[In the event of any conflict or discrepancy between any translated version of Annex I and the Vietnamese language version, the Vietnamese language version shall prevail]

Annex I

GUIDELINES FOR DETERMINING THE ELIGIBILITY FOR PATENT PROTECTION OF CLAIMED SUBJECT MATTER OF COMPUTER PROGRAM RELATED INVENTIONS

(Attached to Decision No. 6193/QĐ-SHTT dated 31 December 2021 issued by Intellectual Property Office of Vietnam)

1. Introduction

The assessment of whether a claimed subject-matter in a patent application related to a computer program is eligible for patent protection is provided in section 5.8.2.5 of the Guidelines on examination of a patent application (the "**Guidelines**") attached to Decision No. 487/QĐ-SHTT dated March 31, 2010 of the Director General of the Intellectual Property Office of Vietnam, amended and supplemented under Decision No. 5196/QĐ-SHTT dated December 31, 2020. Accordingly, such a subject-matter can be eligible for patent protection if the program (software), when running on a computer (hardware), produces a further technical effect beyond the normal interaction between the program and the computer. Section 5.8.2.5 of the Guidelines also gives some examples of a further technical effect, such as controlling an industrial process, processing data representing physical entities, or implementing the internal functions of the computer itself or its interfaces under the influence of the program.

Computer programs are applied more and more widely in numerous areas of life to serve different needs and purposes, including non-technical character purposes. In examination practice, situations in which the subject is related to a computer program, including both technical features (for example, hardware-related) and non-technical features (implemented by a software), tend to increase. In many cases, it is not easy to identify whether such a subject-matter has a technical character or further technical effect beyond the normal interaction between the program and the computer.

This Annex is to supplement guidelines for a better explanation of the provisions of section 5.8.2.5 of the Guidelines, in particular, the explanation of the further technical effect, some common features contributing to the technical character of the invention to produce the further technical effect, and the manner of handling the examination process.

2. Assessment of technical character in the process of formality examination and substantive examination

When considering a claimed subject-matter including technical features, for example, related to hardware, such as the computer, computer network, memory, or data processing representing physical entities as parameters, controlling values of an industrial process implemented by software, and non-technical features, such as those related to sales, insurance, candidate selection for a job, booking, management, or data processing of money values, business data, graphs, etc., in order to identify whether the interaction between the program and the computer produces a further technical effect, it usually requires fully understanding of the invention, to thereby analyze the features of the claimed subject matter. To do this, the examiner has to study the claim and related content in the description carefully, and such an amount of work only can be implemented in the substantive examination phase.

In the formality examination phase, a claimed subject-matter related to a computer program may be temporarily accepted if it contains at least one technical feature, for example, a feature related to hardware or data processing representing physical entities. The assessment of whether such a subject-matter actually has the physical character, therefore being patentable, will be implemented in the substantive examination phase.

Hence, the application will be validly accepted if its claim contains the following subjects, for example:

1. The method for a **computer**-implemented *purpose* includes steps: step A, step B, step C.
2. **Processing device** adapted to implement the method under point 1.
3. **Record object readable by the computer** storing the program to implement the method under point 1.

However, if the claim contains subject-matter with names represented by phrases such as “computer program”, “computer software”, “computer program/software product”, “program-carrying signal”, etc., the examiner should issue a notification of rejection of such subject-matter in accordance with point 5.8.2.5 of the Rule.

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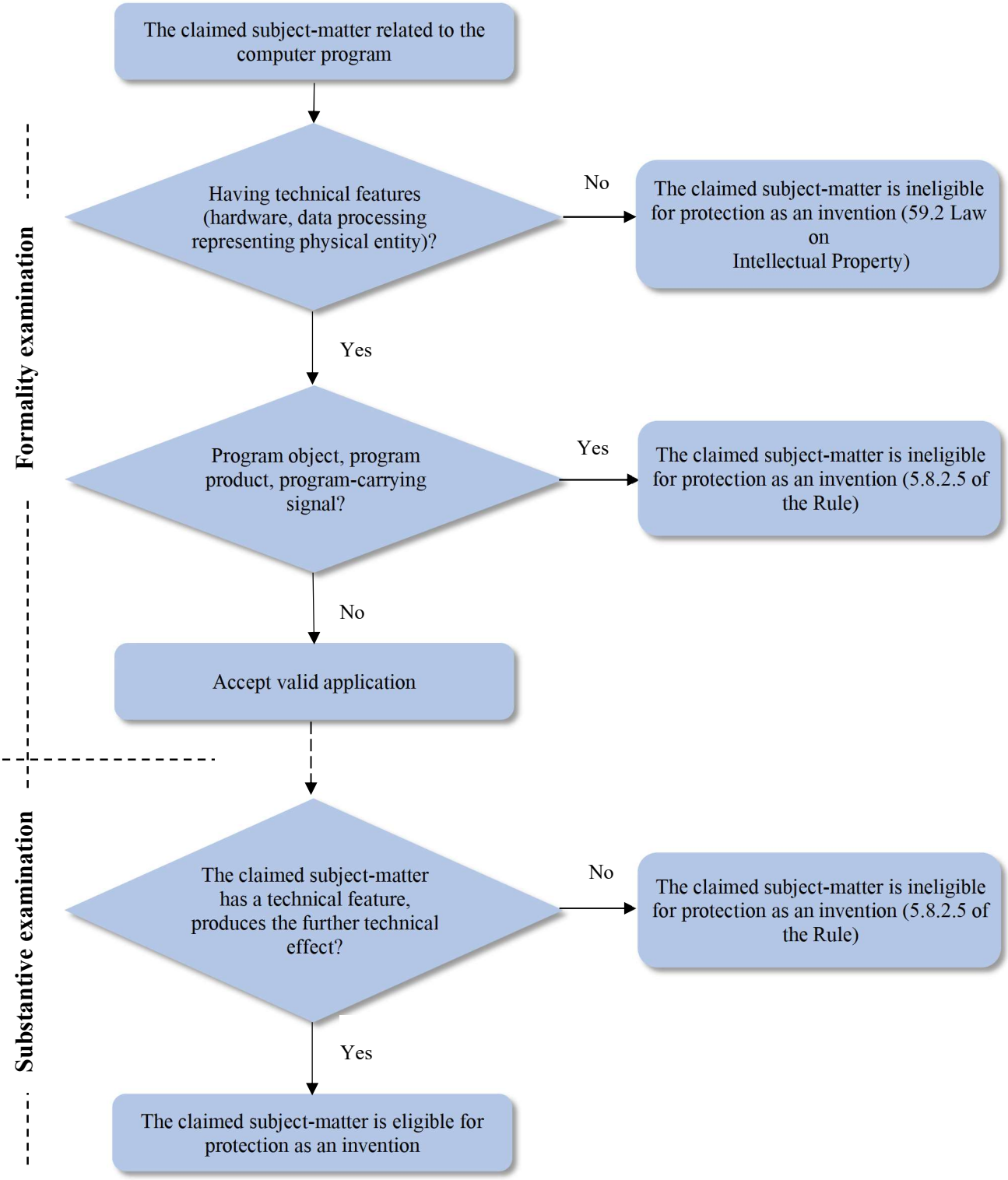


Handling process in the formality and substantive examination phases

Example 1:

The method of incentivizing customers to become loyal customers by offering discounts on future purchases.

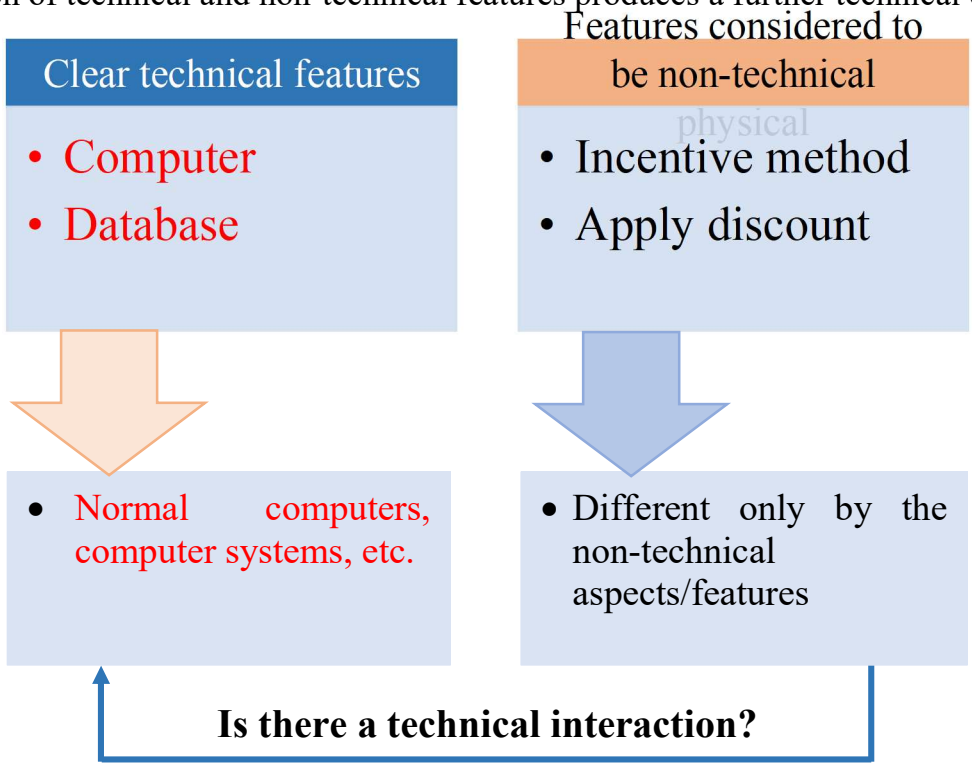
Assume that, in the description, the above method is presented in a computer-implemented form. However, the claimed subject-matter in this example does not contain any technical feature and is only related to a mere business method, and is therefore subject to exclusion under Article 5.2 of the Intellectual Properties Law. The examiner should issue a notification of non-acceptance in the formality examination phase.

Example 2:

*A **computer**-implemented method with a **database** to save the data of customers which made a previous purchase to apply the discount on the next purchase.*

The subject-matter is related to a computer program and has hardware-related technical features, which are the computer and database, and is therefore accepted in the formality examination phase.

In the substantive examination phase, the examiner should assess whether such a subject-matter has the technical character, specifically, an assessment of whether the combination of technical and non-technical features produces a further technical effect.



3. Examples of further technical effects

If a subject-matter related to a computer program has a technical character beyond the mere fact that it is computer-implemented, the corresponding computer program implementing features of such subject-matter should produce a further technical effect when run on a computer. For example, a computer program which

specifies a method of controlling an anti-lock braking system (ABS) in a car, determining emissions through an X-ray device, compressing video, restoring a distorted digital image, or encrypting electronic communications brings about a further technical effect when it is run on a computer; which is, anti-lock braking in a car, emissions determination, video compression, distorted digital image recovery, and electronic communications encryption.

Furthermore, if a computer program is designed based on specific technical considerations of the internal functioning of the computer on which it is to be executed, such as by being adapted to the specific architecture of the computer, it may be considered to produce a further technical effect. For example, computer programs implementing security measures for protecting boot integrity or countermeasures against power analysis attacks have a technical character since they rely on a technical understanding of the internal functioning of the computer. Similarly, computer programs controlling the internal functioning or operation of a computer, such as processor load balancing or memory allocation, normally produce a further technical effect; which is, processor load balancing or memory allocation.

Programs for processing code at a low level, such as builders or compilers, may well have a technical character. For example, when building runtime objects from development objects, regenerating only those runtime objects resulting from modified development objects contributes to producing the further technical effect of limiting the resources needed for a particular build.

However, a computer program for a non-technical purpose that requires less computation time than a known program for a similar purpose does not produce a further technical effect. Similarly, the comparison of a computer program with how a person implements a task would not be an appropriate basis for assessing whether such a program has a technical character.

The subject-matter of an invention related to a computer program cannot be considered to be of a technical character simply because such a computer program is designed and can be implemented automatically by the computer. Further technical considerations, which are often related to physical considerations of the internal functioning of the computer, are required beyond merely finding a computer algorithm to implement a task. They must be reflected in the claimed features, which produce a further technical effect.

4. Some categories of subject-matter related to the computer program

This section mentions some categories of subject-matter related to a computer program prescribed in Section 5.8.2.5 of the Rules on examination of patent applications, in particular, the categories in which the computer program implements features related to mathematical methods; artificial intelligence and machine learning; simulation, design or modeling; schemes, rules and methods for playing games; business methods; information modeling, activity of programming and programming languages; data retrieval, formats and structures; database management systems and information retrieval; presentations of information; and user interfaces. For each category of subject-matter related to a computer program, there are specific guidelines on how to determine whether the features implemented by the program produce a technical contribution and provide a further technical effect.

4.1. Implementing mathematical methods

A mathematical method may contribute to the technical character if applied to a field of technology for a specific technical purpose (for example, the analysis of audio and digital images; data encryption and decryption for transmission or storage; providing a genotype estimate based on an analysis of DNA samples; and providing a medical diagnosis using an automated system processing physiological measurements), and/or by being adapted to a specific technical implementation (for example, the adaptation of a polynomial reduction algorithm to exploit word size shifts matched to the word size of the computer hardware is based on such technical considerations of the internal functioning of the computer and can contribute to producing the technical effect of an efficient hardware implementation of the said algorithm).

However, the mere fact that a mathematical method may serve a technical purpose is not sufficient. The claim is to be functionally limited to the technical purpose, either explicitly or implicitly. This can be achieved by establishing a sufficient link between the technical purpose and the mathematical method steps, for example, by specifying how the input and the output of the sequence of mathematical steps relate to the technical purpose so that the mathematical method is causally linked to a technical effect.

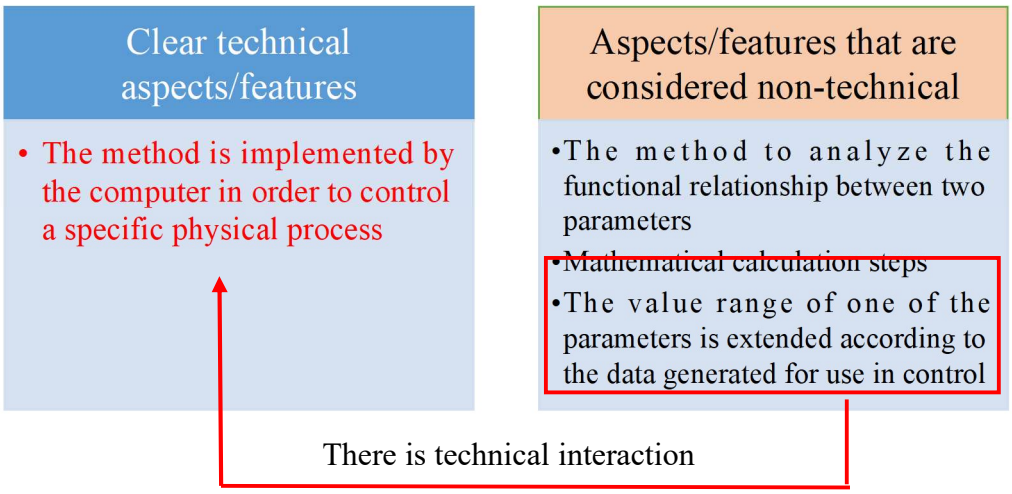
Defining the nature of the data input to a mathematical method does not necessarily imply that the mathematical method contributes to the technical character of the invention. Whether a mathematical method serves a technical purpose is primarily defined by the direct technical relevance of the result provided by such mathematical method.

If the mathematical method does not serve a technical purpose and the claimed technical implementation does not go beyond a generic technical implementation, the mathematical method does not contribute to the technical character of the invention. In such a case, it is not sufficient for the mathematical method to be algorithmically more efficient than prior-art mathematical methods to establish a technical effect.

For example:

A method implemented by the computer to control a specific physical process by analyzing the functional relationship between two parameters, including the following steps:

- *[...mathematical calculation steps...];*
- *in which:*
- *the value range of one of the parameters is extended according to the data generated for use in the control of the above-mentioned physical process.*



The claimed subject-matter is related to the computer program in which the program implements a mathematical method of analyzing the functional relationship between two parameters. To assess whether such subject-matter, overall, has a technical character, it is not solely based on features such as *"computer-implemented"*, since a specific implementation beyond the normal technical implementation has not been defined, or based on the purpose to *"control a specific physical process"*. It is important to define whether there is an adequate relationship between the technical purpose and the mathematical method implemented by the software. It can be seen that the input and output of this mathematical method are related to the technical purpose and its result, which has the value range of one of the parameters extended, directly affects the control of a specific physical process. Therefore, such subject-matter is assessed as creating a further technical effect and is eligible for protection as an invention.

4.2. Artificial intelligence and machine learning

Artificial intelligence and machine learning are based on computational models and algorithms for classification, clustering, regression, and dimensionality reduction, such as neural networks, genetic algorithms, support vector machines, k-means, kernel regression, and discriminant analysis. Such computational models and algorithms are per se of an abstract mathematical nature, irrespective of whether they can be "trained" based on training data.

Terms such as "support vector machine", "reasoning engine", or "neural network" may, depending on the context, merely refer to abstract models or algorithms and thus do not, on their own, necessarily imply the use of a technical means. This has to be taken into account when examining whether the claimed subject-matter has a technical character as a whole.

Artificial intelligence and machine learning find applications in various fields of technology. For example, the use of a neural network in a heart monitoring apparatus for the purpose of identifying irregular heartbeats makes a technical contribution. The classification of digital images, videos, audio, or speech signals based on low-level features (e.g., edges or pixel attributes for images) are further typical technical applications of classification algorithms.

Classifying text documents solely in respect of their textual content is, however, not regarded to be per se a technical purpose but a linguistic one. Classifying abstract data records or even "telecommunication network data records" without any indication of a technical use being made of the resulting classification is also not per se a technical purpose, even if the classification algorithm may be considered to have valuable mathematical properties such as robustness.

Where a classification method serves a technical purpose, the steps of generating the training set and training the classifier may also contribute to the technical character of the invention if they support achieving that technical purpose.

Example 1:

A power generation estimation system for a hydroelectricity dam implemented by the computer includes a neural network built in the form of an information processor, a neural network with an input layer and an output layer in which the input data fed into the input layer contains the temperature upstream of the river during the predefined time interval between the reference time and the predefined time before the reference time.

It is easy to see the feature that the neural network uses the input data, which is a physical quantity including the temperature upstream of the river during the predefined time interval between the reference time and the predefined time before the reference time can bring a significant effect on the accuracy of the result of the power generation estimation of the hydroelectricity generated by the above-mentioned neural network. Therefore, such a feature is considered to serve a specific technical purpose and be a contributor to the technical character of the invention. Hence, the above-mentioned subject-matter is eligible for protection as an invention.

Example 2:

A storage medium is readable by a computer containing a computer program that makes the computer output the quantitative values of the hotels' reputation based on the textual data of the hotels' reputation, in which:

such a program includes a first and second neural network connected in such a way that the second neural network receives the output from the first neural network;

the above-mentioned first neural network includes an input layer to the intermediary layers of the feature extraction neural network, where, in this feature extraction neural network, the number of neurons of at least one intermediary layer is less than the number of neurons of the input layer, the number of neurons of the input layer and the output layer are the same, and the weights have been trained in such a way that each input value for the input layer and each corresponding output value from the output layer become equal;

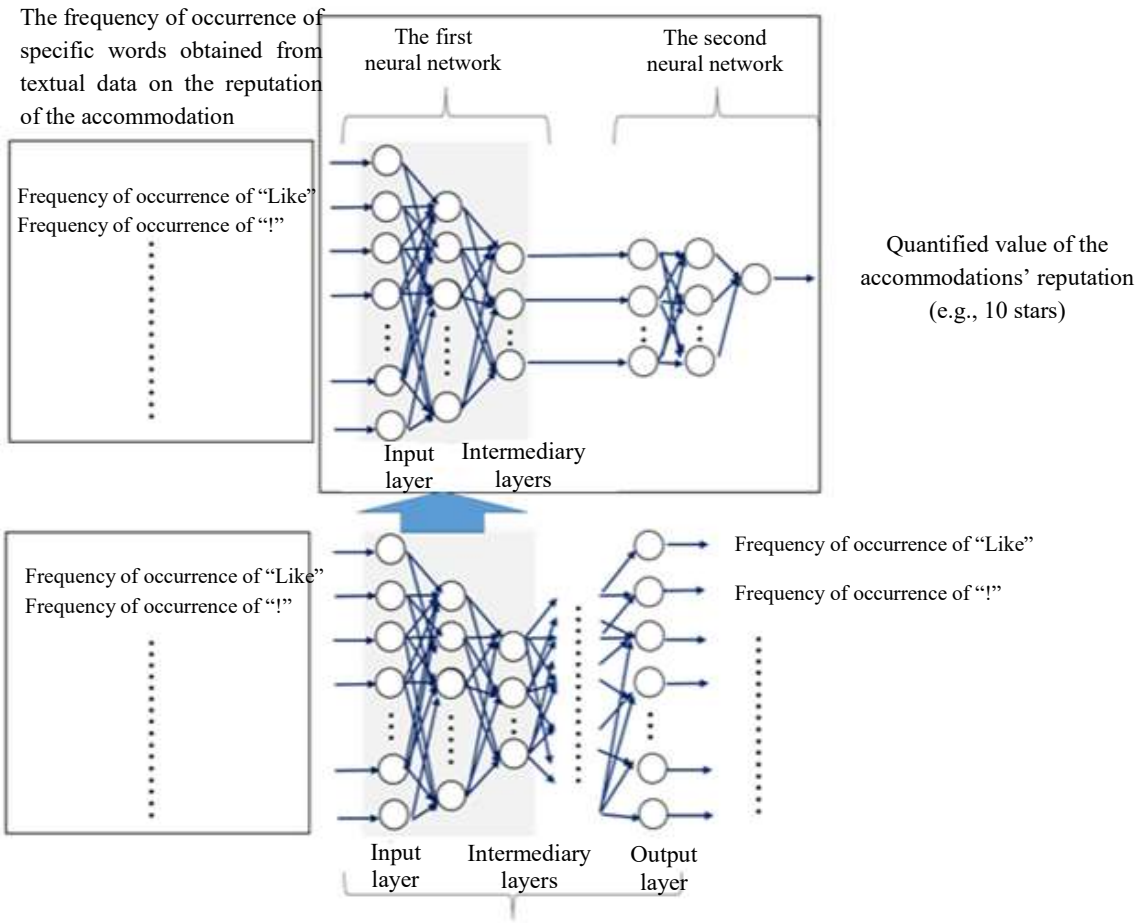
the weights of the above-mentioned second neural network have been trained without changing the weights of the above-mentioned first neural network;

the program causes the computer to implement a calculation based on the above-mentioned trained weights in the above-mentioned first and second neural networks in response to the frequency of occurrence of specific words obtained from the textual data on the hotels' reputation entered into the input layer of the first neural network in order to output the value quantified of the hotels' reputation from the output layer of the above-mentioned second neural network.

The claimed subject matter relates to the storage medium being readable by a computer containing a computer program that makes the computer output the quantitative values of the hotels' reputation based on the textual data of the hotels' reputation. Although the purpose of "outputting the quantitative values of the hotels' reputation based on the textual data of the hotels' reputation" may be considered non-technical character and may serve for business purposes, the features in the claim

define a specific technical implementation beyond the aspects of a mere business method, in particular, the first neural network and the second neural network receive the output from the first neural network, in which the first neural network includes an input layer to the intermediary layers of a feature extraction neural network. Such a feature extraction neural network has the number of neurons of at least one intermediary layer is less than the number of neurons of the input layer, the input layer and the output layer have the same number of neurons, and the weights are trained in such a way that each input value for the input layer and each corresponding output value from the output layer become equal.

The trained model according to the invention



Thus, according to the character of this feature extraction neural network, the intermediary layer will obtain the feature values representing the features of each input data. These feature values can be compressed to retain only significant features in the intermediary layers with a smaller number of neurons in the input layer. Although the feature values in the intermediary layers do not need to have a clear physical

implication, these feature values are compressed but still ensure that the input information fed into the input layer can be restored as output information from the output layer and the feature values in the intermediary layers become virtually the same regardless of the feature input values fed into the input layer. According to the invention, the weights of the second neural network have been trained without changing the weights of the first neural network, as mentioned above. Such training is implemented by a widely known method called the back-propagation method. Therefore, the above-mentioned program can accurately analyze the hotels' reputations without appropriately selecting the feature input values fed into the input layer (no need to pre-install the feature values). Hence, from the aspect of pre-processing the training data for machine learning, such a feature is considered to serve a technical purpose and contribute to the technical character of the invention. Thus, the above-mentioned subject-matter is eligible for protection as an invention.

4.3. Simulation, design, or modelling

A computer-implemented simulation of a method of operation of a satisfactorily defined class of specific technical products or technical processes under technically suitable conditions qualifies as a technical purpose, for example, a numerical simulation of the performance of circuits subjected to 1/f disturbances or of a specific industrial chemical process.

Such computer-implemented simulation methods are undeniably technically efficient based solely on the fact that they precede the actual manufacture and/or do not include the manufacturing step for the tangible final product.

On the other hand, a simulation of non-technical processes, such as a marketing campaign, a management scheme for freight transportation, or defining a schedule for agents in a call center, does not represent a technical purpose. A general limitation, such as “the simulation of a technical system”, does not define a valid technical purpose.

In the context of a computer-aided design of a specific technical subject (product, system, or process), the determination of specifications intrinsically linked to the function of the technical subject, in which such determination is based on technical considerations, is a technical purpose.

For example, in a computer-implemented method for designing an optical system, the use of a specific formula to define specifications, such as the index of refraction and magnification factor, for the given input conditions to obtain optimal optical performance shall produce a technical contribution. For another example, the

determination by computer simulations repeating the maximum value at which an operation parameter of the nuclear reactor can be implemented without the risk of stress-induced tube breakage shall produce a technical contribution.

Otherwise, when the determination of computer-aided specifications depends on decisions that need to be made by humans and the technical considerations for making such decisions are not presented in the claim, the technical effect of the improved design is not recognized since such an effect has no causal relationship with the features claimed.

If a computer-implemented method only leads to an abstract model of a product, system, or process, e.g., a set of equations, the model itself is not considered a technical effect, even though the modeling product, system, or process is technical. For example, a logical data model for a family of product configurations with no intrinsic technical character and a method only describing how to arrive at such a logical data model shall not produce technical contributions beyond it being computer-implemented. Similarly, a method only indicating how to describe a multiprocessing system in a graphical modeling environment produces no technical contribution beyond it being computer-implemented.

For example:

A computer-implemented method to numerically simulate the performance of a circuit subject to 1/f disturbance, in which:

(a) such a circuit is described by a model featured by input channels, disturbance input channels, and output channels;

(b) the performance of the input channels and the output channels is described by a system of stochastic differential equations;

(c) an output vector is calculated for an input vector present in the input channels and for any disturbance vector of 1/f distributed random numbers present in the disturbance input channels; and

(d) a y disturbance vector generated by the following steps:

(d1) set the number n of random numbers to be generated;

(d2) generating a vector x of length n of Gauss distributed random numbers;

(d3) generating the vector y by multiplying the vector x by the matrix L defined by the E1 equation (Assuming that the E1 equation is explicitly presented in the claim).

The claimed subject matter represents a computer-implemented to numerically simulate the performance of a circuit subject to 1/f disturbances, which is one of the principal disturbance sources in electrical circuits. The features (a)-(c) indicate the mathematical model used in this numerical simulation. It includes the y disturbance vector of the 1/f distributed random numbers, i.e., random numbers with the typical eigenstatistical properties of a real 1/f (physical) disturbance. Steps (d1)-(d3) define the algorithm used to generate these random numbers. According to the description, this algorithm is particularly efficient in terms of the computation time and storage resources required to generate the random numbers needed for the simulation.

Using the computer to implement the claimed method is a clear technical feature but is not enough to bring about the technical character of the subject matter. The question is whether the remaining features, namely the algorithm in steps (d1)-(d3), contribute to the technical character of the claimed subject matter. Considered separately, steps (d1)-(d3) represent a mathematical method, which can be considered to be of no technical character. However, this mathematical method is a computer-implemented method for the technical purpose of numerically simulating the performance of a circuit subject to 1/f disturbances. In addition, the features (a)-(c) ensure that the claim is functionally limited to this technical purpose to indicate clearly the mathematical model used in the simulation and how the y disturbance vector generated is to be used therein, i.e., establish a link between the proposed purpose of the method and steps (d1)-(d3). Furthermore, this mathematical model is indicated by features (a)-(c) defining how the numerical simulation is implemented, which also contributes to the above-mentioned technical purpose. As a result, all the steps related to the circuit simulation, including the claimed features represented by the mathematical steps (d1)-(d3), also contribute to the technical character of the subject-matters to the extent relating to the simulation of the electrical circuit.

4.4. Implementing schemes, rules, and methods for playing games

Contemporary games, and in particular video games, are often characterized by complex interactive and narrative elements in a virtual game world. Such game elements govern how the game proceeds of its own accord (e.g., evolving characters and storylines) as well as how it proceeds in interaction with the player(s) (e.g., tapping along with the game soundtrack to make your character dance if rhythms match). Given that these elements are conceptual in nature, they qualify, in a wider sense, as rules for playing games. This holds true irrespective of the fact that they might be untold or revealed only while playing.

Game rules often are designed to entertain and keep the interest of players by way of psychological effects such as amusement, suspense, or surprise. Such effects do not qualify as technical effects. Similarly, giving rise to fair or otherwise rewarding gameplay are psychological effects, not technical ones. Hence, rules and corresponding computations which determine a game score or a skill rating for players, even if computationally complex, are usually considered non-technical.

Highly interactive gameplay such as in video games involves technical means for sensing user input, updating the game state, and outputting visual, audio, or haptic information. Cognitive content that informs the player about the current game state at a non-technical level, e.g., about a game score, the arrangement and suits of playing cards, or the state and attributes of a game character is regarded as non-technical information. This equally holds true for instructions presented on game boards or cards. An example of a technical context in which the manner of presenting information can have technical character is the interactive control of real-time maneuvers in a game world, the display of which is subject to conflicting technical requirements.

Features which specify how to provide user input are normally of a technical character. However, a mapping of parameters obtained from known input mechanisms to parameters of a computer game qualifies as a game rule in a wider sense if it reflects the choice of the game designer, set for the purpose of defining the game or making it more interesting or challenging (e.g., a condition specifying that a slide gesture on a touchscreen determines both the power and the spin of a virtual golf shot).

4.5. Implementing business method

Subject-matters or activities which are of a financial, commercial, administrative, or organizational nature fall within the scope of schemes, rules, and methods for doing business. In the rest of this section, any such subject-matter or activities will be subsumed under the term “business method”.

Financial activities typically include banking, billing, or accounting. Marketing, advertising, licensing, management of rights and contractual agreements, as well as activities involving legal are of a commercial or administrative nature. Personnel management, designing a workflow for a business process, or communicating postings to a target user community based on location information are examples of organizational rules. Other activities typical of doing business concern operational considerations, planning, forecasting, and optimizations in business environments, including logistics and scheduling of tasks. These activities involve collecting information, setting goals, and using mathematical and statistical methods to evaluate the information for the purpose of facilitating managerial decision-making.

Although the features related to a mere business method do not produce a technical effect, the features which are the result of the selection of specific technical implementation plans, which are not a part of the business method, can contribute to the technical character and must be fully considered.

Example 1:

A networked computer system that allows customers to obtain audiovisual content of selected products by using computers installed in each company's store, where all of them are connected to a central server with a central database that stores audiovisual content in the form of electronic files, and where the distribution of electronic files from the central server to the sales stores can be performed by allowing the download of individual files directly from a central database to a computer at the request of the customer, or by transferring multiple selected electronic files to each store, storing these files in a local database of the store, and retrieving the corresponding files from the local database when the customer requests the audiovisual content at the store.

The above-mentioned subjects have technical features including a computer system, a network, a central database, a server, and a local database for distributing audiovisual content in the form of electronic files. In such system the implementation of one of the aforementioned two technical implementations for the distribution of files is under the capacity of someone with average knowledge of this technical area, such as a software engineer, and choosing various sets of audiovisual content to provide to each store will often be optional or dependent on the manager or businessman. Features that refer to any of these two technical implementations are technical features, while features that refer only to business methods are non-technical features.

Although this subject has technical features related to methods for distributing files to customers, these technical features are not beyond the normal technical implementations. In addition, the manager’s choice of one of the distribution methods in a subjective manner is a purely business method, not intended to solve a specific technical problem, and when combined with technical features does not create a further technical effect. Therefore, the subject of this example, when being comprehensively reviewed, is not considered to have technical character and shall not be protected in the name of an invention.

Example 2:

A networked computer system that allows customers to obtain audiovisual content of selected products by using computers installed in each company's store, where all of them are connected to a central server with a central database that stores audiovisual content in the form of electronic files, and where the distribution of electronic files from the central server to the sales stores can be performed by allowing the download of individual files directly from a central database to a computer at the request of the customer, or by transferring electronic files ***that were requested more than a predetermined number of times*** *from another store to the concerned store, storing these files in a local database of such store, and retrieving the corresponding files from the local database when the customer requests the audiovisual content at the store.*

In addition to the technical features similar to the previous example, in this example, the selection of files that were requested multiple times for storage in the local database of the store and retrieval from the local database when the customers request audiovisual content will avoid multiple repeated downloads of the same file directly from a central database, thus saving communication resources, simultaneously saving local storage resources at the store because only files with a high request probability are selected for storage. Therefore, the subject of the protection claim in this example, when being comprehensively reviewed, will create another technical effect that is an effective use of resources and may be protected in the name of an invention.

In the event that the protection claim is directed towards the technical implementation of a business method, the change in the business method is intended to avoid a technical problem rather than to solve this problem in a technical manner will not be considered a technical contribution. In the case of automating a business method, the effects inherent in the business method are not regarded as technical effect.

For example, an automatic accounting method that avoids the reserve bookkeeping step may require fewer computer resources to store and calculate. These advantages, to the extent that it is the result of a reduction in the number of operations to be performed and the amount of data to be considered due to the business character of the accounting method, are inherent to the accounting method and therefore not enough to be regarded as technical effect.

Another example is an electronic auction which is done by successively reducing prices until the price is fixed by the remote participant who is the first to send the message. Since messages are likely to be received out of sequence due to the line latency, each message contains timestamp information. The change of auction rules to

remove the requirement for timestamp information in order to avoid the technical problem of line latency instead of solving it by technical means is therefore not regarded as technically effect.

Another example is in the method of conducting electronic financial transactions by credit card at a sale location, a management decision made to remove the requirement of collecting the name or address of the customer for transaction verification can save time and reduce data traffic. However, this solution is per se not a technical solution to the technical problem of bandwidth congestion and server capacity limitations, but an administrative measure without technical contribution and therefore does not constitute a technical feature for the subject of the protection claim.

The input of real-world data into a business method is insufficient for the business method to contribute to the technical feature of the subject of the protection claim, even if this data is physical parameters. (e.g., geographical distance between sale locations).

As a method performed by computers to facilitate the decision-making of a manager, automatically selecting the most cost-effective business plan from a set of business plans that can meet certain technical requirements (e.g., to achieve a reduction in environmental impact) is not regarded as contributing to a technical effect other than that performed by a computer.

The ability to serve a technical purpose only is not sufficient for a method to contribute to the technical character of the invention. For example, a protection claim that refers to a "resource allocation method in an industrial process" could include a purely financial, administrative, or managerial business processes and services that are not limited to any particular technical process due to the broad definition of the term "industrial".

The results of a business method may be useful and practical, but not sufficient to be regarded as a technical effect.

Features of a business method, for example those related to administrative, can be found in different contexts. For example, a medical assistance system can be configured to provide information to a clinician on the basis of data obtained from a patient's sensors, and only if that data is not available in the database provided by the patient. Prioritizing sensor data over data provided by the patient is an administrative rule. Setting it up falls within the authority of a manager, for example the head of a clinic, rather than the authority of an engineer. As an administrative rule without

technical effect, it does not contribute to the technical character of the subject of the protection claim.

4.6. Information modelling, activity of programming, and programming languages

Information modelling is an intellectual activity devoid of technical character and is typically carried out by a systems analyst in the first stage of software development, to provide a formal description of a real-world system or process. Consequently, specifications of a modelling language, the structure of an information modelling process, or the maintenance of models likewise have no technical character. Similarly, properties inherent to information models, like re-usability, platform-independence, or convenience for documentation are not regarded as technical effects.

If an information model is purposively used in the context of an invention to solve a specific technical problem, it can contribute to the technical character of the invention.

Features specifying how the model is actually stored (e.g., using relational database technology) can also make a technical contribution.

Conceptual methods describing the process of software development (meta-methods) normally have no technical character. For example, in a computer-implemented method for generating program code for a control task, a feature specifying that a platform-independent model is converted to a platform-dependent model, from which program code adapted to the target platform is derived, makes no technical contribution in so far as the performance of the control task itself is not affected.

The activity of programming, in the sense of writing code, is an intellectual, non-technical activity, to the extent that it is not used in the context of a concrete application or environment to contribute in a causal manner to the production of a technical effect.

For example, reading a data type parameter from a file as it is input into a computer program, rather than defining the data type in the program itself, is merely a programming option when writing code, which has per se no technical character. The same applies to naming conventions for object names for facilitating the intelligibility and the management of program code.

Defining and providing a programming language or a programming paradigm such as object-oriented programming does not per se solve a technical problem, even if its particular syntax and semantics enable the programmer to develop a program with

greater ease. Easing the intellectual effort of the programmer is per se not a technical effect.

When assessing an invention relating to a programming environment, the features pertaining to the programming language do not normally contribute to its technical character. For example, in a visual programming environment, the provision of specific graphical building blocks is part of the programming language and makes no technical contribution if the only effect is easing the intellectual effort of the programmer. The provision of particular programming constructs may enable a programmer to write shorter programs, but that does not qualify as a technical effect since any resulting reduction of program length ultimately depends on how the programming constructs are used by a human programmer. In contrast, automatically processing machine code by dividing it into an instruction chain and an operand chain and replacing repeating instruction sets by macro-instructions so as to generate optimized code of reduced memory size makes a technical contribution. In this case, the effect does not depend on how a human programmer makes use of the macro-instructions.

4.7. Data retrieval, formats, and structures

A data structure or format contributes to the technical character of the invention if it causes a technical effect. This may happen if the data structure or format has a technical function in a technical system, such as controlling the operation of the device processing the data. Functional data inherently comprises, or maps to, the corresponding technical features of the device. Cognitive data, on the other hand, is data whose content and meaning are only relevant to human users and do not contribute to producing a technical effect.

For example, a record carrier for use in a picture retrieval system stores coded pictures together with a data structure defined in terms of line numbers and addresses which instruct the system how to decode and access the picture from the record carrier. This data structure is defined in terms which inherently comprise the technical features of the picture retrieval system, namely the record carrier and a reading device for retrieving pictures therefrom in which the record carrier is operative. It thus contributes to the technical character of the record carrier, whereas the cognitive content of the stored pictures (e.g., photograph of a person or landscape) does not.

Similarly, an index structure used for searching a record in a database produces a technical effect since it controls the way the computer performs the search operation.

Another example is an electronic message with a header and a content section. The information in the header comprises instructions which are automatically recognized and processed by the receiving message system. This processing in turn determines how the content elements are to be assembled and presented to its final recipient. The provision of such instructions in the header contributes to the technical character of the electronic message, whereas the information in the content section, representing cognitive data, does not.

A data structure or a data format may have features which may not be characterized as cognitive data (i.e., not for conveying information to a user) but which nevertheless do not make a technical contribution. For example, the structure of a computer program may merely aim at facilitating the task of the programmer, which is not a technical effect serving a technical purpose. Furthermore, data models and other information models at an abstract logical level have per se no technical character.

4.8. Database management systems and information retrieval

Database management systems are technical systems implemented on computers to perform the technical tasks of storing and retrieving data using various data structures for efficient management of data. A method performed in a database management system is thus a method which uses technical means and is therefore not excluded from patentability under Article 59 of the Law on Intellectual Property.

Features specifying the internal functioning of a database management system are normally based on technical considerations. Therefore, they contribute to the technical character of the invention. For instance, technical considerations are involved in improving system throughput and query response times by automatically managing data using various data stores with different technical properties such as different levels of consistency or performance.

Database management systems execute structured queries, which formally and precisely describe the data to be retrieved. Optimizing the execution of such structured queries with respect to the computer resources needed (such as CPU, main memory, or hard disk) contributes to the technical character of the invention since it involves technical considerations concerning the efficient exploitation of the computer system.

However, not all features implemented in a database management system necessarily make a technical contribution by virtue of this fact alone. For example, a feature of a database management system for accounting costs related to the use of the system by different users may be regarded as not making a technical contribution.

Data structures, such as an index, hash table, or a query tree used in database management systems to facilitate access to data or for the execution of structured queries contribute to the technical character of the invention. Such data structures have a technical function since they purposively control the operation of the database management system to perform said technical tasks. Conversely, data structures defined solely by the cognitive information they store are not considered to contribute to the technical character of the invention beyond the mere storage of data.

It is necessary to distinguish between executing structured queries through a database management system and information retrieval. The latter includes searching for information in a document, searching for documents themselves, and also searching for metadata that describe data such as texts, images, or sounds. The query may be formulated by the user in need of information, typically informally using natural language without a precise format: the user may enter search terms as a query in web search engines to find relevant documents or submit an exemplary document to find similar documents. If the method of estimating relevance or similarity relies solely on non-technical considerations, such as the cognitive content of the items to be retrieved, purely linguistic rules, or other subjective criteria (e.g., items found relevant by friends in social networks), it does not make a technical contribution.

The translation of linguistic considerations into a mathematical model with the aim of enabling the linguistic analysis to be done automatically by a computer can be seen as involving, at least implicitly, technical considerations. However, this is not enough to guarantee the technical character of the mathematical model. Further technical considerations, such as those relating to the internal functioning of the computer system, are needed.

For example, a mathematical model for calculating the probability that a given term is similar in meaning to another term by analyzing the co-occurrence frequency of the two terms in a collection of documents does not make a technical contribution per se since it is based on considerations of a purely linguistic nature (i.e., based on the assumption that terms which are related are more likely than unrelated terms to occur in the same documents). The search results produced by using this method of similarity calculation would differ from a method that adopts another mathematical model only in that information with different cognitive content would be retrieved. This is a non-technical distinction and does not qualify as a technical effect. In this context of retrieval based on similarity of meaning of terms, the concept of "better search" is subjective. In contrast, optimizing the execution time of structured queries in a database management system as discussed above is a technical effect.

4.9. Information representation

Information representation is interpreted as the transmission of information to the user. It concerns both the cognitive content of the presented information and the manner in which it is presented. It is not limited to visual information, but also includes other modes of representation, such as acoustic or tactile information. However, it does not extend to the technical means used to create such information representations.

Furthermore, the transmission of information to the user should be distinguished from the technical information representations to the technical system that will process, store, or transmit such information. The features of data encoding schemes, data structures, and electronic communication protocols that represent functional data that is contrary to cognitive data is not regarded as information representation.

Features determining the information representation create a technical effect if it reliably supports the user in performing the technical task by means of a continuous human-machine interaction process and/or with instructions. Such technical effect is considered to be reliably achieved if assisting the user in performing the technical task is objectively and reliably connected and causal with the feature. This would not be true if the effect was supposed to depend on the preferences or subjective interests of the user. For example, for some users, data is intelligible when it is displayed as a numeric value, while others may prefer when it is displayed as color codes. Therefore, choosing a way to display the data is not regarded as a technical effect. Similarly, whether audio information is intelligible when it is conveyed in the form of scales rather than words is a matter of only the cognitive ability of the user. As another example, allowing the user to set parameters that define the information to be presented or choosing the way to present the information does not contribute to the technical aspect if it only satisfies the subjective preferences of the user.

Consequently, the presentation related to the content of information and the manner in which the information is presented will be considered in terms of technical effect, specifically as follows:

The content of the presented information:

If the cognitive content of the information presented to the user is related to the internal status commonly found in the technical system and enables the user to properly operate such technical system, it has technical effect. An internal status commonly found in a technical system is an operation mode, technical condition, or an event related to the internal workings of the system, which is dynamically changeable

and automatically detected. Displaying this content reminds the user to interact with the system, for example to avoid technical problems.

Static or predefined information about the technical properties or latent status of the system, the system's technical parameters, or operating guidance is not considered to be internal statuses normally found in the system. If the representation of static or predefined information only supports the user in performing non-technical operations before the technical operations, it does not contribute to the technical effect. For example, the effect that the users are not required to know or memorize the sequence of buttons to be operated before configuring the system is not technical effect.

Non-technical information such as the status of a casino game, business processes, or abstract simulation models is intended solely to help the users with subjective evaluations or non-technical decisions. It has no direct connection to a technical mission. Therefore, such information is not regarded as internal statuses commonly found in the technical system.

The manner in which the information is presented:

These kinds of features usually indicate the form or the arrangement, or the time at which information is transmitted to the user (e.g., on a screen), for example, diagrams designed to convey information only. Specific technical features regarding how audio or visual signals are generated should not be regarded as mere representations of information.

Features that define the visualization of information in a particular diagram or layout are generally not regarded as technical contribution, even if this diagram or layout is supposed to convey information in a way which the viewer may intuitively evaluate as particularly attractive, clear, or logical.

For example, handling of the limited available screen space is part of the design of how information is presented to the viewer and therefore it is per se not a technical feature. The general idea of giving an overview of multiple images in a limited display area by displaying a single image and sequentially replacing it with other images is not based on technical considerations but a layout design. Similarly, arranging subjects in the available screen space by removing "whitespace" between window panes follows the same layout principles that would apply to magazine cover layouts and does not relate to technical considerations.

On the other hand, if the presentation manner reliably supports the user in performing the technical missions by means of a continuous and/or guided human-device interaction process, it creates technical effect. For example, displaying multiple

images side-by-side at low resolution and allowing selection and display of an image at a higher resolution will convey information to the user as a technical tool that allows the user to perform the technical mission of interactive search and retrieval of stored images more efficiently. Storing digital images at different resolutions creates the technical effect of allowing a simultaneous overview of several images. As another example, in a football game, a specific way to convey to the user the location of the nearest teammate by dynamically displaying a guide mark on the edge of the screen when the teammate is off-screen creates the technical effect of facilitating continued human-device interaction by resolving the conflicting technical requirements: displaying the enlarged portion of the image and maintaining an overview of the area of interest that is larger than the visible area. Another example is in the situation of providing visual aid to a surgeon: if during surgery, the on-going orientation of the medical ball joint implant is displayed in a reliable way that aids the surgeon to correct the position of the implant more precisely, this is regarded as technical effect.

In addition, the information presentation is considered in terms of technical effect based on human physiological function and based on the user's mental activities, in particular:

The effect based on human physiological function:

When the presentation manner of information creates in the user's mind an effect that does not depend on psychological or other subjective factors but depends on physical parameters based on human physiological function and can be precisely defined, the effect can be regarded as a technical effect. Such manner of presenting information will make a technical contribution to the extent that it contributes to this technical effect. For example, displaying a notification on one of the many computer screens near the current focus of the user's visual attention has the technical effect of such notification being more or less guaranteed to be seen immediately (compared with an arbitrary position on one of the screens). On the contrary, the decision to display only urgent notifications (compared to all notifications) was based solely on psychological factors and thus made no technical contribution. Reducing information overload and distraction is not enough to be regarded as technical effect. As another example, the presentation of an stream of images in which the parameters of the delay and change of content between successive images is calculated on the basis of the physical properties of human visual perception to achieve smooth transitions is regarded as technical contribution.

If the information (e.g., visual or acoustic stimuli) is presented to a person with the intent to induce a physiological response in that person (e.g., unintentional eye

direction) that can be measured when assessing health status (e.g., vision, hearing impairment, or brain injuries), that information presentation can be regarded as a technical effect.

The effect is based on the user's mental activities:

In the event that the subject of a protection claim includes a feature that presents information to the user, which can be the cognitive content of the information or the method of the presented information, it will always include the evaluation of users. Although such evaluation is per se a mental activity, the inclusion of such mental activities does not necessarily make the subject non-technical. For example, if the user makes an evaluation based on an overview of low resolution images to determine the location and objectively identify the desired image, this mental evaluation can be regarded as the intermediate step that orients the process of image search and retrieval and thus forms an integral part of the solution to a technical problem. Such a solution does not depend on facilitating human tasks of understanding, learning, reading, or memorizing, nor does it influence the user's decision about which image to be searched for. It provides a mechanism for entering a selection that would not be possible if the images were not displayed in that particular arrangement.

Conversely, if the selection or layout of information presented is focused solely on the human mind, especially to help users make non-technical decisions (e.g., which product to purchase based on a diagram presenting product characters), it does not make a technical contribution.

4.10. User interface

User interfaces, especially graphical user interfaces (GUIs), consist of features that represent information and receive input as part of human-computer interaction. Features that define users' input are more likely to be technical in nature than those that only relate to data output and display, because the input requires compatibility with the predefined protocol of the device, while the most of output can be dictated by the subjective preferences of the user. Features related to the graphic design of the menu (such as its appearance) are determined by aesthetic considerations, subjective user preferences, or administrative rules that do not contribute to the technical specification of a user interface based on the menu.

Features identifying mechanisms that allow user input, such as text input, selection, or command submission, are generally regarded as technical contributions. For example, providing in the GUI an alternative graphical shortcut that allows the user to directly set various processing conditions, such as starting the printing process

and setting the number of copies to be printed by dragging and moving the document icon back and forth over the printer icon, makes a technical contribution. Conversely, supporting the users' input by providing information only facilitates the mental decision-making of the user in the process of performing this mission (e.g., helping the users decide what to enter) is not regarded as a technical contribution.

Aiding the users to enter text in a computer system by providing predictive input is a technical function. However, generating the word variations shown for the predictive input mechanism is a non-technical matter itself. The language model used to solve this non-technical matter by itself does not contribute in terms of technical. If technical considerations are involved in implementing the language model on a computer, such as those related to the inner workings of a computer, technical effects can arise.

In the event that achieved practical effects such as simplifying the user's actions or providing more convenient user input functions depend entirely on the user's subjective abilities or preferences, such effects may not be the basis of an objective technical matter to be solved. For example, a reduction in the number of interactions required to perform the same amount of input would not be reliably achieved if it were only possible for certain usage patterns that occur depending on the level of expertise or subjective preferences of the user.

The ways of providing input information, such as gestures or keystrokes, that only reflect the user's subjective preferences, game conventions, or rules which cannot generate an ergonomic advantage in objective reality make no technical contribution. However, performance-oriented improvements in respect of input detection, such as enabling faster or more accurate gesture recognition or reducing the processing load of the device when performing the recognition, are technical contributions.

[In the event of any conflict or discrepancy between any translated version of Annex I and the Vietnamese language version, the Vietnamese language version shall prevail]

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