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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DEBASIS DUTTA, BRIAN GASPAR,
JULIAN CHALLENGER, and DINESH ARORA

Appeal 2017-009329
Application 12/814,756[1]
Technology Center 3600

Before JASON V. MORGAN, IRVIN E. BRANCH, and
MICHAEL M. BARRY, *Administrative Patent Judges*.

MORGAN, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Introduction

This is an appeal under 35 U.S.C. § 134(a) from the Examiner's final rejection of claims 1, 3–8, 10, 11, and 13–20. Claims 2, 9, and 12 are canceled. Appeal Br. 18–20. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] Appellants identify Oracle International Corporation as the real party in interest. Appeal Br. 2.

Invention

Appellants disclose using a data mining tool to predict "the future performance of [an] employee and/or the likelihood that the worker leaves at some point in the future." Abstract.

Representative Claim (*key limitations emphasized*)

> 1. A non-transitory computer-readable medium having instructions stored thereon that, when executed by a processor, cause the processor to foresee employee characteristics, the foreseeing comprising:
>
> collecting attributes associated with each of a plurality of workers, wherein the attributes relate to at least one of backgrounds, responsibilities, or compensations of the workers;
>
> applying a regression technique to the attributes to find a first function of the attributes that outputs a performance rating of at least one of the workers;
>
> *using the first function to predict a future performance of a specific worker*;
>
> applying a classification technique to the attributes to find a second function of the attributes that outputs a voluntary termination of at least one of the workers; and
>
> using the second function to predict a future likelihood of attrition of the specific worker.

Rejections

The Examiner rejects claims 1, 3–8, 10, 11, and 13–20 under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter. Final Act. 4–6.

The Examiner rejects claims 1, 4–6, 8, 11, 14–16, 18, and 19 under 35 U.S.C. § 103(a) as being unpatentable over April et al. (US 2011/0015958 A1; published Jan. 20, 2011) ("April"), Sureka (US 2008/0077544 A1; published Mar. 27, 2008), Menon (US 2009/0307025

A1; published Dec. 10, 2009), and Scarborough et al. (US 7,472,097 B1; issued Dec. 30, 2008) ("Scarborough"). Final Act. 6–12.

The Examiner rejects claims 3, 7, 10, 13, 17, and 20 under 35 U.S.C. § 103(a) as being unpatentable over April, Sureka, Menon, Scarborough, and Youngjo Lee et al., *Generalized Linear Models with Random Effects: Unified Analysis via H-likelihood*, CRC Press (2006) ("Lee"). Final Act. 12–14.

35 U.S.C. § 101 REJECTION

Examiner's Determinations and Conclusions

In rejecting claim 1 as being directed to patent-ineligible subject matter, the Examiner determines the claimed invention is directed to "predicting employee characteristics," which is "a species of fundamental economic practices, methods of organizing and assessing and predicting human activities and performance," and, thus, directed to an abstract idea. Final Act. 4. The Examiner also determines the claim recitations "all entail organizing information through mathematical correlations [and] hence are directed to further abstract ideas." *Id.* at 5. The Examiner determines claim 1 does not include "additional elements that are sufficient to amount to significantly more than the judicial exception because the additional limitations . . . are insignificant data gathering steps such as insignificant pre[-] and post-solution activities." *Id.*

Principles of Law

To be statutorily patentable, the subject matter of an invention must be a "new and useful process, machine, manufacture, or composition of matter, or [a] new and useful improvement thereof." 35 U.S.C. § 101. There are implicit exceptions to the categories of patentable subject matter identified in § 101, including: (1) laws of nature; (2) natural phenomena; and (3) abstract ideas. *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 217 (2014). The Supreme Court has set forth a framework for distinguishing patents with claims directed to these implicit exceptions "from those that claim patent-eligible applications of those concepts." *Id.* (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66 (2012)). The evaluation follows a two-part analysis: (1) determine whether the claim is directed to a patent-ineligible concept, e.g., an abstract idea; and (2) if so, then determine whether any element, or combination of elements, in the claim is sufficient to ensure that the claim amounts to significantly more than the patent-ineligible concept itself. *See Alice*, 573 U.S. at 217–18.

"[A]ll inventions at some level embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas." *Mayo*, 566 U.S. at 71. We "'must be careful to avoid oversimplifying the claims' by looking at them generally and failing to account for the specific requirements of the claims." *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1313 (Fed. Cir. 2016) (quoting *TLI Commc'ns LLC Patent Litig.*, 823 F.3d 607, 611 (Fed. Cir. 2016)). We, therefore, look to whether: (1) the claims focus on a specific means or method that improves the relevant technology or (2) the claims are instead directed to a result or effect that itself is the abstract idea and merely invoke generic processes and machinery. *See Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335–36 (Fed. Cir. 2016). That is, we look to whether the claims are "specifically designed to achieve an improved *technological* result in conventional industry practice." *McRO*, 837 F.3d at 1316 (emphasis added) (citing *Alice*, 573 U.S. at 222–24).

If a claim proves to be unpatentable as a result of the two-part analysis, no additional determination regarding preemption is necessary. "While preemption may signal patent ineligible subject matter, the absence of complete preemption does not demonstrate patent eligibility," as "questions on preemption are inherent in and resolved by the § 101 analysis." *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015) (internal quotation marks and citation omitted).

Appellants' Contentions and Our Analysis (Step 1)

Appellants contend the Examiner erred by failing "to provide a court decision or provide a proper identification of an abstract idea." Appeal Br. 5; *see also* Reply Br. 2. The Examiner, however, properly determines that the claim recitations are directed to fundamental economic practices related to "predicting employee characteristics." Final Act. 4.

Specifically, the claimed invention's application of regression and classification techniques to predict, based on collected attributes, future worker performance and attrition merely juxtaposes methods of calculating that, individually and in combination, are abstract. *See SAP Am., Inc. v. Versata Dev. Grp., Inc.*, 107 USPQ2d 1097, 1110 (PTAB 2013) (non-precedential), *aff'd*, 793 F.3d 1306 (Fed. Cir. 2015). The ideas of seeking to predict worker performance and seeking to predict worker attrition are forms of risk management that, like methods of hedging against price fluctuation risk or mitigating settlement risk, are directed to abstract fundamental economic practices. *See Alice*, 573 U.S. at 219–21. The Specification acknowledges that "[o]rganizations utilize human resource management processes to attract appropriately skilled employees, integrate them into the organization, assess and develop their competencies, and retain their commitment." Spec. ¶ 2. The claimed invention, which uses mathematical techniques as part of these processes (e.g., assessing an employee's competencies and commitment) merely adds the use of mathematical concepts without making the underlying abstract idea—the fundamental economic practice of managing risks associated with the use of human resources by predicting employee performance and attrition—patent eligible. *See RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1328 (Fed. Cir. 2017), *cert. denied*, 138 S. Ct. 672 (2018) ("A claim directed to an abstract idea does not automatically become eligible merely by adding a mathematical formula").

Furthermore, "[u]sing a certain technique (i.e., classification) for predicting attrition and a completely different technique (i.e., regression) for predicting performance" (Appeal Br. 6) merely adds two abstract concepts together (i.e., two fundamental economic risk management practices) in a manner that fails to render claim 1 non-abstract (*see RecogniCorp*, 855 F.3d at 1327). As the Examiner correctly notes, "merely using two basic and different, but well-known techniques, for analyzing data for two distinct purposes, one for predicting performance and one for predicting class membership, does not establish unconventionality." Ans. 7. The overall claim continues to be directed to managing risks associated with the use of human resources by predicting employee performance and attrition—a fundamental economic practice.

For these reasons, we agree with the Examiner that claim 1 is directed to an abstract idea. Final Act. 4.

Appellants' Contentions and Our Analysis (Step 2)

Appellants contend the Examiner erred because

> use of a computer to apply a classification technique for predicting attrition and a regression technique for predicting performance is clearly a technical solution to the tedious problem of determining employee characteristics based on attributes associated with each of a plurality of workers, and is not a solution that can be easily performed manually or using routine computer data storage and mathematical operations.

Appeal Br. 6–7. That is, Appellants argue the invention of claim 1 "improve[s] the functioning of [a] computer." *Id.* at 9.

Appellants' arguments are unpersuasive because "mere automation of manual processes using generic computers does not constitute a patentable improvement in computer technology." *Credit Acceptance Corp. v. Westlake Servs.*, 859 F.3d 1044, 1055 (Fed. Cir. 2017). Here, the Specification generically describes a number of computer technologies that could perform the claimed techniques without detailing how such computer technologies are improved. *See, e.g.*, Spec. ¶¶ 27 ("Processor 22 may be any type of general or specific purpose processor"), 37 ("functionality may be performed by hardware . . . or any combination of hardware and software"), 73–77, Fig. 1.

Furthermore, contrary to Appellants' arguments that the claimed solution cannot be performed "using routine computer data storage and mathematical operations" (Appeal Br. 7), the Specification describes both the storage and mathematics used broadly as routine, well-known technologies and techniques. For example, the Specification discloses that "[c]omputer readable media may be any available media that can be accessed by processor 22 and includes both volatile and nonvolatile media, removable and non-removable media, and communication media." Spec. ¶ 28. The Specification also discloses multiple classification and regression techniques, denoting some simply by name. *See, e.g.*, *id.* ¶¶ 41 ("classification algorithms include Naive Bayes, Decision Tree, . . ."), 42 ("regression algorithms include Multiple Regression . . .").

For these reasons, we agree with the Examiner that claim 1 is "specified at a very high level of generality and invoke[s] well understood techniques for the statistical analysis of data." Ans. 7. Moreover, the invention of claim 1 merely recites, in the preamble, use of generic computer elements as a tool. *See Credit Acceptance*, 859 F.3d at 1055 (citing *Enfish*, 822 F.3d at 1335–36). Therefore, we agree with the Examiner that claim 1 does not have additional limitations sufficient to transform the underlying abstract idea into patent-eligible subject matter. Final Act. 5.

Accordingly, we sustain the Examiner's 35 U.S.C. § 101 rejection of claim 1, and claims 4–8, 11, and 14–20, which Appellants do not argue separately with respect to this rejection.

Dependent Claims 3, 10, and 13

With respect to claim 3, which depends from claim 1, the Examiner determines that "outputting information in a graphical X-Y chart . . . constitute[s] . . . insignificant post-solution activity associated with data gathering." Final Act. 5. Appellants contend the Examiner erred because "the recited graphical representation provides benefits that are significantly more than an abstract idea." Appeal Br. 8. We agree with the Examiner, however, that "the use of such graphical outputs, especially in the context of statistical methods, is a well understood and commonplace practice such as use of scatter plots and the like." Ans. 9. The Examiner correctly concludes that "[s]uch typical and usual types of displays are not generally seen as constituting significantly more than abstract ideas." *Id.* (citing *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1352 (Fed. Cir. 2016)). The Specification's illustrations of the claimed XY chart (*e.g.*, Spec. Fig. 13a) show that the claimed XY chart is merely a scatterplot—a basic visualization of two-dimensional data points that has its origins in the first half of the nineteenth century (*see* Michael Friendly and Daniel Denis, *The Early Origins and Development of the Scatterplot*, Journal of the History of the Behavioral Sciences, Vol. 41(2), 103–30, 128 (Spring 2005)). The use of this well-known visualization technique does not make the invention of claim 3 significantly more than the underlying abstract idea of managing risks associated with the use of human resources by predicting employee performance and attrition—an abstract fundamental economic practice.

Accordingly, we sustain the Examiner's 35 U.S.C. § 101 rejection of claim 3, and claims 10 and 13, which Appellants do not argue separately with respect to this rejection.

35 U.S.C. § 103(A) REJECTIONS

Examiner's Determinations and Conclusions

Menon discloses examples of general behaviors, such as consistent low performance on metrics, that form general employee satisfaction indicator set 206. Menon ¶ 46, Fig. 2. Menon teaches that an "employer may use a knowledge base, database, or other information to evaluate the employee satisfaction behavior." *Id.* ¶ 52. "The expected attrition time measurement for [an] employee may be calculated based on . . . the employee satisfaction behavior." *Id.* ¶ 60.

In rejecting claim 1 the Examiner relies on Menon's employee satisfaction behavior teachings, which include performance metrics, to teach or suggests *using a first function to predict a future performance of a specific worker*. Final Act. 8 (citing, e.g., Menon Fig. 9, ¶¶ 46–50, 61); *see also* Ans. 11 ("the rejection clearly attributes prediction of performance to Menon"). The Examiner concludes it would have been obvious to modify the teachings and suggestions of the other cited references "to include worker performance predictions as taught by Menon" because "the claimed invention is merely a combination of old elements." Final Act. 8.

Appellants' Contentions and Our Analysis

Appellants contend the Examiner erred because "Menon merely lists 'examples of general behaviors' which may include 'consistent low performance.' Such behaviors are used as ***input information*** in various embodiments of Menon to ***predict attrition***, but Menon is completely silent regarding any performance related output such as a ***prediction of performance***." Appeal Br. 14.

Appellants accurately characterize the use of "performance" as an input predictor rather than as a prediction output. Menon teaches that an employee with "consistent low performance" exhibits of the negative employee satisfaction indicators that places the employee at higher risk of attrition, which can be reported as expected attrition date. *See* Menon ¶¶ 46–53, 60. Importantly, the Menon does not predict employee performance. Rather, Menon uses employee performance to predict attrition. The Examiner does not present findings or explanation showing that it would have been obvious to predict employee performance based on the cited teachings of Menon. Nor does the Examiner show that the other references cure the noted deficiency of Menon.

Accordingly, we do not sustain the Examiner's 35 U.S.C. § 103(a) rejection of claim 1, and the Examiner's 35 U.S.C. § 103(a) rejections of claims 3–8, 10, 11, and 13–20, which contain similar recitations

DECISION

Because we affirm at least one rejection of each claim, we affirm the Examiner's decision rejecting claims 1, 3–8, 10, 11, and 13–20.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 41.50(f).

AFFIRMED

APPENDIX

Excerpts from Michael Friendly and Daniel Denis, *The Early Origins and Development of the Scatterplot*, Journal of the History of the Behavioral Sciences, Vol. 41(2), 103–30 (Spring 2005)

Notice of References Cited	Application/Control No. 12/814,756	Applicant(s)/Patent Under Patent Appeal No. 2017-009329	
	Examiner	Art Unit 3629	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	The Early Origins and Development of the Scatterplot, Journal of the History of the Behavioral Sciences, Vol. 41(2), 103-30 Spring 2005
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Journal of the History of the Behavioral Sciences, Vol. 41(2), 103–130 Spring 2005
Published online in Wiley Interscience (www.interscience.wiley.com). DOI 10.1002 /jhbs.20078

THE EARLY ORIGINS AND DEVELOPMENT OF THE SCATTERPLOT

MICHAEL FRIENDLY AND DANIEL DENIS

Of all the graphic forms used today, the scatterplot is arguably the most versatile, polymorphic, and generally useful invention in the history of statistical graphics. Its use by Galton led to the discovery of correlation and regression, and ultimately to much of present multivariate statistics. So, it is perhaps surprising that there is no one widely credited with the invention of this idea. Even more surprising is that there are few contenders for this title, and this question seems not to have been raised before.

This article traces some of the developments in the history of this graphical method, the origin of the term *scatterplot*, the role it has played in the history of science, and some of its modern descendants. We suggest that the origin of this method can be traced to its unique advantage: the possibility to discover regularity in empirical data by smoothing and other graphic annotations to enhance visual perception. © 2005 Wiley Periodicals, Inc.

Of all the well-known graphical devices used today for the display of quantitative data, the most ubiquitous, at least in popular presentation graphics—pie charts, line graphs, and bar charts—in their modern form, are generally attributed to William Playfair[1] (1759–1823). All of these were essentially one-dimensional (1D) or at least topographically equivalent to 1D forms (or perhaps 1.5D, where the .5 was a dimension of time, a categorical variable, or another variable, showing an apparently functional or exact relation).

The next major invention, and the first true two-dimensional (2D) one, is the *scatterplot*. Indeed, among all the forms of statistical graphics, the humble scatterplot may be considered the most versatile, polymorphic, and generally useful invention in the entire history of statistical graphics. Tufte (1983) estimated that between 70 and 80 percent of graphs used in scientific publications are scatterplots; see also Cleveland and McGill (1984) for modern developments.

To distinguish it from other graphic forms, we define a scatterplot as a plot of two variables, x and y, measured independently to produce bivariate pairs (x_i, y_i), and displayed as individual points on a coordinate grid typically defined by horizontal and vertical axes, where there is no necessary functional relation between x and y. The definition for the terms *scatter diagram, plot,* from the *Oxford English Dictionary* (*OED2*) gives the three essential characteristics: (a) two variables measured on the same observational units, (b) plotted using points referred to (typically orthogonal) axes, and (c) designed to show the relation between these variables (typically as how the ordinate variable, y, varies with the abscissa variable, x):

> **scatter diagram, plot** (*Statistics*), a diagram having two variates plotted along its two axes and in which points are placed to show the values of these variates for each of a number of subjects, so that the form of the association between the variates can be seen.

1. Line graphs of time series go back at least to Robert Plot (1685), and to Christopher Wren's 1750 "weather clock," a mechanical device for automatically recording a graph of temperature. The idea of a bar chart, to represent a mathematical function, rather than data, goes back to Nicholas Oresme (1482). But Playfair's 1786 *Commercial and Political Atlas* and his subsequent *Statistical Breviary* (Playfair, 1801) are generally acknowledged as the first modern use and explanation of these graphic forms to portray empirical (largely economic) data.

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Concurrently (i.e., in the 1970s), researchers began to develop software to allow users to interact directly with a collection of several *linked* displays of the same data by selecting a subset of observations or a rectangular region in a display or table (with a mouse) so that those selected observations were identified and highlighted in all other (linked) views of the same data. More recent extensions and combinations of these ideas, and widely available software implementations too numerous to cite here, have led to explosive growth of interactive data-visualization methods, many of which exploit the polymorphic adaptability of the basic scatterplot.

Summary and Conclusions

In the first half of the nineteenth century, all the modern forms of data display were invented (Friendly & Denis, 2001), but the scatterplot—a bivariate plot of points designed to show the relation between two separate quantitative variables—was a relatively late arrival, perhaps the last to be introduced. We have argued that the idea of such a plot would not have occurred to Playfair, who viewed the largely economic data with which he was concerned as comparisons of distinct series of measurements across time or circumstance (country, product, imports vs. exports, etc.), but in Playfair's time such comparisons were conceived indirectly, by overlaying several graphs on the same page.

The need for a scatterplot arose only when scientists had the need to examine bivariate relations between distinct variables *directly*. As opposed to other graphic forms—pie charts, line graphs, and bar charts—the scatterplot offered a unique advantage: the possibility to discover regularity in empirical data (shown as points) by adding smoothed lines or curves designed to pass "not *through*, but among *them*," so as to pass from raw data to a theory-based description, analysis, and understanding. Indeed, in the cases of both Herschel and Galton, it may be argued that the plots of the smoothed relations were primary, in both presentation and use.

The term *scatter diagram* did not enter the statistical lexicon until the early 1900s, when it was illustrated as the method to "see the relationship" between variables. In this same period, the scatterplot proved its worth in several remarkable discoveries.

Modern enhancements of the basic scatterplot include a variety of methods designed to show more than a 2D view, to deal effectively with more complex data, and to allow the user to work interactively with collections of bivariate displays.

From the material we have presented, it appears that credit for the origin of the scatterplot in modern form belongs to J. F. W. Herschel, though of course there were earlier roots in graphing functions and in mapmaking, as we described in our opening section. As far as we are aware, Herschel's 1833 paper was the first to both describe the construction of a basic scatterplot and suggest its use for smoothing empirical bivariate data. (J. H. Lambert [1760] had earlier described curve fitting and interpolation for empirical data, in the context where a functional relation was expected.) More generally, we have also attempted to provide a brief history of statistical and graphical ideas that led to the modern use of the scatterplot.

Acknowledgments

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