



PATENTS ACT 1977

APPLICANT International Business Machines Corporation

ISSUE Whether patent application GB2101742.1 satisfies the requirements of sections 1(1)(d) and 1(2)

HEARING OFFICER B Micklewright

DECISION

Introduction

- 1 International application PCT/IB2019/056146 was filed on 18 July 2019 with a declared priority date of 24 July 2018 in the name of International Business Machines Corporation. It was published under the Patent Cooperation Treaty on 30 January 2020 as WO 2020/021404. The application subsequently entered the national phase in the UK and was allocated the application number GB2101742.1. It was republished as GB2588874 A.
- 2 The examiner considered the invention claimed in the application to be a program for a computer as such and therefore to be excluded from patentability. The applicant disagreed and, following several rounds of correspondence, requested that the matter be referred to a hearing officer for a decision on the papers.
- 3 I confirm that I have considered arguments made in all the correspondence on file, in particular in letters from the applicant dated 26 May 2021, 28 July 2021 and 01 November 2021.

The invention

- 4 The invention relates to performing large scale entity resolution using active learning. Entity resolution relates to finding records in a data set that refer to the same entity across different data sources. It is used for deduplication in a single database or for matching entities of different databases. The present invention is aimed at improving active learning of entity resolution rules to better scale over large data sets. Matching functions are basic components for composing entity resolution rules. The active learning learns the composition of several matching functions together with thresholds and generates an entity resolution rule. Multiple iterations of the active learning process outputs a number of such rules, which identify entities that belong to the same real-world entity.

5 Entity resolution normally involves a rule, for example (specified in paragraph [0035] of the application in suit):

T.lastName = C.lastName and T.location.state = C.state and
firstNameMatch(T.firstname,C.firstname)

6 It also involves a similarity score of entries based on the rule. On occasions the similarity based on a containing rule (e.g., in the above example, T.lastName = C.lastName and T.location.state = C.state) has already been computed. The invention caches similarity scores that are computed in the form of features vectors (a feature vector in the context of machine learning is a numeric individual measurable property or characteristic of a phenomenon) and, before computing similarities based on a rule, checks whether the rule is already computed or a containing rule is already computed, as it is easier to compute similarities for a rule if similarities for a containing rule are already known. The cache is a two-level cache hierarchy comprising a distributed memory cache and a distributed disk cache.

7 The latest set of claims was filed on 26 May 2021. The three independent claims, claims 1, 10 and 16 relating to a method, computer program product and apparatus respectively, are all similar in scope. For the purposes of this decision it will be sufficient to consider claim 1 which reads:

1. A method comprising:

performing, by a processor, active learning of large scale entity resolution using a distributed compute memoing cache to eliminate redundant computation;

determining link feature vector tables for intermediate results of the active learning of the large scale entity resolution; and

managing the link feature vector tables by a two-level cache hierarchy comprising a distributed memory cache and a distributed disk cache.

The law

8 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.

9 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.*

10 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”. In *Symbian*³ the Court of Appeal made clear that the *Aerotel* approach is not intended to be a departure from the previous requirement in case law that the invention must provide a technical contribution to avoid falling into the excluded matter.

11 Lewison J in *AT&T/CVON*⁴ 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*⁵. 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.*

Assessment

12 I will consider the *Aerotel* steps in turn in my analysis.

- (1) *Properly construe the claim*

13 No particular construction issues arise in relation to the claim. Entity resolution is a well-known concept as I have discussed above. Similarly I have also discussed feature vectors, which are also well known in the field of machine learning. The

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

³ *Symbian Ltd's Application* [2008] EWCA Civ 1066, [2009] RPC 1

⁴ *AT&T Knowledge Venture/CVON Innovations v Comptroller General of Patents* [2009] EWHC 343 (Pat)

⁵ *Gemstar-TV Guide International Inc v Virgin Media Ltd* [2010] RPC 10

applicant, in their letter of 26 May 2021, defined memoization as “an optimization technique used to speed up computer programs by storing the results of expensive function calls and returning the cached results when the same inputs occur again”. This definition is consistent with established definitions, and I am happy to accept this definition. Thus a memoing cache is a cache used for this purpose.

- 14 Although the claim is not specific in relation to how the link feature vector tables are managed by the two-level cache hierarchy, it is sufficient for the purposes of this decision to construe this as the table being managed in the two-level cache hierarchy (the distributed memory cache and the distributed disk cache) in the way that such caches are generally used to manage access to data so as to allow efficient access to data.

(2) Identify the actual contribution

- 15 The examiner and the applicant appear to be in general agreement in relation to identifying the contribution. The examiner identified the contribution as:

“Using a two-level cache hierarchy comprising distributed memory cache and distributed disk cache for storing link vector tables for intermediate results to be used as a memoing cache when performing active learning of large-scale entity resolution.”

- 16 This seems to me to be a reasonable identification of the contribution and I will consider steps (3) and (4) on this basis.

(3) Ask whether it falls solely within the excluded subject matter; (4) Check whether the actual or alleged contribution is actually technical in nature

- 17 For convenience I will consider steps (3) and (4) together. The applicant sets out two main arguments in their correspondence, and then also makes arguments in relation to each of the *AT&T* signposts.

- 18 The applicant’s first argument relates to the technical nature of large-scale entity resolution. This, they submit, is a technical field with real life application and physical significance in the ordering and compression of the datasets. In their letter of 26 May 2021 the applicant stated:

"In the present application, the process for which in effect protection is sought is large-scale entity resolution. Large-scale entity resolution is a technical field that involves large datasets that relate to real life entities. This field is powered by entity resolution engines to connect data sources and has a range of technical aspects including entity matching, data integration, data compression due to duplication elimination, etc. Large dataset manipulation and compression have physical significance and this is therefore a technical field.

It therefore follows that active learning as a subset of machine learning applied to entity resolution is also a technical field. Active learning is a special case of machine learning in which a learning algorithm can query an information source to label new data points with the desired outputs. It is accepted that machine learning applied in a field of technology gives the machine learning technical purpose."

- 19 In their letter of 28 July 2021 the applicant re-iterated that the data sources themselves relate to real-world entities, adding that entity resolution does not relate to analysis of the data values but instead to resolving related data source objects and grouping these together. Stored data objects have real-life meaning and application. It is therefore a technical form of indexing rather than a data analysis or administrative method and has huge practical applications in a wide variety of technical domains. The inputs are the data source objects of one or more data sources and the outputs are mappings or clusters of data source objects. Therefore, the technical process outside the computer to which the invention is applied is processing data sources and generating data source object mappings or clusters referencing equivalent data source objects relating to common real-life entities. The claims relate to "large scale" entity resolution which make clear that it cannot be carried out in a non-technical manner such as "record linkage in a telephone directory." Big data and large scale entity resolution make this a technical task using multiple processing techniques and referencing data sources and database management systems. It is also not a purely mathematical method as it relates to grouping matching data source entries or objects that have contents relating to real-life entities.
- 20 The applicant argues that the EPO's decision in *Vicom*⁶ is relevant to the present invention because it relates to entities in the form of physical real-world objects.
- 21 According to the applicant large scale entity resolution is therefore a technical task outside the computer. The technical problems solved by entity resolution may be considered to include data duplication and proliferation, a lack of data integration, and a lack of security.
- 22 In their letter of 1 November 2021 the applicant stated (emphasis the applicant's):

"Our arguments centre on the technical nature of large scale entity resolution. This is based on the concept of entity resolution being a functional aspect applied to a data source object representing an entity. This is distinct from the cognitive aspect such as data values and information stored in relation to the data source object. This is an important distinction on which a large number of our arguments are based and which has not been addressed by the examiner.

Manipulation of the cognitive data as stored as attributes of an entity may be regarded as a purely administrative task. However, the claimed invention relates to performing active learning of large scale entity resolution, which is a functional aspect of resolving data source objects to identify the data source objects that relate to a single entity and that has a technical function in an entity resolution engine.

This can be considered as analogous to the functional nature of a message header and a cognitive nature of the message payload or content."

- 23 The applicant referred to section G-II 3.6.3 of the EPO Guidelines for Examination⁷ which states that functional data has a technical function in a technical system, such as controlling the operation of a device controlling the data.

⁶ *Vicom Systems Inc T0208/84 [1987]*

⁷ Guidelines for Examination in the European Patent Office, available at <https://www.epo.org/law-practice/legal-texts/guidelines.html>

- 24 The applicant therefore submitted that handling the entities as data source objects is a technical process. By resolving data sources objects as relating to a common entity, data deduplication and compression (in the form of reducing a size of a data source) at least inevitably takes place.
- 25 Taking all these arguments into consideration, I am not convinced that large scale entity resolution is, in itself, a technical field. I agree that large-scale entity resolution can have a number of technical applications, but it can also be applied in non-technical contexts. In and of itself it relates to a method applied to data. I understand the distinction the applicant makes between the data objects representing the entities and the data itself to which the entities relate, but do not agree that the data objects are necessarily technical in nature. Rather they seem to relate to the data records which are the subject of the entity matching. Moreover, although they may relate to “real-life” entities, it does not follow that they are necessarily technical. For example they could relate to the name and address of an individual. In any case it is evident from the application that a match is defined in relation to the data recorded against the entities, for example in the rule I have set out in paragraph 5 above and which is set out in paragraph [0035] of the description of the present application.
- 26 Nor do I consider large-scale entity resolution to be a technical form of indexing. Although entities are matched, this is not, in my view, a form of data indexing. Rather it relates to finding records in a data set that refer to the same entity across different data sources. Although it can be used for data duplication, data compression or security, these applications are not a necessary effect of entity resolution and I note that the contribution I have identified above does not relate to these applications, but rather to improved entity resolution. In any case, as the examiner pointed out in his letter of 10 February 2022, indexing in itself is not necessarily considered technical by the UK courts (see for example paragraph [0047] of *AT&T*). I note that section G-II 3.6.3 of the EPO Guidelines discuss an index structure used for searching a record in a database producing a technical effect since it controls the way the computer performs the search operation. This is not however the situation in the present invention where no such index structure is present and there is no control of the computer in this manner. The applicant also argues that “by the nature of resolving data source objects as relating to a common entity, data deduplication and compression (in the form of reducing the size of the data source) at least inevitably takes place”. I am not convinced that this is the case because resolving data source objects as relating to a common entity does not necessarily reduce the size of the dataset. It could even increase the size in some circumstances, for example if redundant entries are not removed but additional data denoting the commonality is added. In any case there is no data compression in any technical sense. Rather a decision is made as to whether to store matched entities which could reduce data storage requirements.
- 27 I do not agree that the invention relates to using functional data, which is defined by the EPO as having “a technical function in a technical system, such as controlling the operation of the device processing the data.” The data on which the entity resolution takes place is, as I have said, actual data relating to the entity. It is cognitive data (i.e. data relevant only to human users and does not contribute to producing a technical effect) rather than functional data and therefore does not contribute to making a technical contribution. I am also not convinced by the analogy with an

electronic message with a header and a content section put forward by the applicant, also referred to in the same section of the EPO Guidelines. In the present case the rules operate on the data itself, not on any header to the data, and in any case an analogy cannot be drawn between the header data used to control electronic messages and the data objects used in entity resolution, which have very different characteristics and purposes.

- 28 Moreover I do not believe that *Vicom* assists in the present case. *Vicom* was allowed because it related to a technical process on a digital image which improved the quality of a digital image. It was only when the mathematical method of digitally filtering data was applied to a physical entity, namely an image, that it was deemed a patentable invention. The entities of the present invention to which entity resolution is applied are more akin to the abstract notion of filtering data than to the technical process of applying digital filtering to an image. The entities of the present invention are not physical entities in the sense that the image was in *Vicom*. I do not therefore consider *Vicom* to point to a technical contribution in the present invention. In fact it rather points more towards the opposite view, that the entity resolution is an abstract process on entities and does not therefore make a technical contribution.
- 29 The applicant argues that the large-scale nature of the entity resolution and its reliance on “big data” make the task of the invention a technical task. They rely on this to distinguish the invention from an example given by the examiner of record linkage in a telephone directory. In my view merely applying the algorithms to large scale data sets does not impart a technical contribution. Something more is needed.
- 30 The applicant also referred to the EPO decision in *Accenture*⁸, arguing that it was relevant because of its in-depth discussion of the mathematical method exclusion in the context of database management, which also relates to the manipulation and management of data objects that contain data values. I am not however convinced that an analogy with this case and with entity resolution can be drawn. *Accenture* related to an improvement in query execution. It was allowed not because data management as such was considered but because, according to the Board (paragraph 21.5), “*the claimed system is based on “further” technical considerations that concern a specific manner of improving response times for queries by automatically using different data stores, relation database management systems and NoSQL data stores, to manage tables.*” I therefore do not consider *Accenture* to be persuasive in relation to the patentability of the present invention.
- 31 Taking all this into account, it seems to me that large scale entity resolution is not in itself a technical process but rather an algorithmic approach to matching entities based on rules which act on the data contained in the entities.
- 32 As I have found that entity resolution is not, in itself, a technical process, it follows that machine learning when used in entity resolution is also not a technical process. Rather the machine learning algorithms are applied to abstract data sets to match undefined entities.
- 33 The applicant’s second argument is that the substance of the invention is the use of a hardware configuration at the architectural level of the computer that results in a

⁸ Accenture Global Service T1924/17 [2019]

more efficient processing method in the active learning used in entity resolution. In relation to this argument the applicant stated (emphasis the applicant's):

"Taking the second aspect, the substance of the invention is the use of a hardware configuration that results in a more efficient processing method in the active learning for entity resolution which is achieved at the architectural level of the computer.

The claimed invention uses hardware considerations to provide the substance of the actual contribution and therefore this is a technical contribution."

34 They also stated:

"The contribution of the present invention performs a task that is technical in nature as it enables machine learning in the form of active learning with a processing optimization to reduce redundant calculations and therefore provide more efficient processing in entity resolution. This is a technical contribution that results in the invention being more than a computer program as such.

In this case, the substance is the improvement is to remove redundant processing, which is made by the software programmed into the computer using a memoing cache with a two-level hierarchy as defined that provides a more efficient processing of large-scale data."

35 In their letter of 28 July 2021 the applicant emphasised that the use of the two-level cache addresses the technical problem of redundant computation and inefficiency:

"In this case, the data processing is made more efficient by eliminating redundant computation which results in referencing data objects within a same data source or across different data sources. This can also be used to result in compressing data by deduplication wherein entity resolution is used to remove entity duplications so that more data can be stored in a medium. This inventive process inside the computer is applied to the technical process outside the computer of resolving data source objects that relate to a common real-life entity. In turn, this solves a technical problem of data source object proliferation and lack of integration."

36 The invention makes use of a two-level memoing cache hierarchy comprising distributed memory cache and distributed disk cache to carry out the claimed method. Two-level caches comprising a distributed memory cache and a distributed disk cache are well known, as are their advantages for enabling faster access to cached data. The use of such a cache in a computing system is not a new hardware arrangement and does not in itself form the contribution. Rather it is the use of such a cache for storing link vector tables for intermediate results to perform active learning of large scale entity resolution which forms the contribution. The invention relates to a specific application, namely large scale entity resolution, and is not a general improvement at the architectural level which is available to all applications.

37 The applicant referred to an IPO decision, BL O/346/19 (*Fisher-Rosemount*)⁹, which itself refers to an EPO decision T0115/85 (IBM)¹⁰, both of which, according to the applicant, improved the "middle bit" of processing and were not considered excluded from patentability. I agree that, in both cases, it was a programming or processing

⁹ Fisher-Rosemount Systems, Inc (BL O/346/19)

¹⁰ IBM/Computer-related invention T0115/85 [1990]

“bit in the middle” which was important for the invention. But this element did not provide the technical contribution in either case. Rather it was the end result that was considered technical in both cases. In paragraph 35 of *Fisher-Rosemount* the hearing officer considered that T0115/85 was allowed because it was about giving visual indications about events occurring in a technical device of a computer system. Similarly the hearing officer found that, in *Fisher-Rosemount*, the invention “provides a visual indication of the internal operation of a process control system which is arguably quicker and more reliable than the prior art” and considered the claim not to reside in a computer program as such. The present invention does not have an analogous technical result or technical context. Although the invention involves a “middle bit” of processing, the end result does not relate to displaying a visual indication of a physical system. Rather it is to carry out large scale entity resolution which, I have found, is not in itself a technical field.

38 The applicant also referred to *Symbian* in this context, highlighting that the court held that the contribution made by the invention in *Symbian* was not a computer program as such because it had a knock-on effect of the computer working better as a matter of practical reality and emphasised the need to look at the practical reality of what the program achieved. I agree that *Symbian* provides important guidance on such inventions. But I note that the important element in *Symbian* was that the effect improved the operation of every process the computer was running, irrespective of the type of data being processed. This was recognised by Lewison J in *AT&T* and fed into the second *AT&T* signpost, which I will consider below. The present invention is distinguished from *Symbian* in that it uses known hardware elements to improve a specific application, namely large scale entity resolution, and the effect does not apply to all applications running on the computer.

39 In their letter of 1 November 2021 the applicant submitted that, by resolving data sources objects as relating to a common entity, data deduplication and compression (in the form of reducing a size of a data source) at least inevitably takes place. In my view the use of the two-level cache may enable large scale entity resolution to be carried out more efficiently, but, as such caches are commonplace, the contribution really relates to how the computer is programmed to store link vector tables for intermediate results in the two-level cache. This is not an improvement in the computer itself but rather an improvement in the programming of the computer. It is this that reduces redundant processing. The efficiencies therefore stem from the improvements to the program, not to improvements in the computer itself. It is not sufficient for there to be a hardware aspect to an invention; all programs must run on hardware typically comprising combinations of processors, memory and the like. The question is whether it is really the hardware or the program which results in the contribution. In this case, I have found that it is the program which results in the contribution and there is not a contribution at the architectural level of the computer.

40 The arguments above are relevant to the *AT&T* signposts, but for completeness I will briefly consider the signposts in turn.

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

41 The applicant’s first main argument relates to this signpost, where the applicant considers entity resolution to be a technical process and thus provides a technical

effect on a process outside of the computer. They followed these submissions up in their letter of 1 November 2021 with the following comments:

"ER is the task of identifying and resolving different data source objects of the same real-world object (for example, persons, products, publications, movies, etc.). This is recognised as a crucial task in data integration. Accurate and fast ER has huge practical implications in a wide variety of technical domains. In the age of big data, the output of "large scale" ER has become highly technical for data integration and management, including compression, deduplication, and security. In big data, the need for high quality ER is imperative, as we are inundated with more and more data, all of which needs to be integrated, aligned, and matched. Data sources can be very large with many millions of objects."

and

"The processing method addresses the technical problem of redundant computation and inefficiency and is addressed by the claimed contribution using the two-level cache arrangements.

Therefore, this invention falls in the first phrase of large scale entity resolution described by the Examiner in paragraph 8, of "*some implementations of large scale entity resolution can indeed have technical applications (for example, compressing data by deduplication so that more data can be stored in a medium)*". In this case, the data processing is made more efficient by eliminating redundant computation which results in referencing data objects within a same data source or across different data sources. This can also result in compressing data by deduplication wherein entity resolution is used to remove entity duplications so that more data can be stored in a medium."

- 42 I have found that large scale entity resolution is not in itself a technical process and therefore the present invention does not make a technical effect on a process outside of the computer. Rather entity resolution takes place within the computer system. Addressing the point above, it may be the case that using active learning for large scale entity resolution in the manner of the claimed invention could be used for all kinds of technical applications, but it is not the case that all such applications are technical, and the contribution does not relate to any specific application but to the process itself. I therefore conclude that there is no technical contribution on a process outside of the computer.

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

- 43 The applicant submits that the two-level cache allows for segregation of function and computation and is at the architectural level of the computer as it involves the internal working of caching components, following the guidance found in paragraph 1.38.2 of the Manual of Patent Practice¹¹ which states "*In practice, this means in the sense of the operation of the internal workings of a computer: the processor, the cache memory, or other internal components of the computer*". I would add that this paragraph goes on to say "*The "architecture" can be thought of as the combination*

¹¹ The Manual of Patent Practice is available at <https://www.gov.uk/guidance/manual-of-patent-practice-mopp>

of these components, which operate in the same way regardless of the application being run. If the effect being produced would provide a benefit to any software program which runs on the system, it is likely to meet this signpost. If the effect being produced is specific to a particular data set, type of data, or benefits only particular applications, it is likely it will fail to meet this signpost." I have already found that, in the present case, the efficiencies only arise in the specific use of the distributed cache memory for entity resolution. There is therefore no contribution at the architecture level.

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

- 44 The applicant considers the computer to operate in a new way in that it utilises the two-level memoing cache, processing data in a new way resulting in the removal of redundant calculations. However the computer only operates in a new way when performing the specific claimed method for large scale entity resolution. The algorithm makes use of the well-known concept of a distributed memory and disk cache hierarchy to perform entity resolution more efficiently. The cache operates in exactly the way such caches are expected to operate. The computer itself does not operate in a new way.

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

- 45 The applicant argues that the invention results in a better computer by removing redundant calculations and providing more efficient processing of data. I accept that the claimed method may be more efficient than other methods in removing redundant calculations, but it is a better method of entity resolution, not a better computer in itself. The computer is operating in the way it normally does.

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

- 46 The applicant identifies the perceived problem to be the slow and inefficient processing of active learning for entity resolution due to redundant calculations. This, according to the applicant, is a technical problem because the field of active learning, a type of machine learning, is technical. The solution, namely the use of the two-level memoing cache, overcomes the perceived technical problem by reducing the number of redundant calculations required by the active learning in entity resolution.
- 47 I do not agree that the field of active learning is technical. Rather it relates to algorithmic approaches to processing data. It may be applied in many technical contexts, but in itself it is not a technical field. Moreover the problem of slow and inefficient processing of active learning for entity resolution is solved by an improved algorithm that makes better use of available computing resource, namely the two-level cache, not by, for example, an improvement in the cache itself. This seems to me to be circumventing the problem of improving the efficiency of processing of active learning for entity resolution by an improved algorithm, not solving it in any technical sense.

- 48 To summarise, the invention relates to active learning for large scale entity resolution in which a two-level distributed memoing cache hierarchy comprising a memory cache and a disk cache is used to store link vector tables for intermediate results to be used. The contribution lies entirely within the algorithm which makes use of a standard cache arrangement. Neither the field of active learning nor the field of large scale entity resolution are technical fields and there is no technical effect on a technical process outside of the computer. Nor is there a contribution at the architectural level of the computer, and the computer itself operates in its normal way. I therefore conclude that the identified contribution lies solely in the excluded field of a program for a computer as such.
- 49 The applicant submits that their arguments make a reasonable case and are sufficient to cause real and substantial doubt. They therefore argue that the application should be allowed. I have however found that the invention is not patentable and there is, in my view, no real and substantial doubt as to this conclusion.

Conclusion

- 50 I have found that the contribution made by the claimed invention lies solely in the excluded field of a program for a computer as such. I therefore refuse the application under section 18(3).

Appeal

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

B Micklewright

Deputy Director, acting for the Comptroller