



PATENTS ACT 1977

APPLICANTS	Arm Limited and Apical Ltd
ISSUE	Whether patent application number GB 1808595.1 complies with section 1(2)
HEARING OFFICER	Mr B Micklewright

DECISION

Background

- 1 This decision addresses whether the invention claimed in patent application GB1808595.1 is excluded from patentability under section 1(2)(c) of the Patents Act 1977 (“the Act”) as a program for a computer as such.
- 2 The application was filed in the names of ARM limited and Apical Ltd on 24 May 2018 and was subsequently published as GB2574052 A on 27 November 2019.
- 3 The examiner from the outset considered the claims to be a program for a computer as such. There have been several rounds of observations and amendments during the examination process, and the claims have been amended to overcome the prior art with respect to a lack of novelty. There are no outstanding issues with regards to the inventiveness of the invention as claimed, although I note that the search has not yet been updated. Issues to be decided at the hearing were set out by the examiner in a pre-hearing letter of 19 November 2020. I also thank the applicants for submitting skeleton arguments dated 21 December 2020 well in advance of the hearing. The matter came before me at a hearing on 11 January 2021, at which Mr Rob Genders from ARM limited and patent attorney Ben Jones for EIP were present. I confirm that in reaching my decision I have considered all the correspondence on file and the arguments and observations put to me at the hearing.
- 4 I thank Mr Genders for providing a background to ARM Limited and to the inventive concept of the application in suit at the hearing. This was most helpful in understanding the invention in practice.

The Invention

- 5 The invention relates to the general field of image processing technology, whereby a sequential set of image frames representing a dynamic scene are processed. The objects in the frame are identified and classified by an object classifier. The object classifier may for example be used to detect the presence of a human face or animal in an image.
- 6 Categorization data comprises a set of object definitions arranged in a hierarchy with a first group of coarse-level object definitions and a second group of finer-level object definitions below the level of the first group. For example, the coarse-level object definition may define a human faces class and a finer-level object definition may define an individual face class for identifying a particular human face.
- 7 In use, subsets of these object definitions are selected and executed as part of the object classification process. Two different subsets are configured and executed in a first object classification cycle and a second object classification cycle respectively. The configuration of at least one of these object classification cycles takes place in response to control data derived from data sources external to the object classifier. These data sources could for example be sensors and could indicate the availability of a system resource of the image processing system (e.g. the state of charge of the battery, amount of available storage, etc). They could be associated with a device coupled or mounted to a vehicle such as a car and the data sources comprise one or more of a location sensor, a temperature sensor, a visual information sensor to generate data representative of semantic data such as a vehicle number plate, a speed or acceleration sensor, a radio signal sensor, a movement sensor or a simultaneous location and mapping (SLAM) module.
- 8 Mr Jones provided examples of applications of the invention in his skeleton arguments, including using the invention in an autonomous vehicle, where classification results can be obtained more quickly which may provide increased braking response in response to a detected obstacle. Also, in an electric vehicle, the invention could result in reduced power consumption, leaving more power for other functions of the vehicle and may allow for increased range. Another example provided is that an image processing system according to the present invention could adapt to the environment where it is being used, for example disabling object definitions relating to animals if it is being used in an office environment, thereby providing more efficient processing and power saving.
- 9 The latest claims were filed on 16 March 2020. Claims 1, 19 and 21 are independent claims and relate to an image processing system, a method of processing image data and a non-transitory computer-readable storage medium respectively. With the exception of one feature, which I will address below when I construe the claim, the claims all include similar features. Claim 1 reads:
 1. An image processing system comprising:
 - an image data interface arranged to receive image data in the form of sequential image data frames representing a dynamic scene;

an object classifier arranged to perform object classification in object classification cycles, wherein in a given object classification cycle the object classifier performs object classification in a selected image frame;

storage arranged to store categorization data, the categorization data comprising a set of object definitions for use by the object classifier, the set of object definitions being arranged in an object definition hierarchy and including at least a first group of coarse-level object definitions at a first object definition level and a second group of finer-level object definitions at a second object definition level which is below the first object definition level,

wherein the object classifier is arranged to configure a first object classification cycle and a second, subsequent, object classification cycle by:

selecting a first subset of object definitions from the categorization data, the first subset being selected from at least one of the first and second group object definitions, and selectively executing the first subset in the first object classification cycle; and

selecting a second subset of object definitions from the categorization data, the second subset being selected from at least one of the first and second group object definitions and being different than the first subset; and selectively executing the second subset in the second object classification cycle,

wherein the object classifier is arranged to configure at least one of the first and second object classification cycles in response to control data derived from one or more data sources external to the object classifier.

10 Dependent claims 2-5 relate to further details of the external data source and read:

2. An image processing system according to claim 1, wherein the one or more data sources comprise one or more sensors external to the object classifier, the one or more sensors being arranged to generate sensor data, and wherein the control data is derived from the sensor data.

3. An image processing system according to claim 2, wherein the one or more data sources comprise a sensor arranged to sense an availability of a system resource of the image processing system and wherein the sensor data is indicative of the availability of the system resource.

4. An image processing system according to claim 4, wherein the availability of the system resource comprises:

a state of charge of an electric battery configured to power the image processing system;

an amount of available storage accessible by the image processing system;

an amount of compute resource available to the image processing system; or

an amount of electrical power available to the image processing system.

5. The method according to any of claim 2 to 4, wherein the one or more data sources comprise one or more of:

a location sensor arranged to generate sensor data indicative of geographic location;

a temperature sensor arranged to generate sensor data indicative of ambient temperature;

a visual information sensor arranged to generate sensor data indicative of image data;

an audio information sensor arranged to generate sensor data indicative of audio data;

a speed sensor arranged to generate sensor data indicative of a speed of travel;

an acceleration sensor arranged to generate sensor data indicative of an amount of acceleration;

a radio signal sensor arranged to generate sensor data indicative of data carried by a radio signal;

a movement sensor arranged to generate sensor data indicative of movement; and

a simultaneous location and mapping (SLAM) module.

The Law

11 Section 1(2) of the Act states:

1(2) It is hereby declared that the following (amongst other things) are not inventions for the purpose of the Act, that is to say, anything which consists of-

- (a) a discovery, scientific theory or mathematical method;
- (b) a literary, a dramatic, musical or artistic work or any other aesthetic creation whatsoever;
- (c) a scheme, rule or method for performing a mental act, playing a game or doing business, **or program for computer**;
- (d) the presentation of information;

but the foregoing provisions shall prevent anything from being treated as an invention for the purposes of the Act only to the extent that a patent or application for a patent relates to that thing as such.

12 The provisions of Section 1(2) were considered by the Court of Appeal in *Aerotel*¹ when a four-step test was laid down to decide whether a claimed invention is excluded from patent protection:

- (1) *Properly construe the claim;*
- (2) *Identify the actual contribution;*
- (3) *Ask whether it falls solely within the excluded subject matter;*
- (4) *Check whether the actual or alleged contribution is actually technical in nature.*

13 It was stated by Jacob LJ in *Aerotel* that the test is a re-formulation of and is consistent with the previous “technical effect approach with rider” test established in previous UK case law. Kitchen LJ noted in *HTC v Apple*² that the *Aerotel* test is followed in order to address whether the invention makes a technical contribution to the art, with the rider that novel or inventive purely excluded matter does not count as a “technical contribution”.

¹ *Aerotel Ltd v Telco Holdings Ltd and Macrossan’s Application* [2006] EWCA Civ 1371

² *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451

14 Lewison J in *AT&T/CVON*³ set out five signposts that he considered to be helpful when considering whether a computer program makes a technical contribution. Lewison LJ reformulated the signposts in *HTC v Apple* in light of the decision in *Gemstar*⁴. The signposts are:

i) Whether the claimed technical effect has a technical effect on a process which is carried on outside the computer.

ii) Whether the claimed technical effect operates at the level of the architecture of the computer; that is to say whether the effect is produced irrespective of the data being processed or the applications being run.

iii) Whether the claimed technical effect results in the computer being made to operate in a new way.

iv) Whether the program makes the computer a better computer in the sense of running more efficiently and effectively as a computer.

v) Whether the perceived problem is overcome by the claimed invention as opposed to merely being circumvented.

Arguments and analysis

15 I will consider each of the *Aerotel* steps in turn in my analysis.

(1) Properly construe the claim

16 At the hearing I raised a question in relation to discrepancies between the three independent claims. Independent claim 1 refers to classification of objects using hierarchical definitions with coarse-level and fine-level definitions, which is not present in the other independent claims 18 and 21. Instead claims 18 and 21 refer to 'categorization data comprising a set of object definitions'. At the hearing the applicants confirmed that the intention was that all independent claims were to reflect the same inventive concept and that claims 18 and 21 would be amended to address this anomaly of wording. I will proceed on the basis that this feature is present in all independent claims.

17 No further issues of construction arise in relation to the independent claims.

(2) Identify the actual contribution

18 Identifying the contribution in the second step of this test is critical and I refer to the following paragraph in *Aerotel* for guidance:

"43. The second step – identify the contribution - is said to be more problematical. How do you assess the contribution? Mr Birss submits the test is workable – it is an exercise in judgment probably involving the problem said to be solved, how the invention works, what its advantages are. What has the inventor really added to human knowledge perhaps best sums up the exercise. The formulation involves looking at substance not form – which is surely what the legislator intended.

³ *AT&T Knowledge Venture/CVON Innovations v Comptroller General of Patents* [2009] EWHC 343 (Pat)

⁴ *Gemstar-TV Guide International Inc v Virgin Media Ltd* [2010] RPC 10

- 19 The examiner considered the actual contribution to be a computer program that executes a classification algorithm on a video frame by using two cycles, the first cycle using coarse-level object definitions, then a second cycle using finer-level object definitions, wherein some control of the cycles is provided on the basis of external data.
- 20 Mr Jones submitted that the examiner has viewed the contribution too narrowly because object classification is a form of image processing and the contribution should be directed towards this wider interpretation, the rationale being that when objects in an image are being classified the image is also being processed. In support of this approach Mr Jones referred to BL O/112/18⁵, which is itself based on the judgment in *Halliburton Energy Services Inc.*⁶, and guidance in the Office's Manual of Patent Practice, and in his skeleton argument said:

"Taking this into account and considering the task performed by the present invention, what the present invention really adds to human knowledge is an improved image processing system which requires less computational resource and may provide greater efficiency and reduced power consumption. Indeed, as set-out in our previous responses and as set-out above, by configuring object classification cycles such that different subsets of object definitions are selected by the object classification cycles an amount of processing required for each classification cycle may be reduced, compared to, for example, classification cycles where an entire set of object definitions is selected, by only selecting the subset of object definitions needed for the particular object classification cycle at hand. Reducing the processing power needed may provide for a more efficient image processing system with reduced power consumption."

- 21 Mr Jones therefore submits that the actual contribution is:

An improved image processing system which requires less computational resource and may provide greater efficiency and reduced power consumption.

- 22 Image processing is a broad term and can refer to various means for the processing of images. I am not convinced that it makes a material difference in this case as to whether the contribution is characterised as an image processing system or an object classification system. Mr Jones seemed to agree with this at the hearing, where he said that if the contribution was identified as an improved object classification system rather than an improved image processing system the arguments in relation to some of the *AT&T/Cvon* signposts, particularly the fourth and fifth signposts, would still be relevant. This would not dilute the crux of the invention in that the object classifier and its classification cycles would selectively reduce the number of cycles and the layers of the classifier based on the external data sources, resulting in improved efficiency and power consumption. In my view the contribution is more precisely defined as an object classifier but given the breadth of the term "image processing", I will include the term "image processing" in the identified contribution.
- 23 I note the potential advantages of the invention described by Mr Jones, particularly the potential increase in speed of object classification and/or the reduction in

⁵ *Landmark Graphics Corporation*, BL O/112/18

⁶ *Halliburton Energy Services Inc.*, [2011] EWHC 2508 (Pat)

processing required to carry out the classification. I however also note that there is very little information in the claim as to how these advantages can be achieved. Claim 1 merely states that “the object classifier is arranged to configure at least one of the first and second object classification cycles in response to control data derived from one or more data sources external to the object classifier.” Moreover, it is not clear that these advantages are necessarily realised across the breadth of claim 1. This is presumably why Mr Jones said in the paragraph quoted above that the invention “*may provide greater efficiency and reduced power consumption*”. I will come back to this point later but for now will include in the contribution the possibility that these advantages are present.

24 I also note that the applicants’ framing of the contribution includes the alleged advantages of the system but does not specify the features which give rise to the advantages. Although the field of endeavour of the invention is a relevant consideration, as are any potential advantages of the invention, in the present case I consider it necessary also to include in the contribution the steps which are said to provide for the alleged advantages.

25 Taking into account all the above points, I will therefore define the actual contribution as:

An image processing system in the form of an object classification system comprising an object classifier accessing categorisation data comprising hierarchical object definition data sets during classification cycles, the object definition data including a first group of coarse-level object definitions and a second group of finer-level object definitions, whereby, in a first object classification cycle, a first subset of object definitions are selected from the categorisation data, the subset including at least a first group of coarse-level object definitions and at least a second group of finer-level object definitions and, in a second object classification cycle, a second such subset of object definitions is selected, the first subset being selectively executed in the first object classification cycle and the second subset selectively executed in the second object classification cycle, wherein at least one of the first and second object classification cycles is configured in response to control data derived from one or more data sources external to the object classifier. The system may require less processing resource and may provide greater efficiency and reduced power consumption.

Steps (3) and (4): Ask whether the contribution falls solely within the excluded subject matter; check it is actually technical in nature

26 The Court of Appeal in *Symbian*⁷ ruled that the question of whether the invention makes a technical contribution must be addressed when considering the computer program exclusion, although it does not matter whether that takes place at step three or step four. For convenience I will consider the third and fourth steps together. The contribution relates to a program for a computer, although of course it would be installed on computer hardware in order to operate. But this does not mean that the invention is necessarily excluded from patentability. I must decide whether the contribution I have identified above falls wholly in the excluded categories, or

⁷ *Symbian Ltd v Comptroller-General of Patents* [2009] RPC 1

whether it makes a technical contribution. For computer-implemented inventions the *AT&T/Cvon* signposts set out above provide helpful pointers in determining whether such inventions make a technical contribution, and I will consider them in turn.

Signpost i) Whether the claimed technical effect has a technical effect on a process which is carried on outside the computer.

- 27 Signpost i) is based on *Vicom*⁸. In the *AT&T* judgment, Lewison J (as he then was) said in paragraph 18 in relation to *Vicom*:

“The point which I think the Board are making is that what was claimed was not the computer program at all, but the process of manipulating the images. That process was a technical process and hence made a technical contribution. It is, I think, the same point that they make in the other extract quoted by Lord Neuberger (§ 15):

“Generally claims which can be considered as being directed to a computer set up to operate in accordance with a specified program (whether by means of hardware or software) for controlling or carrying out a technical process cannot be regarded as relating to a computer program as such and thus are not objectionable under Article 52(2)(c) and (3) EPC.”

- 28 Thus, *Vicom* was considered by the Board to be not objectionable under Article 52(2)(c) and (3) EPC because the claimed process for digitally filtering an image was considered a technical process of manipulating images.
- 29 Mr Jones acknowledged at the hearing that the first signpost is most pertinent to the assessment of technical contribution for the present invention. He considered the image processing system to be more efficient and reduce power consumption over the prior art systems and argued that this was a technical effect, being an inherently technical problem in the technical field of an image processing system, the steps of image processing being inherently technical in nature.
- 30 The examiner argued that the computer system includes a classifier which operates in two cycles. The two cycles use different subsets of stored categorisation data. The result is the classification of objects in an image. There appears to be no effect or control of a process outside of the computer.
- 31 I need to consider whether the specific object classification system of claim 1 carries out a technical process on an image which can be considered a technical process outside of the computer. I do not read *Vicom* as teaching that all inventions which could be classed as being in the field of image processing make a technical contribution. Rather the Board found that the process in question in that case, which related to a mathematical method applied to the digital filtering of images, was a technical process on an image. A judgment must be made on a case-by-case basis as to whether a particular process carried out on an image is a technical process and makes a technical contribution, considering the claimed invention as a whole.
- 32 Firstly, I will comment that I do not believe it to be the case that all inventions considered to lie in the field of endeavour of object classification can be considered

⁸ VICOM SYSTEMS INC/Computer-related invention T0208/84, [1987] O.J. E.P.O. 14, [1987] 2 E.P.O.R. 74.

to make a technical contribution. There are some inventions which may make a technical contribution in this field, for example in the way they directly analyse the image, but others which may not. This is consistent with the EPO Guidelines for Examination⁹ in relation to AI inventions, to which Mr Jones referred me. Part G, section 3.3.1, states:

“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.”

- 33 Mr Jones generally considered that if the decision was to refuse the application, then this would be moving away from the EPO rather than aligning the law in this field. Furthermore, he also felt that the EPO guidelines do not necessarily refer to whether the low level features are explicitly claimed as part of the invention but rather talks about the process of classification being a technical application of classification algorithms being applied to specific types of signals such as images or videos. This classification based on low level features is an inherent part of making use of machine learning neural networking techniques which utilise these low-level features such as edges, boxes for use in classification.
- 34 I note that the EPO Guidelines for Examination do not necessarily reflect practice in the UK. However, I note that they specifically refer to, “...*low level features (e.g. edges or pixel attributes for images) ...*”. This is consistent with the *Vicom* decision. The application in suit does not refer to such ‘low level’ features during object classification and does not relate specifically to a new classification algorithm, but rather relates to the high-level process of selecting object definitions from the object definition data, which, as the examples set out in the application confirm, are at a high level reflecting a more administrative process. I do not take these guidelines to explicitly state that any invention which could be said to be in the field of the classification of digital images is necessarily a technical application of classification algorithms.
- 35 I also note that in section 3.3 of the EPO’s Guidelines for Examination an example of a technical purpose which might be served by a mathematical method is “digital audio, image or video enhancement or analysis, e.g. de-noising, *detecting persons in a digital image*” (emphasis mine). This section also states that “A *generic* purpose such as “controlling a technical system” is not sufficient to confer a technical character to the mathematical method. The technical purpose must be a *specific* one.” It also states “Furthermore, the mere fact that a mathematical method may serve a technical purpose is not sufficient, either. The claim is to be functionally *limited* to the technical purpose, either explicitly or implicitly.”
- 36 In the present case, I note that the specific algorithms used to analyse the image itself, for example to identify edges or pixel attributes for images, do not form part of the contribution. Nor is the invention claimed in claim 1 directed to identifying any specific features in an image such as detecting persons in an image. Rather it is the selection of the subsets of the object definitions from the categorization data for the respective two object classification cycles in response to control data derived from

⁹ Guidelines for Examination in the European Patent Office, available at <https://www.epo.org/law-practice/legal-texts/guidelines.html>.

one or more data sources external to the object classifier which forms the key part of the contribution. It is ultimately an administrative choice whether to exclude certain categories of object classification data from a particular classification cycle, based for example on the risk of an object being wrongly classified or not classified at all as a result of that choice, or on the level of specificity required in the object classification, as well as on other factors.

- 37 Examples of hierarchical object definitions are provided in paragraphs [0021] and [0022] of the description where, for example, the class “Animal” has a subclass “2 legged”. This has a further subclass “Human” which can itself have further subclasses such as “Male/female” and “Eye colour”. I note however that the claim is not limited to any such examples. The contribution lies therefore in selecting certain subsets of object definitions for use in the object classification system which could be at a coarse level or a fine level in the hierarchy. This seems to me to relate not to a technical process carried out on the image itself, but rather to the way object definitions are administratively selected from the library of categorization data based on the external control data in order to classify an object. Moreover, I note that, although the applicants claim that the classification process will be faster and result in reduced processing, such potential advantages may not necessarily be realised in all circumstances. Although in most cases the system may well result in reduced processing and/or faster or more efficient image classification, there may be situations where the processing required to process the data from the external source and select the subsets of object definitions outweighs any savings in processing resources from using the entire set of object definitions in each cycle, particularly if the selected subsets form a large part of the set from which they are selected. The advantages are only realised if the subsets are selected in a particular manner to achieve these advantages in a particular context. The claim is therefore not functionally limited to any technical purpose.
- 38 Mr Jones argued that many processes outside of the computer would benefit from the image classification system of the present invention. For example, in an autonomous vehicle the image processing system of the present invention would provide benefits to the autonomous vehicle in that there is less power drain because of the more efficient image processing system. There is also the benefit of the object being identified more quickly which enables other systems of the vehicle, such as braking systems, to react more quickly. A further example provided was in the case of an electric vehicle benefiting from the image processing system, which would use less power and thus have a technical effect on battery consumption.
- 39 These examples appear to be a possible, but there is no substantive discussion of such examples in the specification and the claims are not limited to any such application. The specification does refer to the use of the invention in a vehicle and lists examples of various sensors which could provide the source data. It also discloses the use of the invention in simultaneous location and mapping (SLAM) system. The application describes how a SLAM module could be used with a neural network accelerator, but no further details are specified. According to the applicants the SLAM system would benefit from the more efficient image classification system in improving the latency. This may be the case, but I note that claim 1 is not limited to such an application.

- 40 The step of carrying out the configuration of the classification cycles in response to control data from unspecified external data sources, without any limitation to any specific type of external data source, is not sufficient to impart a technical contribution. It is not sufficient that a contribution has the mere possibility of being applied to a technical process. The claim must be limited to that technical process and this is not the case in the present invention. Moreover, the claim does not specify how the object classification cycles are configured in response to this control data, for example in relation to how the subsets of object definitions are selected. Indeed, the control data could merely be used to trigger the configuration process rather than influence the way the cycles are configured, the claim specifying that the cycles are configured "*in response to control data*". I therefore conclude that the contribution identified does not make a technical effect on a process outside of the computer.
- 41 Dependent claims 2-5 claim further details of these external data sources. Claim 2 specifies that the control data is derived from sensor data from external sensors. Claim 3 specifies that the sensor senses the availability of a system resource of the image processing system. Claim 4 states that the availability of the system resource comprises a state of charge of an electric battery to power the image processing system, an amount of available storage accessible by the image processing system, an amount of compute resource available to the image processing system, or an amount of electrical power available to the image processing system.
- 42 Claims 2-4 therefore define an image processing system whereby the status of the hardware of that system is monitored and the image classification process configured on the basis of this status in the way the subsets of object definitions are selected. This provides a link between the status of the hardware of the system and the operation of the image classification system which does, in my view, constitute a technical contribution. Claim 2 alone does not bring this out but claims 3 and 4 do.
- 43 Claim 5 is dependent on claim 2 and defines another list of sensors as the external data source, specifically a geographic location sensor, an ambient temperature sensor, a visual information sensor to generate sensor data indicative of image data, an audio information sensor arranged to generate data indicative of audio data, a speed sensor, an acceleration sensor, a radio signal sensor, a movement sensor, and a SLAM module. The purpose of these sensors is less clear, perhaps because they are shorn of any specific application. It may be that they are intended for use with a vehicle, but the claim is not limited to this use. The claim relates to one or more of these data sources and I am not convinced that each of them would make a technical contribution.

Signpost iii) Whether the claimed technical effect results in the computer being made to operate in a new way

- 44 The applicants argue that the computer operates in a new way. During image processing the object classifier is arranged to configure the object classification cycles in response to control data from external sources. This inherently requires the computer to obtain data from external data sources. Thus, the computer operates differently compared with an image classifier that does not receive data from sources external to the object classifier.

- 45 Any conventional computer operating new software would make the computer operate differently. This is not sufficient to satisfy this signpost. Rather the computer itself must operate in a new way in the sense of running more efficiently and effectively as a computer. In the present case the computer program does not make the computer itself operate in a new way, rather it is the object classification process which operates in a new way.

Signpost ii) Whether the claimed technical effect operates at the level of the architecture of the computer; that is to say whether the effect is produced irrespective of the data being processed or the applications being run.

Signpost iv) Whether the program makes the computer a better computer in the sense of running more efficiently and effectively as a computer.

- 46 I will assess the contribution with regards to Signposts ii) and iv) together, although I note that the applicants did not make any specific arguments in relation to signpost ii). The applicants acknowledge that the invention does not improve the computer's architecture but argue its operational performance is efficiently enhanced. The invention does not operate at the architectural level and does not make any changes to the underlying computer system. Nor does the contribution make the computer itself operate in a new way or enable the computer to operate more efficiently or effectively as a computer. Any performance improvements arise directly out of the specific application and the specific data being processed and do not make the computer a better computer in a general sense.

Signpost v) Whether the perceived problem is overcome by the claimed invention as opposed to merely being circumvented.

- 47 The final signpost looks at the problem being solved by the invention and establishes whether the problem has been solved or circumvented. The agent disagrees with the examiner on the problem to be solved. The agent suggests the problem to be: "How to increase the efficiency of an image processing system whilst reducing power consumption." This differs from the examiner's definition of the problem, "...*There is thus a need for more efficient methods of detecting characteristics of images...*", which is taken from paragraph [0002] of the description. In practice I do not believe that there is a great deal of difference between these characterisations of the problem to be solved. Both refer to the need for greater efficiency, the applicants' characterisation also picking up on the desire to reduce power consumption. As I have already said, whether the contribution is characterised as an image processing system or an object classification system does not, in practice, make a significant difference.

- 48 The problem, expressed in the general terms of claim 1, is not solved in any technical sense, for example in an improved processor design for carrying out the necessary calculations or improved algorithms for carrying out the detailed analysis of the image as was the case in *Vicom*. Rather it is solved by selecting subsets of classification data for the two object classification cycles on the basis of control data from an external source. This seems to me to be circumventing the problem rather than overcoming it in any technical sense. Therefore, signpost (v) does not indicate that the program provides a technical contribution.

- 49 Having considered all the signposts, none of them point to the contribution as making a technical contribution. Taking a step back and looking at the contribution as a whole, the improvements to the object classification system lie in the selection of subsets of object classification data over the two classification cycles, the configuration of the two cycles being controlled by control data from an external source. This is not a technical solution to the problem of improving the efficiency and/or reducing the power consumption of an object classifier but rather more of an administrative solution in selecting particular classification data based on control data from an external data source, implemented as a program for a computer. It is not a technical improvement to the object classification system. I therefore conclude that the invention claimed in independent claims 1, 19 and 21 is excluded from patentability as a program for a computer as such.
- 50 Claim 5 also does not make a technical contribution as it is not sufficiently tied into a technical application for all the data sources listed in the claim. I have however found that the invention claimed in claims 3 and 4 does make a technical contribution and these claims are therefore allowable.

Conclusion

- 51 I have found that the invention claimed in claims 1, 19 and 21 is excluded from patentability as a program for a computer as such. I have however found that claims 3 and 4 are not excluded from patentability.
- 52 I will therefore provide the applicants with an opportunity to file amendments to restrict the independent claims to claims 3 or 4. Any such amendments must be filed within a period of one month of the date of this decision. The examiner will also, at that point, need to update the search as specified in his letter dated 19 November 2020. If no amendments are filed within this period then I direct that the application be refused.

Appeal

- 53 Any appeal must be lodged within 28 days after the date of this decision.

B Micklewright

Deputy Director, acting for the Comptroller