PATENT ASSIGNMENT COVER SHEET

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EPAS ID: PAT6163132

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
ALBERT RONALD PEREZ	09/08/2014

RECEIVING PARTY DATA

Name:	The Nielsen Company (US), LLC
Street Address:	85 Broad Street
City:	New York
State/Country:	NEW YORK
Postal Code:	10004

PROPERTY NUMBERS Total: 2

Property Type	Number
Application Number:	14835401
Application Number:	62192919

CORRESPONDENCE DATA

Fax Number: (312)580-9696

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: (312)580-1020
Email: hshamat@hfzlaw.com
Correspondent Name: HANLEY, FLIGHT & ZIMMERMAN, LLC
Address Line 1: 150 SOUTH WACKER DRIVE
Address Line 2: SUITE 2200
Address Line 4: CHICAGO, ILLINOIS 60606

ATTORNEY DOCKET NUMBER:	20004/113430US02
NAME OF SUBMITTER:	WILLIAM E. JACKLIN
SIGNATURE:	/William E. Jacklin/
DATE SIGNED:	06/19/2020

Total Attachments: 8
source=113430US02_Disclosure_and_Coversheet#page1.tif
source=113430US02_Disclosure_and_Coversheet#page2.tif
source=113430US02_Disclosure_and_Coversheet#page3.tif
source=113430US02_Disclosure_and_Coversheet#page4.tif

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor	:	Michael Sheppard
U.S. Serial No.	:	14/835,401
Filed	:	August 25, 2015
Title	:	"REDUCING PROCESSING REQUIREMENTS TO CORRECT FOR BIAS IN RATINGS DATA HAVING INTERDEPENDENCIES AMONG DEMOGRAPHIC STATISTICS"
Art Unit	:	3683
Examiner	:	Timothy Padot

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

REQUEST FOR RECORDATION OF ASSIGNMENT

Dear Commissioner for Patents:

This paper is being submitted with a document that acts as an assignment executed by inventor Albert Ronald Perez for U.S. Provisional Patent Application No. 62/192,919, and also for U.S. Patent Application No. 14/835,401, which claims priority to U.S. Provisional Patent Application No. 62/192,919. The attached document is a proper assignment as it:

1) Identifies the patent application for which rights are being assignment (see the docket number provided on the top of page 1 of the attached document – 81<u>113430</u> – the last 6 digits of which correspond to the attorney docket number (<u>113430</u>US01) listed for U.S. Provisional Patent Application No. 62/192,919 and also corresponds to the attorney docket number (<u>113430</u>US02) listed for U.S. Patent Application No. 14/835,401;

2) Includes the statement that Albert Ronald Perez does "... hereby assign and transfer, all of my entire right, title and interest, in and to all such Invention(s) to Nielsen (or its designated affiliated company), its successors, assigns or nominees" (see p. 4 of the attached document); and

3) Is signed by Albert Ronald Perez (see p. 5).

Accordingly, recordation of the attached document is respectfully requested.

Respectfully submitted,

HANLEY, FLIGHT & ZIMMERMAN, LLC
150 South Wacker Drive, Suite 2200
Chicago, Illinois 60606
(312) 580-1020

June 17, 2020 /William E. Jacklin/

William E. Jacklin (Reg. No. 64,894)

Record ID	81113430	Last Modified	■■■■■■ (redacted)
Invention Reference		Invention Short Title	Multiple Bias Sample Correction
View	Review Status and Patent Application Details	Invention Status	To Be Filed

Step 1 - Disclosure

INVENTION DESCRIPTION

1. Initial IDF Creation Date

■■■■■ (redacted)

2. Inventor Full Name

Michael Sheppard

3. Select the Nielsen business group you represent.

■■■■■ (redacted)

INVENTION DISCLOSURE FORM OVERVIEW

A critical piece of the Nielsen patent process is the submission of an Invention Disclosure Form. Please complete all sections of the form before submission to the Intellectual Property (IP) Group. Incomplete submissions may be returned. While your responses should be kept as brief as possible, be sure to include sufficient information to enable the Nielsen Patent Committee to properly evaluate your invention. Please try to limit your completed submission to five pages maximum. If you have any questions filing out the enclosed form, please feel free to contact the IP Group. It is important you consult with the IP Group early in the patent submission process.

Please note, U.S. Patent Law requires that all "inventors" be named on each patent application filed with the United States Patent and Trademark Office. An inventor is a person who has contributed to the conception of at least one of the inventive concepts that will be claimed in the patent application. Inventors can include current or past employees/contractors of Nielsen or other entities. Any United States Patent that fails to name all inventors or includes those that did not contribute to an invention may be invalidated. Your assistance is required so that the IP Group can accurately determine who qualifies as an inventor and ensure they are correctly named on any related patent filings. If you have any questions filing out the enclosed form, please feel free to contact the IP Group. It is important you consult with the IP Group early in the patent submission process.

4. Invention Title

Method and Apparatus to correct for bias samples with overlapping constraints

5. Short Title

Multiple Bias Sample Correction

6. Nielsen Project

■■■■■■■■■ (redacted)

7. Is this invention disclosure a redirect from the Innovation Portal?

■ (redacted)

8. If yes, what is the name of the challenge?

9. Select any product areas that align with your disclosure.   (redacted)

■■■■■■■■■■■■■■■■■■■■■■■■■■■■
■■■■■

10. Identify all business units who may benefit from this invention   (redacted)

■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■

11. Primary Business Implementer

■■■■■■ (redacted)

In order to achieve a more nuanced understanding of the technology associated your invention we request a separate mapping to each of two independent technology trees (Technology A, Technology B).

12. Technology A

■■■■■■■■■■■ (redacted)

13. Technology B

■■■■ (redacted)

PROBLEM AND SOLUTION

14. Problem

(see attached)
Finding weights for a sample to correct for bias, but when the criteria for biasness overlaps with other criteria.

15. Inspiration

OCR work.

16. Your Solution/Invention

(see attached)

VALUE TO THE BUSINESS

17. Value To The Business

This procedure is an algorithmic and implementable procedure to find the proper weights to correct for sample bias - even if multiple measures of bias are taken and they interact with each other.

INVENTION QUESTION SET

18. Is the invention in a conceptual stage or a developmental stage?

████████████████████████████ (redacted)

19. Have you worked with or received input from non-Nielsen employees?

█ (redacted)

20. Details

USAGE

21. What is the likelihood of use by Nielsen competitors, customers, suppliers?

███ (redacted)

22. Details

This procedure can be marketed to solve complex sampling questions where multiple constraints have to be satisfied.

23. How difficult would it be to detect others' use of this invention?

██████ (redacted)

24. Details

25. Are there present plans to include the invention in a submission to a standards body?

No

DATES

26. Date of conception

██████(redacted)

27. Date of prototype development

██████ (redacted)

28. Has the invention been or will the invention be discussed and/or disclosed outside of Nielsen, or offered for sale?

█ (redacted)

29. If so, was or will the discussion and/or disclosure made under the terms of a Non-Disclosure Agreement?

30. If there is a date planned for a future discussion, disclosure, or offer for sale, when is that date?

ATTACHMENTS

Please

attach any other documents, emails, personal notes or presentations that apply to this idea at Step 2-Documents. In the case of personal notes, please date them at the time of creation. Attach all related documentation with this submission.

IP OWNERSHIP

I acknowledge,

that my submission of a Nielsen Invention Disclosure Form (IDF) is a result of my engagement by Nielsen to use my skills and ability to develop new processes, make new discoveries, conceive or first reduce to practice new things, improvements and inventions, and associated embodiments and works of authorship, relating to one or more current, planned or future Nielsen products, services, methods or the like, including, without limitation, processes, methods of manufacture, distribution or management of products ("Inventions"). I further acknowledge my obligation to submit to Nielsen for evaluation Inventions developed in connection with or as a result of my engagement with Nielsen or through the use of Nielsen resources. I acknowledge my obligation to assign, and by these presents do hereby assign and transfer, all of my entire right, title and interest in and to all such Inventions to Nielsen (or its designated affiliated company), its successors, assigns or nominees. I further agree to fully cooperate with and assist Nielsen in evaluating said Inventions and should Nielsen so decide in its sole discretion, in applying for and preparing any patent applications, executing any assignment or other documents reasonably necessary to file said patent applications, and/or record, perfect or maintain Nielsen's sole and exclusive ownership of said Inventions, patent applications, and any patents that may issue there from anywhere in the world and all intellectual property rights embodied therein or associated with any of the foregoing.

I also agree that,

except as specifically approved in connection with matters I am working on for Nielsen, I shall not, directly or indirectly use, disclose or cause to be disclosed any of the inventions, trade secrets or proprietary information ("Information") associated with this or any IDF or any other Information I may be exposed to as a result of my access thereto through the Anaqua software application. All such Information and related materials are and shall remain the exclusive property of Nielsen or the clients of Nielsen.

You will be asked to acknowledge and agree to the above once you save the disclosure, and after you sign and approve the form at Step 4. You must agree to the above language in order to submit the disclosure.

STEP 2 - DOCUMENTS

Document/Title	Date	Document Type
Unbiased Weights		██ (redacted)

Automated Email

Invention Disclosure 81113430 ("Multiple Bias Sample Correction-Method and Apparatus to correct for bias samples with overlapping constraints") - Attachment: RE Invention Disclosure 81113430 (Multiple Bias Sample Correction-Method and Apparatus to correct for bias samples with overlapping constraints).msg

Notice to Inventor(s) of Decision to File

(redacted)

(redacted)

(redacted)

STEP 4 - APPROVALS

Email	Name	Role	Phone	% Approval Date	Approved By	Signature
Michael.Sheppard@nielsen.com	Michael Sheppard	Inventor		03 Sep 2014 16:09:07	Michael Sheppard	/Mike Sheppard/
Jonathan.Sullivan@nielsen.com	Jonathan Sullivan	Inventor		03 Sep 2014 16:11:02	Jonathan Sullivan	/Jonathan Sullivan/
alex.terrazas@nielsen.com	Alex Terrazas	Inventor	■■■■■	03 Sep 2014 16:51:00	Alex Terrazas	/Alex Terrazas/
peter.lipa@nielsen.com	Peter Lipa	Inventor	■■■■■	10 Sep 2014 17:55:34	Jonathan Sullivan	Approval Override
ALBERT.PEREZ@NIELSEN.COM	Albert Ronald Perez	Inventor	■■■■	08 Sep 2014 18:29:29	Albert Ronald Perez	/Albert Perez/

Method to find weights to correct for biased samples with possible dependent proportions

Mike Sheppard
The Nielsen Company

Last edited: ███████████████ (redacted)

DRAFT - WORK IN PROGRESS

1 Introduction

Many projects within Nielsen require using a sample to represent a larger population. In order to produce correct results the sample should be unbiased in relation to the reference population. Example: If 43% of those who use Product X are Male, then 43% of our sample should also be Male. If we undersample or oversample a certain demographic or group, that group should either be weighted up or down.

If the proportions we are using to determine bias-ness are dependent, then finding the proper weights can be challenging; as correcting for one proportion can make another correction worse.

Consider the following biased sample of which two questions were asked, (1) their gender, (2) if they used a cell phone or not: (Numbers used for illustration purposes only)

Criteria	Population	Sample	
P(Male)	34.78%	90.02%	
P(Female)	65.22%	9.98%	
P(Male | Cell Phone)	27.12%	89.99%	(1.1)
P(Female | Cell Phone)	72.88%	10.01%	
P(Cell Phone | Male)	40.61%	6.31%	
P(Cell Phone | Female)	58.20%	6.33%	

1

The sample is heavily biased towards men, and all proportions for any criteria is biased. Note that adding weights in one group or another will change all other percentages, and that they are not independent.

2 Solution

Find the minimum set of mutually exclusive partitions of the population that combinations thereof can yield all criteria under study. In effect, we are post-stratification based on criterias. In this example only four stratas are needed:

Strata	Label
Male + no Cell Phone	A
Male + yes Cell Phone	B
Female + no Cell Phone	C
Female + yes Cell Phone	D

(2.1)

Notice that all six criteria can be reconstructed exactly

Criteria	Numerator	Denominator
P(Male)	A+B	A+B+C+D
P(Female)	C+D	A+B+C+D
P(Male | Cell Phone)	B	B+D
P(Female | Cell Phone)	D	B+D
P(Cell Phone | Male)	B	A+B
P(Cell Phone | Female)	D	C+D

(2.2)

The problem can now be rephrased to finding the correct weight for each of the four mutually exclusive stratas. Assume the following is the size of each strata within the sample we are trying to correct

Strata	Label	Size
Male + no Cell Phone	A	595, 622
Male + yes Cell Phone	B	154, 530
Female + no Cell Phone	C	198, 315
Female + yes Cell Phone	D	51, 533

(2.3)

Define the matrix C with the (ij)th position equalling

$$(C)_{ij} = k_i * ([N_{ij}] - p_i[D_{ij}]) * S_j \qquad (2.4)$$

i runs through the number of criteria (in this example 6), while j runs through the number of statas (eg. 4). k_i is a importance weight, which in this example is set to 1. Another option is the set it to the one over the sum of members in the numerator of the ith criteria.

The middle term using the symbol $[X]$ which is the Iversion bracket where equals 1 if true. In this case, $[N_{ij}]$ is 1 if the jth strata is in the set of elements belonging to the numerator of the ith criteria, and 0 otherwise. Similarly for $[D_{ij}]$. The middle term is short-hand notation for the following table

2

Middle Term	Meaning for jth strata
0	In neither numerator nor denominator
1	In numerator only
$-p_i$	In denominator only
$1 - p_i$	In both numerator and denominator

$$(2.5)$$

It means the middle term of (ij) location of matrix C is one of four possible cases depending on if that strata is in either the numerator or denominator

The last term, S_j, is the size of the jth strata.

After the matrix C is constructed, we can solve the constrained linear least-squares problem

$$\begin{aligned} \text{minimize} \quad & \|Cw\|_2^2 \\ \text{subject to} \quad & 1 \le w < \infty \end{aligned}$$

This forces all weights to be not only positive, but without loss of generality the smallest to equal 1.

Strata	Label	Size	weight
Male + no Cell Phone	A	$595,622$	1.0000
Male + yes Cell Phone	B	$154,530$	2.6361
Female + no Cell Phone	C	$198,315$	3.9642
Female + yes Cell Phone	D	$51,533$	21.2397

$$(2.6)$$

The above procedure will try to match all known criteria simultaneously

3   Results

Criteria	Population	Sample (original)	Sample (corrected)
P(Male)	34.78%	90.02%	34.78%
P(Female)	65.22%	9.98%	65.22%
P(Male | Cell Phone)	27.12%	89.99%	27.12%
P(Female | Cell Phone)	72.88%	10.01%	72.88%
P(Cell Phone | Male)	40.61%	6.31%	40.61%
P(Cell Phone | Female)	58.20%	6.33%	58.20%

$$(3.1)$$

As verification, here is the last criteria written out

$$\text{Uncorrected} \quad \frac{51,533}{198,315 + 51,533} = 6.33\% \tag{3.2}$$

$$\text{Corrected} \quad \frac{51,533 * 21.2397}{198,315 * 3.9642 + 51,533 * 21.2397} = 58.20\% \tag{3.3}$$

3