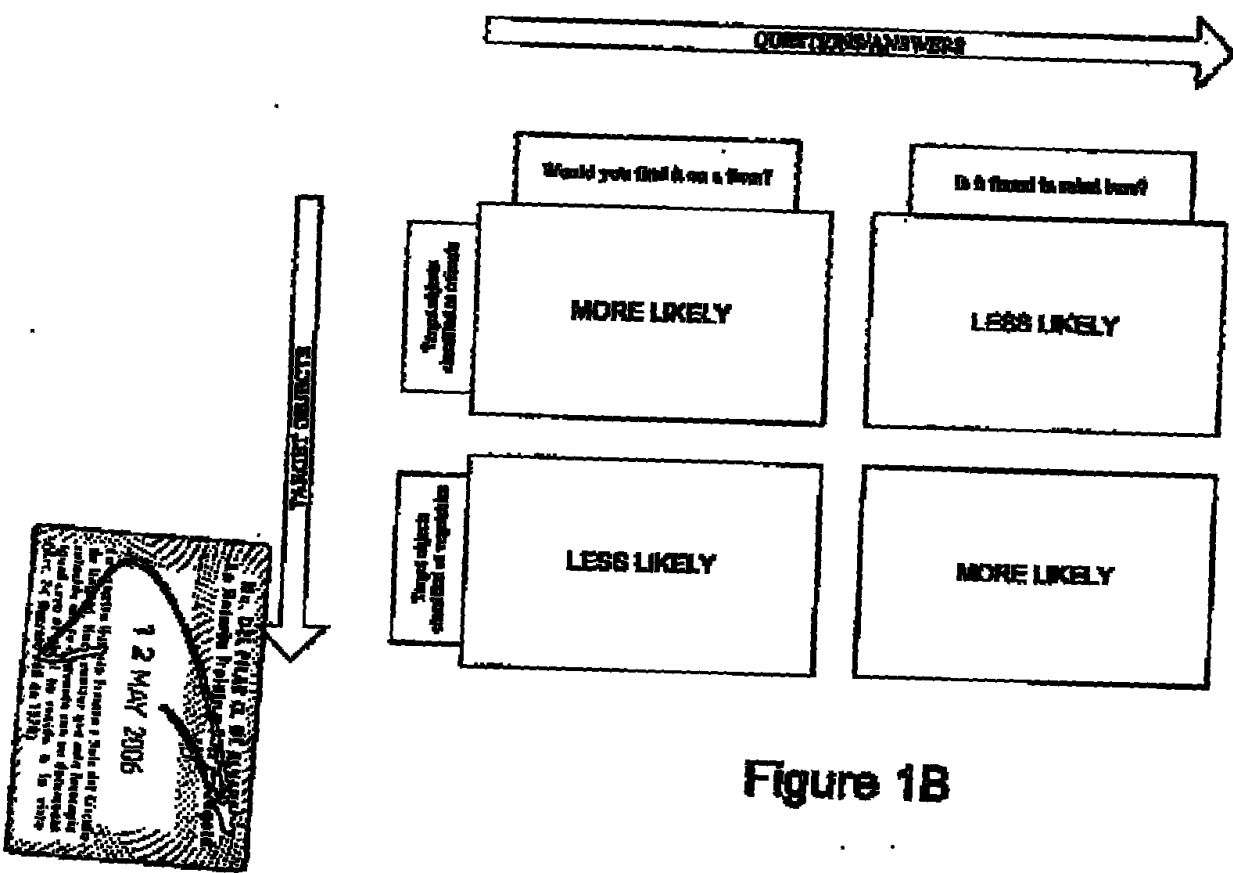


Figure 1B

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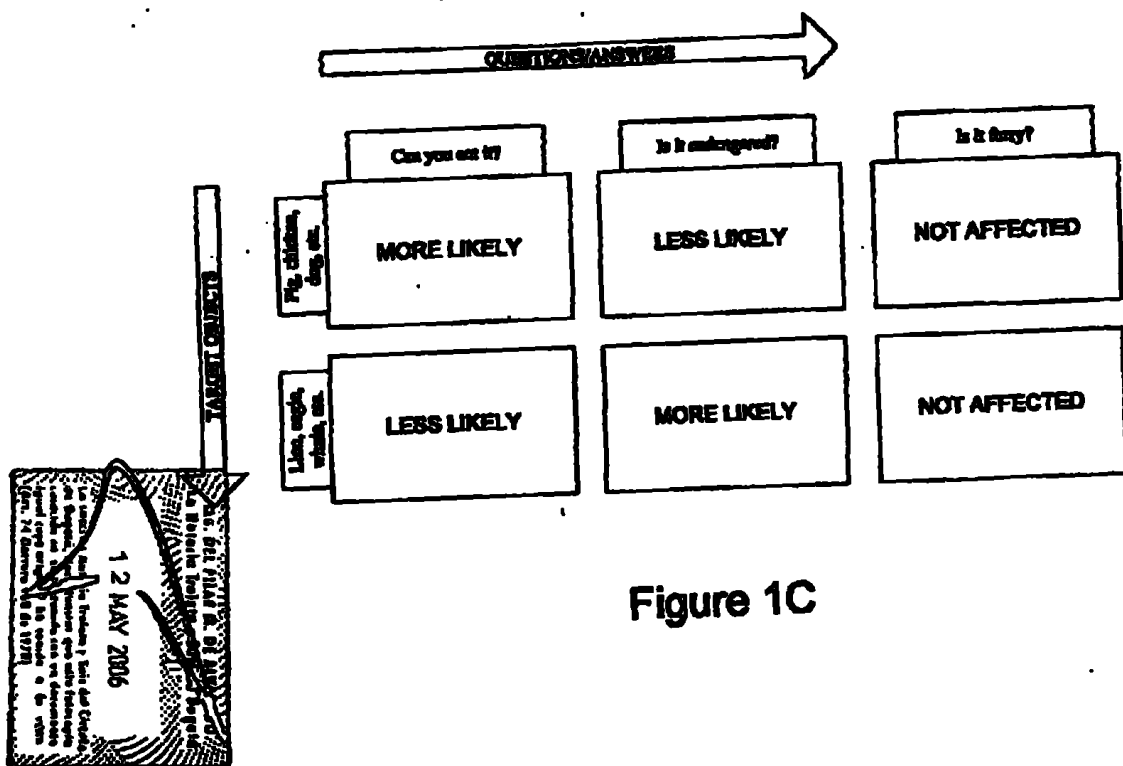


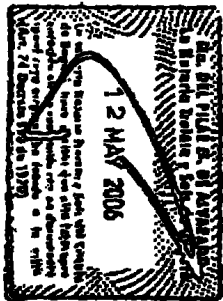
Figure 1C

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Positive Answer	Weight	Negative Answer	Weight
"Yes"	4	"No"	4
"Usually"	4	"Rarely"	2
"Probably"	3	"Doubtful"	1
"Sometimes" / "Partly"	2	"Depends"	0
"Maybe"	1	"Irrelevant"	0

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Figure 2

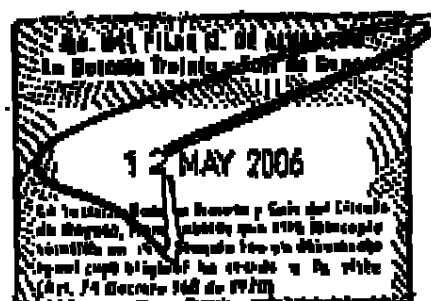


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Question	Top Target Others		
	Top	Target	Others
Question K	3000	2000	4000
Question J	2000	1000	3000
Question W	1000	500	2000
Question E	500	250	1000

Figure 3A

	Top Tiered Category		
	Beg	Mid	End
Question X			
Question Y		3004	
Question W		4004	
Question Z			



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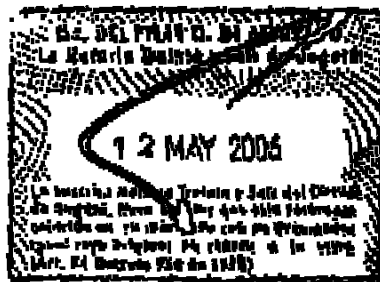
Question		Top Target Column	
		Pos	Len
Question XX	Can you find them a target?	7000	4000
Question YY			
Question ZZ			
Question AA			

Figure 3C

Question		Top Target Column	
		Pos	Len
Question XX	Can you find them a target?	7000	4000
Question YY			
Question ZZ			
Question AA			

Figure 3D

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Question	Top Target Clients						Agreement (Total number of YES's)	Disagreement (Total number of NO's)	Match or Difference
	Young	Old	Children	White	Lean	Black			
1. Does it hurt?	YES	NO	NO	NO	NO	NO	1	3	1
2. Would you feel it on a hand?	YES	YES	YES	NO	NO	NO	1	3	1
3. Can you feel it in a hand?	YES	YES	NO	NO	NO	NO	1	3	1
4. Is it hard?	YES	YES	NO	NO	YES	NO	1	3	1
5. Does it hurt more?	NO	NO	NO	NO	NO	NO	1	3	1
6. Is it bigger than a hand?	YES	YES	NO	YES	YES	YES	1	3	1
7. Is it hard to hold hand?	NO	NO	NO	NO	NO	NO	1	3	1
8. Can you feel it?	NO	NO	YES	NO	NO	NO	1	3	1
9. Is it hard?	YES	NO	NO	NO	NO	NO	1	3	1

Figure 4

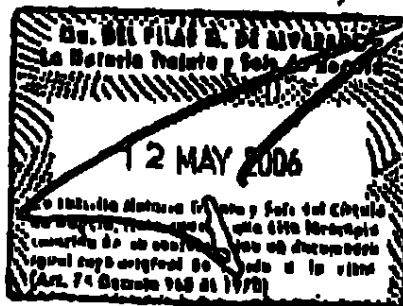


Figure 5

		Top Target Objects		
Questions	Question X	Deg	Pin	Cat
	Can you eat it?	-7000	-4000	-4500
	Question Y			
	Question W			
	Question Z			

Figure 6A

		Top Target Objects		
Questions	Question X	Deg	Pin	Cat
	Can you eat it?	-7000	-4000	-4500
	Question Y			
	Question W			
	Question Z			

Figure 6B

