

Views from a patent attorney – What to consider and where to protect AI inventions?

Folke Johansson 5.2.2019
Director, Patent Department
European Patent Attorney

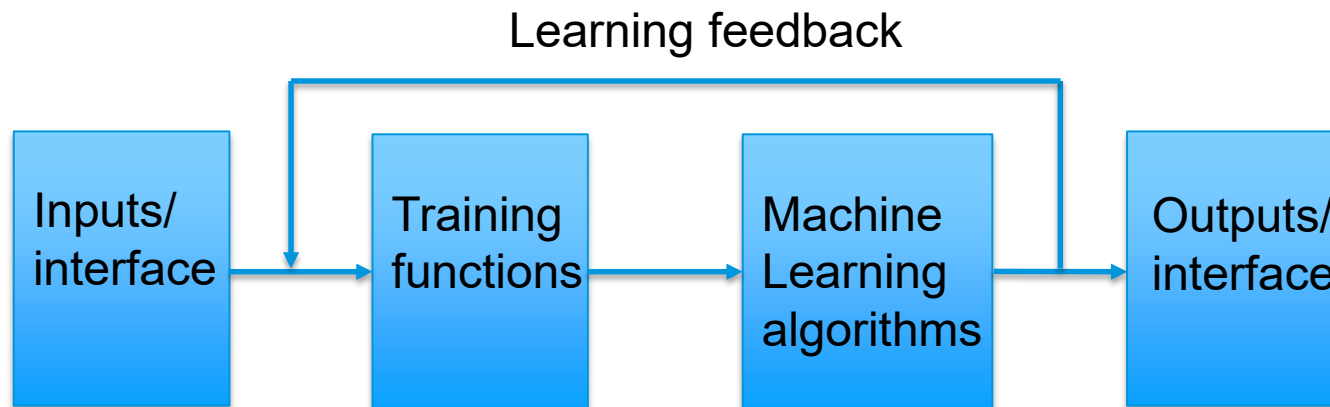
Contents

- AI and application of AI
- Patentability at the EPO
- USA §101, §112 and guidelines
- Comparison to some Asian countries



Artificial intelligence

- Typical functions making up AI



Application of AI

- Typical application fields are:
 - Image processing
 - Speech processing
 - Simulators (e.g. flight simulators)
 - Finance (trading algorithms, market analysis)
 - Healthcare (prediction, medical diagnosis/analysis)
 - On-line customer service
 - Transportation (autonomous cars, traffic management)
 - Robots

Patentability - EPO



Excluded subject-matter

- Technical character is a requirement.
- Claims can include a mix of technical and non-technical features

Art 52(2)EPC

Excluded matter:

- (a) discoveries, scientific theories and mathematical methods;
- (b) aesthetic creations;
- (c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers;
- (d) presentations of information.

Inventive step

- Only the features of a claim that contribute to its technical character are used for assessment of inventive step
- Non-technical features are omitted in assessing inventive step
- Non-technical features are often overstruck by examiners

T1670/07 Nokia



1. A method of facilitating shopping with a mobile wireless communications device (12) ~~to obtain a plurality of purchased goods and/or services from a group of vendors (14) located at a shopping location (16)~~ comprising:

communicating from the mobile wireless communications device with at least one server (18) a ~~selection of two or more goods and/or services to be purchased~~ by a user of the mobile wireless communications device on or before the user shops at the shopping location;

the at least one server, in response to information stored therein regarding vendors located at the shopping location and the goods and/or services offered by the vendors and ~~the selection of the plurality of goods and/or services to be purchased by the user~~, causing at least an identification ~~of the vendors from which available ones of the two or more goods and/or services may be purchased and the available ones of the two or more goods and/or services~~ to be transmitted to the mobile wireless communications device; and

the mobile wireless communications device providing to the user an identification ~~of the available ones of the goods and/or services to be purchased and an itinerary (120) of the user setting forth at least a choice of an order in which the user visits the identified vendors to obtain the goods and/or services to be purchased wherein the itinerary is a function of at least one profile of the user.~~

(overstruck sections are my interpretation of what the BoA considered as non-technical elements)

T1670/07 Nokia



- The application acknowledges systems that show on a mobile device available products as a shopper moves around in a shop.
- The shopper enters two or more desired goods/services into the mobile device before going shopping and the device displays a shopping itinerary showing an order (sequence) in which the shopper can visit *a group of vendors* to obtain them.
- The itinerary is a function of a user profile, e.g. requiring shortest distance between vendors, or goods at cheapest purchase price.
- In the Board's view, the overall effect of the method, namely to produce an ordered list of shops, is not technical.

T1670/07 Nokia



- The appellant also argued that the difference of identifying a group of vendors rather than a single vendor as in D1 implied a problem of **logistics**, which was not a business method. However, the Board considered that a logistic or navigation system **that actually involves navigation** to a particular place **might have some technical element**, but considered the Nokia invention did not as it did not involve any physical elements, but simply indicated possible choices.
- Moreover, in the Board's view, producing an itinerary is not technical as it involves only standard human behavioural concepts such as going to the bank and then going to the supermarket. The appellant replied that the physical act of going to the locations conferred technical character on these thoughts.

T1670/07 Nokia



- In summary, therefore, the Board was of the opinion that a technical effect may arise from either the **provision of data about a technical process**, regardless of the presence of a user or its subsequent use, or from the provision of **data** (including data that on its own is excluded, e.g. produced by means of an algorithm) that is **applied directly in a technical process**.
- In the Board's view, neither applied to the Nokia case.

EPO & AI – negative (from Guidelines)



- 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, i.e. excluded subject-matter.
- Expressions such as "support vector machine", "reasoning engine" or "neural network" are considered **not** to have technical character.
- 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 (T1358/09)
- Classifying abstract data records without any indication of a technical use being made of the resulting classification is also not *per se* a technical purpose

EPO & AI – positive (from Guidelines)

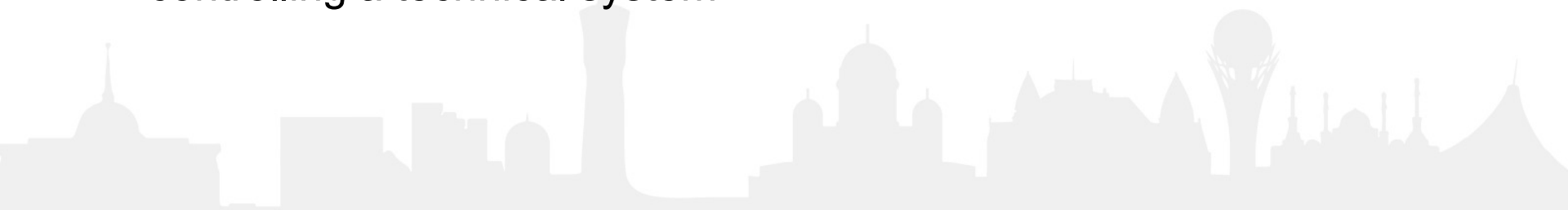


- The use of a neural network in a heart-monitoring apparatus for the purpose of identifying irregular heartbeats makes a technical contribution.
- Classification of digital images, videos, audio or speech signals based on low-level features (e.g. edges or pixel attributes for images) are further typical **technical applications** of classification algorithms.
- 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.

EPO – mathematical methods



- There is a section concerning Mathematical methods in the Guidelines G-II, 3.3 (November 2018)
- Under the EPO's new practice, a mathematical method can contribute to the technical character of an invention if the claim is limited to a specific “*technical application*” of the mathematical method.
 - In this case, the mathematical method is capable of distinguishing over the prior art when inventive step is examined by the EPO.
 - Examples audio/image/video enhancement, encryption/decryption etc.
- The technical purpose must be a specific one, not generic such as “controlling a technical system”



EPO – Identify a technical problem



- Technical problems could be (traditional CII problems):
 - saving resources (memory, processing capacity, bandwidth, space, time, power)
 - improving accuracy (of simulation, prediction, control of processes or equipment)
 - improving security



EPO – Identify a technical problem



- AI involves new problems such as:
 - Generating a rationale for an AI decision (e.g. how something is implemented in co-operation with a neural network)
 - Implementing the right to be forgotten (solution to removing personal data without being merely an administrative task)
 - Determining accountability of autonomous vehicle (e.g. when the vehicle is involved in a collision), e.g. storing data in a tamper-proof manner
 - AI ethics related problems (e.g. how not to be biased in face recognition against people with certain ethnic background)
- If a solution to these problems is more than mere abstract statistics, there is potential for a technical solution
- Discuss with inventors what traditional and what AI related problems the invention solves

USA §101



Alice test (2 step test):

1. Is the claim directed to a law of nature, a natural phenomenon (product of nature) or an **abstract idea**?
2. If **yes**, does the claim recite additional elements that amount to **significantly more** than the judicial exception (e.g. than the abstract idea itself) ?

If yes, claim concerns eligible subject-matter

If no, claim is not eligible

USA §101 – New Examiner Guidelines for software inventions

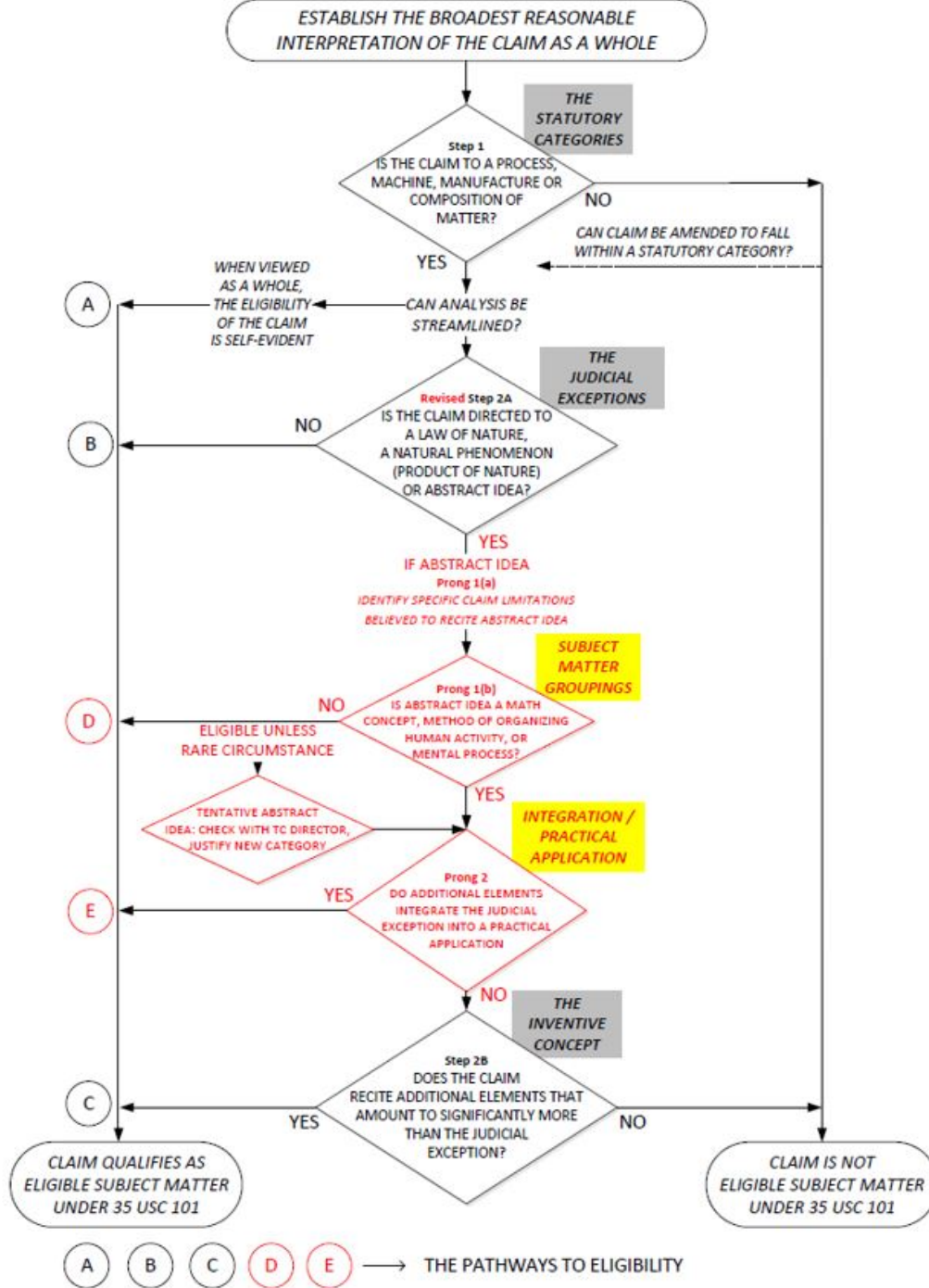


- January 7, 2019 Revised Patent Subject Matter Eligibility Guidance (Revised 101 Guidance) issued
- <https://www.federalregister.gov/documents/2019/01/07/2018-28282/2019-revised-patent-subject-matter-eligibility-guidance>
- The following is considered an abstract idea:
 - **Mathematical concepts** (*i.e.*, mathematical relationships, mathematical formulas or equations, and mathematical calculations);
 - **Certain methods of organizing human activity** (*i.e.*, fundamental economic principles or practices (including hedging, insurance, mitigating risk); commercial or legal interactions (including agreements in the form of contracts; legal obligations; advertising, marketing or sales activities or behaviors; business relations); managing personal behavior or relationships or interactions between people (including social activities, teaching, and following rules or instructions); and
 - **Mental processes** (*i.e.*, concepts performed in the human mind (including an observation, evaluation, judgment, or opinion)).

§101 – New USPTO guidance



- The guidance **also includes a “two-prong inquiry” for whether a claim is “directed to” a patent-ineligible concept.**
- The first prong entails examiner consideration of **whether the claim at issue recites a patent-ineligible concept** (see previous slide). If the claim does, the examiner proceeds to the second prong.
- The examiner must consider **whether the ineligible concept is “integrated into a practical application”**.
 - **If the concept is integrated into a practical application, the claim’s subject matter is patent-eligible.**
 - If a claim both recites a patent-ineligible concept and does not integrate that concept in a practical application, then the claim is deemed “directed to” a judicial exception and “further analysis pursuant to the second step of the *Alice* ... test” is required.



New USPTO guidance in combination with the Alice test



US §101 - recommendations



- The guidance provides a non-exhaustive list of examples of abstract ideas and other judicial exceptions, such as laws of nature that have been integrated into a practical application.
 - These examples include when the subject feature improves the functioning of a computer, treats a particular disease or medical condition, is implemented into a machine that is integral to the claim, transforms an item into a different thing, or otherwise “applies or uses” the judicial exception with a particular technology in a “meaningful way”.
- Applicants should highlight the **practical application** in each claim, and connect the practical application to an improvement described in the specification.
- For subject matter eligibility purposes, the broad phrase “practical application” does not require that the practical application be novel or non-obvious.

New USPTO guidance - §112(f)

- January 7, 2019 guidance on examining computer-implemented functional claim limitations for compliance with 35 USC 112 issued
- <https://www.federalregister.gov/documents/2019/01/07/2018-28283/examining-computer-implemented-functional-claim-limitations-for-compliance-with-35-usc-112>
- Functional claim language is problematic in the US. Under [35 U.S.C. § 112\(f\)](#), a claim that recites a “*means*” or “*step*” for performing a function, but without reciting the structure that performs that function, is construed to cover the structure that is described in the specification (and any equivalents thereof).
- The USPTO’s guidance on clarity provides helpful suggestions on functional terms that should be avoided when drafting claims. In addition to avoiding the words “*means*” and “*step*” that are mentioned in § 112(f) itself, other terms to avoid include:

“mechanism for”, “module for”, “device for”, “unit for”, “component for”, “element for”, “member for”, “apparatus for”, “machine for” and “system for”.



New USPTO guidance - §112(f)



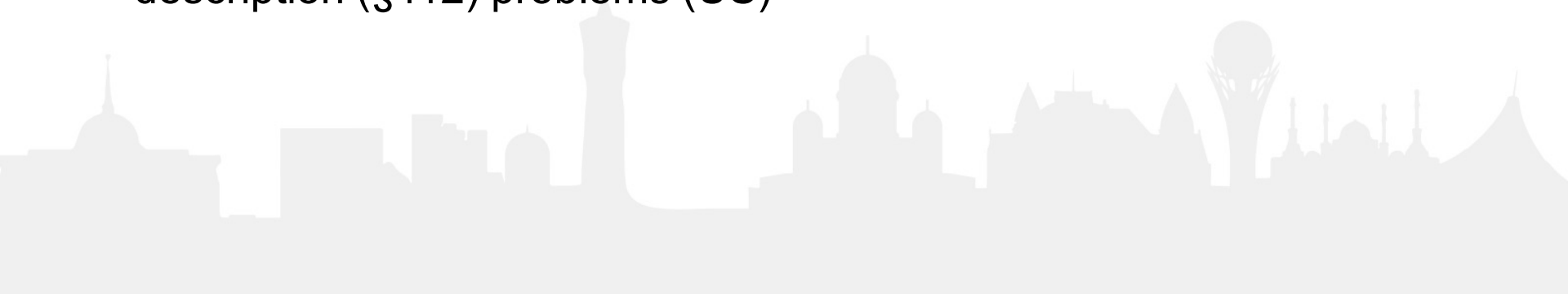
- When drafting a patent application for a computer-implemented invention that will be filed in the U.S., the specification should disclose an algorithm for performing the claimed functionality.
- In this regard, the guidance defines an algorithm as “*a finite sequence of steps for solving a logical or mathematical problem or performing a task*”.
- The algorithm may be expressed as a mathematical formula, as prose, as a flow chart, or in any other suitable manner.
- Care should be taken to ensure that the disclosed algorithm is sufficient to perform all of the functionality that is claimed.
- Failure to disclose an algorithm can result in claims of the U.S. patent or application being found to be indefinite under §112(b) and lacking written description under §112(a)
 - Flow chart + detailed written description is recommended

Comparison

	EPO	USPTO	JPO	CNIPA	KIPO	IPIN
Eligible subject-matter	Technical character, solution to a technical problem	2-step test: 1) Claim directed to abstract idea? 2) Additional elements that amount to significantly more than the abstract idea	Technical idea utilizing law of nature? Is information processing implemented by using HW resources?	3-prong test is used: 1) Technical problem solved? 2) Technical means are used? 3) Is a technical effect achieved?	Similar to JPO	Technical contribution or technical effect (e.g. algorithm solving a technical problem)
Determining inventive step	Non-technical elements that do not contribute to technical character are omitted	--	Claim as a whole is analysed (see examples in Patent Examination Handbook (Ex. 30-36 concern AI))	--	--	
Other	Technical application of mathematical method is eligible. Technical elements in method claims	Practical application of abstract idea is eligible. Technical application of mathematical method is eligible. Technical elements in method claims	Technical elements (hardware resources) in method claims when processing software			Not merely computer program as such

Conclusions on patenting AI

- Include technical elements in claims
- Claims should be directed to a technical application
- Identify a technical problem
- Inventive step should be found in the technical elements (EP)
- Mathematical methods are considered in evaluating inventive step when applied to a specific technical application (EP)
- Practical application (of the method/idea) should be described (US) and should be included in the claim
 - The practical application need not be novel or non-obvious
- Algorithms should be explained in writing and figures to avoid written description (§112) problems (US)



Questions:

folke.johansson@papula-nevinpat.com