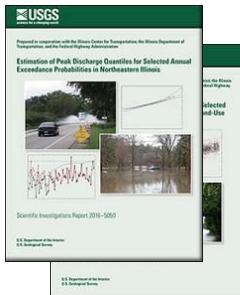
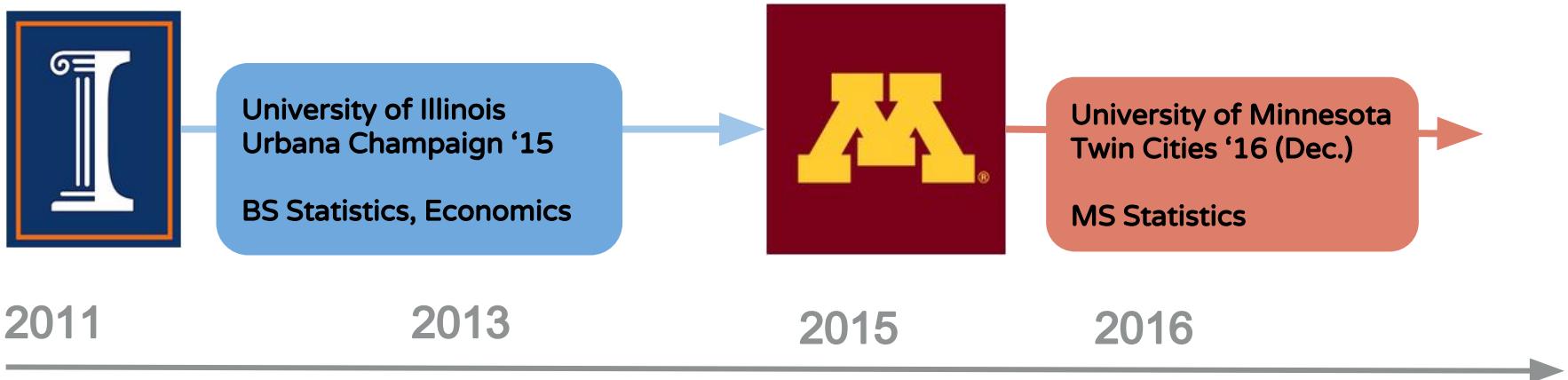


logitech[®]

About Me

About Me - Riki Saito



Project

Intern Project

Project

To create a Unique Identifier for each Product Line to merge market analytics data sources (**NPD** and **GfK**)

Issue

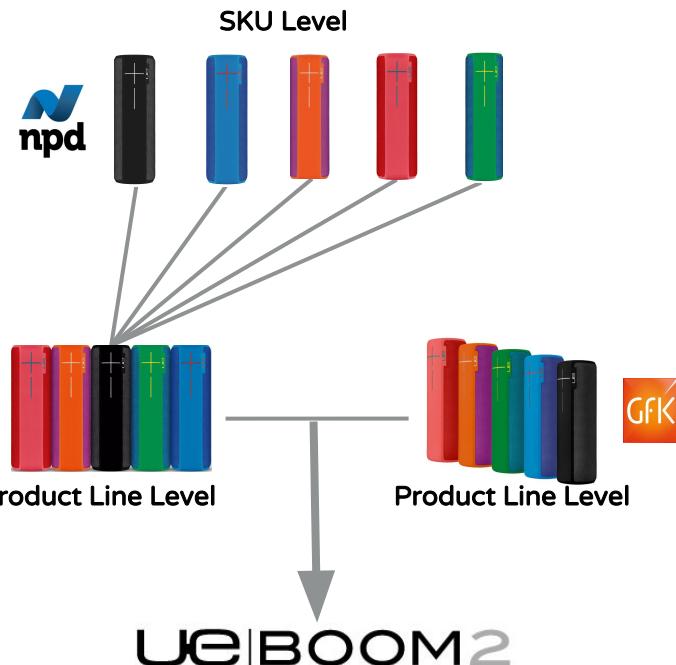
Data sources are reported at different levels of granularity and we are unable to merge data at the Product Line Level (**NPD** reports at SKU Level vs. **GfK** at Product Line Level)

Goals

- Produce a Unique Identifier for each Product Line
- Develop a Tool (R program) to map **NPD/GfK** data
 - Phase 1: Map SKU Level to Product Line Level in NPD
 - Phase 2: Map NPD to GfK at Product Line Level
- Apply and Integrate tool to automate data mapping

Phase 1

Phase 2



Issue

Issue: NPD and GfK reports data at *different levels of granularity*

Data Hierarchy			e.g.
Family	✓	✓	Mobile Speakers
Group	✓	✓	Mobile Speakers
Type	✓	✓	Mobile Speakers
Brand	✓	✓	Ultimate Ears
Product Line		✓	BOOM
SKU (Stock Keeping Unit)	✓		BOOM Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black



Data Preview: Mobile Speakers Top 25 Ranking

PL Ranking	SOURCE SYSTEM	PRODUCT_DESCRIPTION	Units Sold
1	GFK	GO WIRELESS PORTABLE SPEAKER	59,850
2	NPD	984-000551 BOOM 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	53,471
3	GFK	SOUNDLINK MINI II	45,085
4	NPD	SoundLink Mini II Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	44,698
5	NPD	SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	40,030
6	NPD	Flip 3 Portable Bluetooth Speaker for MP3 Player/Cell Phone Black	39,940
7	NPD	984-000504 Roll Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	38,272
8	NPD	Flip 3 Portable Bluetooth Speaker for MP3 Player/Cell Phone Blue	32,504
9	NPD	984-000436 Megaboom Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black/Gray	28,129
10	NPD	Onyx Studio 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	26,427
11	NPD	ML4M2LL/A Pill+ Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	26,162
12	NPD	Clip+ Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	24,937
13	NPD	984-000516 Roll Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Blue	24,903
14	NPD	984-000552 BOOM 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Blue	24,165
15	NPD	IBC233B Portable Bluetooth FM/CD Boombox for MP3 Player/Cell Phone Black	22,868
16	NPD	SoundLink III Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Silver/Black	22,612
17	GFK	UE BOOM 2	22,508
18	NPD	SoundLink Mini II Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Silver	22,262
19	GFK	CHARGE II PLUS	21,050
20	NPD	Flip 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone Black	19,229
21	NPD	SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Blue	18,904
22	NPD	SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Green	18,273
23	NPD	IBT74BC Portable Bluetooth Color Changing Speaker for MP3 Player/Cell Phone/Tablet Black	18,164
24	NPD	SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Red	17,166
25	NPD	HX-P140BK Hangtime Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	17,110

Phase 1

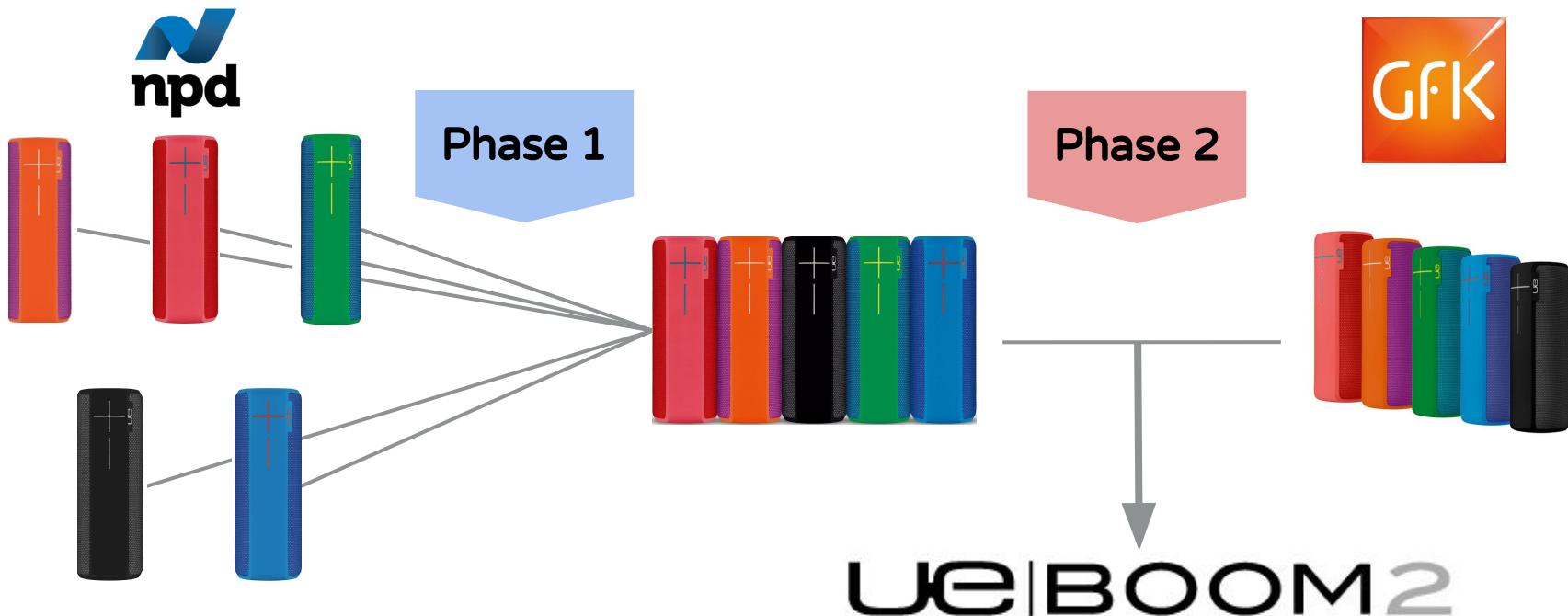
Phase 2

Example of Issue: Worldwide Mobile Speakers Top 25 Ranking

PL Ranking	SOURCE SYSTEM	PRODUCT_DESCRIPTION	Units Sold
1	GFK	GO WIRELESS PORTABLE SPEAKER	59,850
2	NPD	984-000551 BOOM 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	53,471
3	GFK	SOUNDLINK MINI II	45,085
4	NPD	SoundLink Mini II Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	44,698
5	NPD	SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	40,030
6	NPD	Flip 3 Portable Bluetooth Speaker for MP3 Player/Cell Phone Black	39,940
7	NPD	984-000504 Roll Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	38,272
8	NPD	Flip 3 Portable Bluetooth Speaker for MP3 Player/Cell Phone Blue	32,504
9	NPD	984-000436 Megaboom Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black/Gray	28,129
10	NPD	Onyx Studio 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	26,427
11	NPD	ML4M2LL/A Pill+ Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	26,162
12	NPD	Clip+ Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	24,937
13	NPD	984-000516 Roll Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Blue	24,903
14	NPD	984-000552 BOOM 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Blue	24,165
15	NPD	IBC233B Portable Bluetooth FM/CD Boombox for MP3 Player/Cell Phone Black	22,868
16	NPD	SoundLink III Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Silver/Black	22,612
17	GFK	UE BOOM 2	22,508
18	NPD	SoundLink Mini II Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Silver	22,262
19	GFK	CHARGE II PLUS	21,050
20	NPD	Flip 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone Black	19,229
21	NPD	SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Blue	18,904
22	NPD	SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Green	18,273
23	NPD	IBT74BC Portable Bluetooth Color Changing Speaker for MP3 Player/Cell Phone/Tablet Black	18,164
24	NPD	SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Red	17,166
25	NPD	HX-P140BK Hangtime Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	17,110



Procedure



Project Overview

Goals

- Develop a tool (R program) to match **NPD/GfK** data
- Produce a unique identifier for each product
- Apply and Integrate tool to automate data matching



Tool needs to be:

- Accurate
- Reproducible/Scalable
- Maintainable



Challenges

- Data size ~250,000 product descriptions
- Only way to check performance is by manual inspection



Methods

Potential Methods

1) Substringing

- Cutting parts of strings by location according to rules (e.g. remove string before/after key words)

Rule: remove after “Portable”

BOOM ~~Portable Bluetooth Speaker
for MP3 Player/Cell Phone/Tablet
Black~~ = BOOM

2) Text Mining and Removing

- Removing specific words from strings, defined in a dictionary of words obtained through text mining

Dictionary: [Portable, Bluetooth, Speaker, for,
MP3, Player/Cell, Phone/Tablet, Black]

BOOM ~~Portable Bluetooth Speaker
for MP3 Player/Cell Phone/Tablet
Black~~ = BOOM

3) Fuzzy String Matching

- Pattern matching algorithm to compute likelihood of match between two strings

BOOM Portable Bluetooth Speaker
for MP3 Player/Cell Phone/Tablet
Black ≈ BOOM

Overview of Methods

	Substringing	Fuzzy String Matching	Text Mining and Removing
Description	Cutting parts of strings by location according to rules (e.g. remove string before/after key words)	Pattern matching algorithm to compute likelihood of match between two strings	Removing specific words from strings, defined in a dictionary of words obtained through text mining
Example	Define Rules: Remove string after "for" and "USB". <i>(NPD) V220 Cordless Optical Scroll Mouse USB Cobalt Blue</i> → <u>V220 Cordless Optical Scroll Mouse</u> <i>(Gfk) V220 CORDLESS OPTICAL SCROLL MOUSE FOR NOTEBOOKS</i> → <u>V220 CORDLESS OPTICAL SCROLL MOUSE</u>	Use measure = Cosine Distance (range 0-1) Set distance threshold = 0.1 Calculate "distance" b/w <i>(NPD) V220 Cordless Optical Scroll Mouse USB Cobalt Blue</i> <i>(Gfk) V220 CORDLESS OPTICAL SCROLL MOUSE FOR NOTEBOOKS</i> Cosine Distance = 0.0717 < 0.1 → MATCH	Dictionary: "USB", "Notebooks", Stop Words (for, w/), Colors <i>(NPD) V220 Cordless Optical Scroll Mouse USB Cobalt Blue</i> → <u>V220 Cordless Optical Scroll Mouse</u> <i>(Gfk) V220 CORDLESS OPTICAL SCROLL MOUSE FOR NOTEBOOKS</i> → <u>V220 CORDLESS OPTICAL SCROLL MOUSE</u>
Pros	<ul style="list-style-type: none"> - Simple - Intuitive - User has complete control over conditions (rules) 	<ul style="list-style-type: none"> - Flexible - Scalable - User has some control over parameters (algorithm, parameters, threshold) 	<ul style="list-style-type: none"> - Fast - Scalable - Small amount of work required from user
Cons	<ul style="list-style-type: none"> - Relies on exact match - Not scalable - Relies heavily on assumptions about data (strict assumptions) 	<ul style="list-style-type: none"> - High learning curve of algorithms/implementation - Relies somewhat on assumptions about data (general assumptions) 	<ul style="list-style-type: none"> - Relies on exact match - Dangers of frequently appearing product-specific words

Solution: Fuzzy String Matching

Fuzzy String Matching is a pattern matching algorithm that computes degree of similarity between two strings (sequence of words, letters, symbols, etc)

Why use Fuzzy String Matching?

Flexible

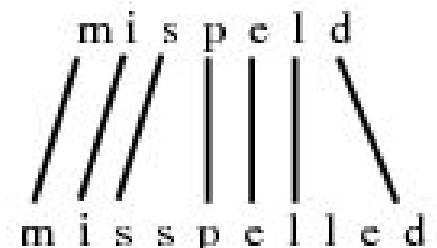
adaptable to any words, sequence of words, phrase structures, etc

Scalable

can accommodate increasing data size and new instances

Adjustable

algorithms and parameters can be tweaked to better fit the data



Solution

Use **Fuzzy Matching** for both phases

Phase 1:

- **Weighted Optimal String Alignment Distance** (adopted from Optimal String Alignment)

Phase 2:

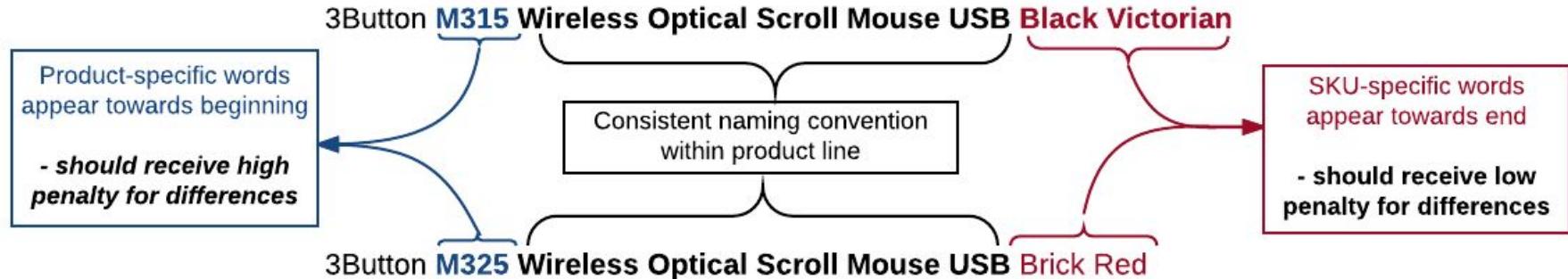
- **Adjusted Jaccard Distance** (adopted from q-gram/Jaccard Distance)

*these names are not in existence academically

Phase 1: Assumptions About NPD Data

Phase 1: Grouping NPD to Product Line

After inspection, we make some assumptions/generalizations about the NPD data..



Example: Existing Method of Fuzzy String Matching

Example: Find a Match for

3Button M315 Wireless Optical Scroll Mouse USB Brick Red

	SKU 1	3Button M315 Wireless Optical Scroll Mouse USB Black Victorian	?
SKU 2	BOOM Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	No Match	✗
SKU 3	3Button M325 Wireless Optical Scroll Mouse USB Brick Red	?	

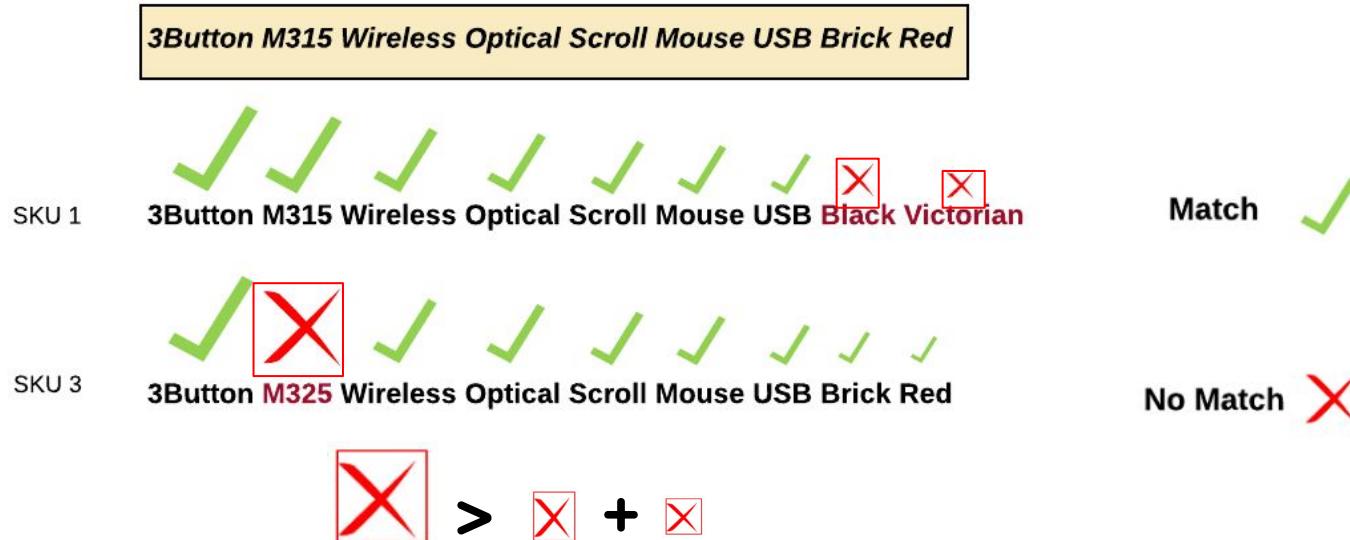
The table illustrates the results of fuzzy string matching for three SKUs against a target product description. Each row shows the SKU number, its name, the result of the match, and a question mark indicating further analysis is needed.

- SKU 1:** The target product is "3Button M315 Wireless Optical Scroll Mouse USB Brick Red". The SKU "3Button M315 Wireless Optical Scroll Mouse USB Black Victorian" has a match score of 8/9, indicated by 8 green checkmarks and 1 red X. The result is marked with a question mark.
- SKU 2:** The target product is "3Button M315 Wireless Optical Scroll Mouse USB Brick Red". The SKU "BOOM Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black" has a match score of 0/9, indicated by 9 red Xs. The result is marked with "No Match" and a red X.
- SKU 3:** The target product is "3Button M315 Wireless Optical Scroll Mouse USB Brick Red". The SKU "3Button M325 Wireless Optical Scroll Mouse USB Brick Red" has a match score of 7/9, indicated by 7 green checkmarks and 2 red Xs. The result is marked with a question mark.

How do we differentiate between SKU 1 and SKU 3?

Adjustment to Existing Method: Weights by Location

Solution: Give different weights to words by location



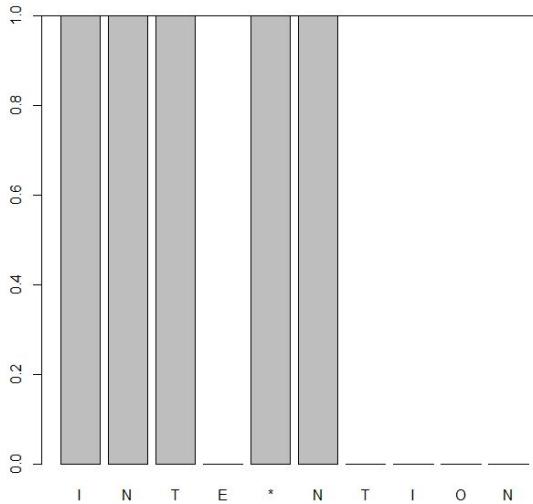
Optimal String Alignment

We used Optimal String Alignment (OSA, also known as Damerau-Levenshtein distance)

- Maximum number of edits (insertion, deletion, substitution, transposition)
- Note: All edits are given a value of 1

I	N	T	E	*	N	T	I	O	N
*	E	X	E	C	U	T	I	O	N
d	s	s		i	s				

- In this case, OSA = 5, or distance of $5/10 = 50\%$



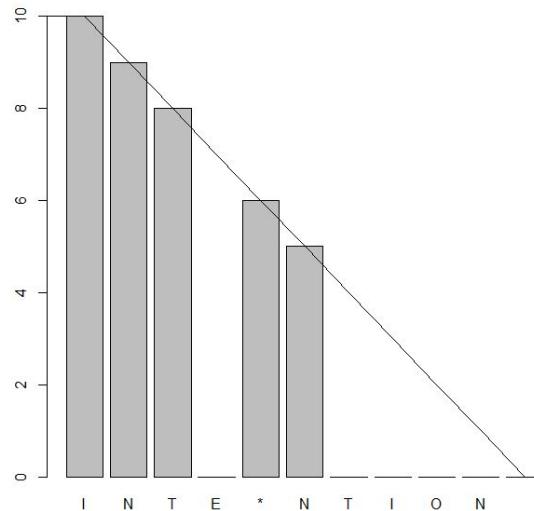
Weighted Optimal String Alignment (WOSA)

Weighted Optimal String Alignment (WOSA, currently not in existence academically)

- Weights are given to edits depending on location.
- E.g. decreasing linear function

I	N	T	E	*	N	T	I	O	N
* E	X	E	C	U	T	I	O	N	
d	s	s		i	s				

- Score is sum(shaded)/sum(under line)
- $38/55 \approx 70\%$



Parameters in Weighted Optimal String Alignment

Parameters in WOSA

Type - Option to apply algorithm by whole “item” or by single “character”. Since we want to apply algorithm to WHOLE WORDS rather than single characters, by “item” is ideal.

Weight - Weight function (linear, quadratic, root). In the previous example, linear was used

Sum.Right - Flag for whether or not to consider everything after the first mismatch (from the left-hand side) as mismatches (in other words, sum scores of all mismatches to the right of first mismatch)

Performance with Different Parameters in WOSA

- 1) 3Button M315 Wireless Optical Scroll Mouse USB Black Victorian
- 2) 3Button M315 Wireless Optical Scroll Mouse USB Brick Red
- 3) 3Button M325 Wireless Optical Scroll Mouse USB Brick Red

Sum Right	TRUE						FALSE					
Type	Item			Character			Item			Character		
Weight	Linear	Quad.	Root	Linear	Quad.	Root	Linear	Quad.	Root	Linear	Quad.	Root
1-2	0.067	0.018	0.125	0.054	0.012	0.111	0.067	0.018	0.125	0.037	0.008	0.081
1-3	0.800	0.716	0.845	0.706	0.593	0.770	0.244	0.242	0.272	0.063	0.041	0.103
2-3	0.800	0.716	0.845	0.677	0.557	0.746	0.178	0.225	0.147	0.029	0.035	0.024

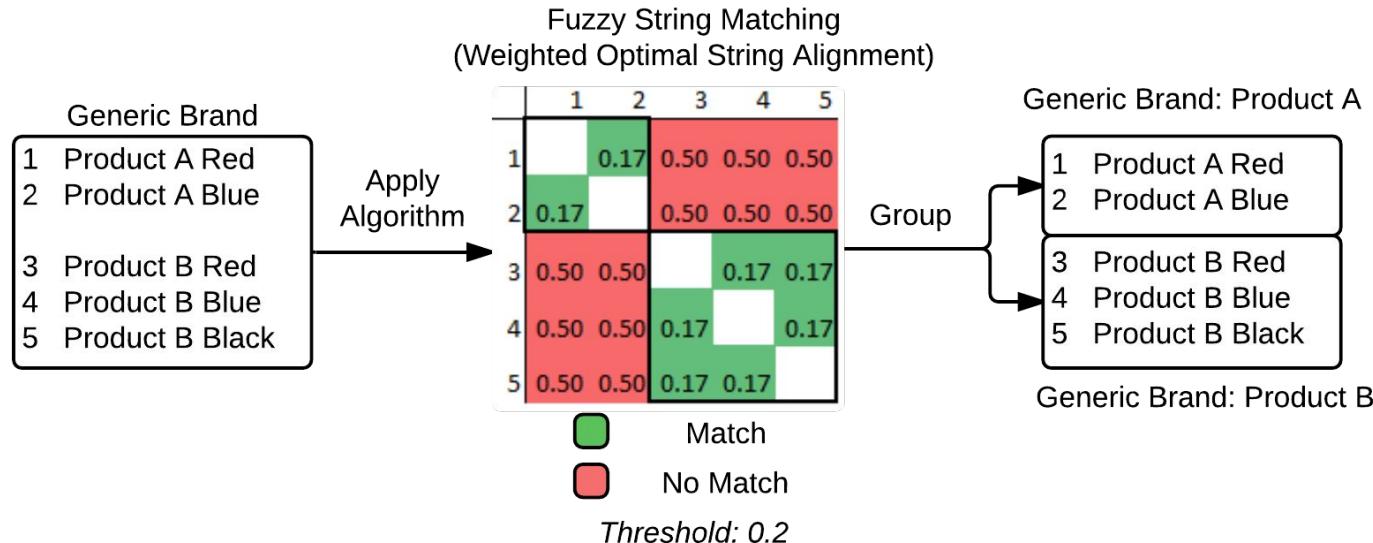
*Best performing parameters

LOGITECH

CONFIDENTIAL: NOT FOR DISTRIBUTION

Weighted Optimal String Alignment in Application

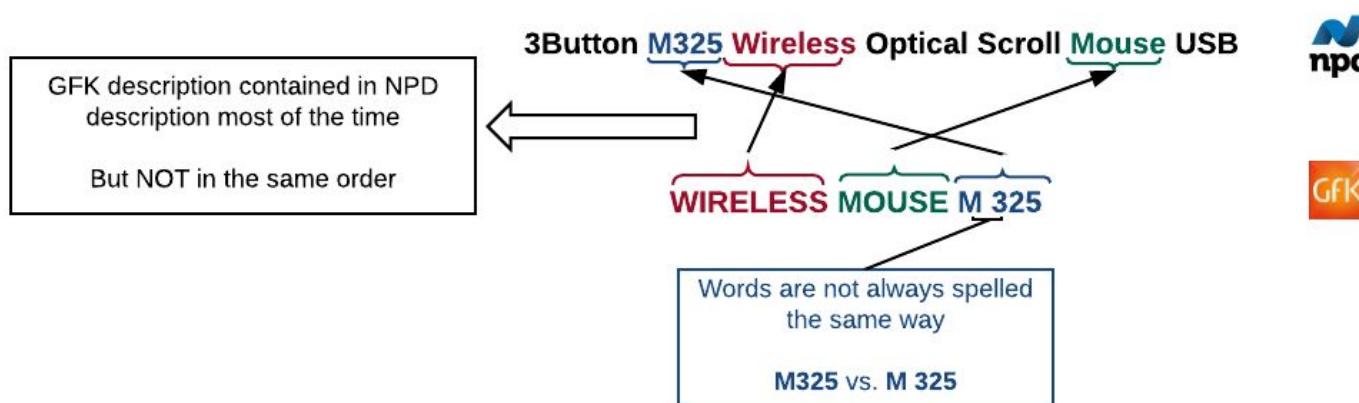
- For every pair in a list of strings, compute “distance” based on similarities of character patterns (scaled on a range from 0-1), then classify as match/no match against a threshold



Phase 2: Assumptions about NPD/GFK Data

Phase 2: Mapping NPD and GFK

After inspection, we make some assumptions/generalizations about the relationship between NPD and GFK data..



How do we account for slight misspellings in an almost exactly matching scenario?

N-Gram/Q-gram

Definition: All subsequences of N/Q consecutive items from a given sequence or string (N/Q is an integer)

Item can be identified as whole words, syllables, single characters, etc (*example to the right is a 5-gram by single characters*)

N-gram is a frequency table of all subsequent occurrences

Q-gram is a distance measure based on common n-gram between two strings

Ideal for catching typos

text: Once upon a time

n-gram

Once upon a time

'Once_ '

once upon a time

'nce_u'

Once upon a time

'ce_up'

Onde upon a time

'e_upo'

and so on...

Jaccard Distance

Jaccard Distance is an algorithm measuring distance based on Q-gram.

Example: [morning] and [mourning], q=2

2-gram	1	2	3	4	5	6	7	8
2-gram	mo	or	rn	ur	ou	ni	ng	in
morning	1	1	1	0	0	1	1	1
mourning	1	0	1	1	1	1	1	1

Common 2-grams are [mo], [rn], [ni], [ng], and [in], for a total of 5 out of 8

$$Jaccard\ Distance = 1 - \frac{\# \text{ matches}}{\# \text{ total } n\text{-grams}} = 1 - \frac{5}{8} = 37.5\%$$

Adjusted Jaccard Distance (AJD)

Adjusted Jaccard Distance: modify the denominator

- Instead of **total n-grams** (8), we use **total n-grams of shorter string** (6)

2-gram	1	2	3	4	5	6	7	8	Total
morning	1	1	1	0	0	1	1	1	6
mourning	1	0	1	1	1	1	1	1	7

2-grams for shorter string [morning] = 6

$$\text{Adjusted JD} = 1 - \frac{\# \text{ matches}}{\# \text{ total n-grams of shorter string}} = 1 - \frac{5}{6} = 16.7\%$$

Adjusted Jaccard Distance (AJD)



- 1 3Button M315 Wireless Optical Scroll Mouse USB
- 2 3Button M325 Wireless Optical Scroll Mouse USB
- 3 WIRELESS MOUSE M325

- 1. Apply Algorithm
- 2. Find smallest distance
- 3. Match



- 1 3Button M315 Wireless Optical Scroll Mouse USB

M315

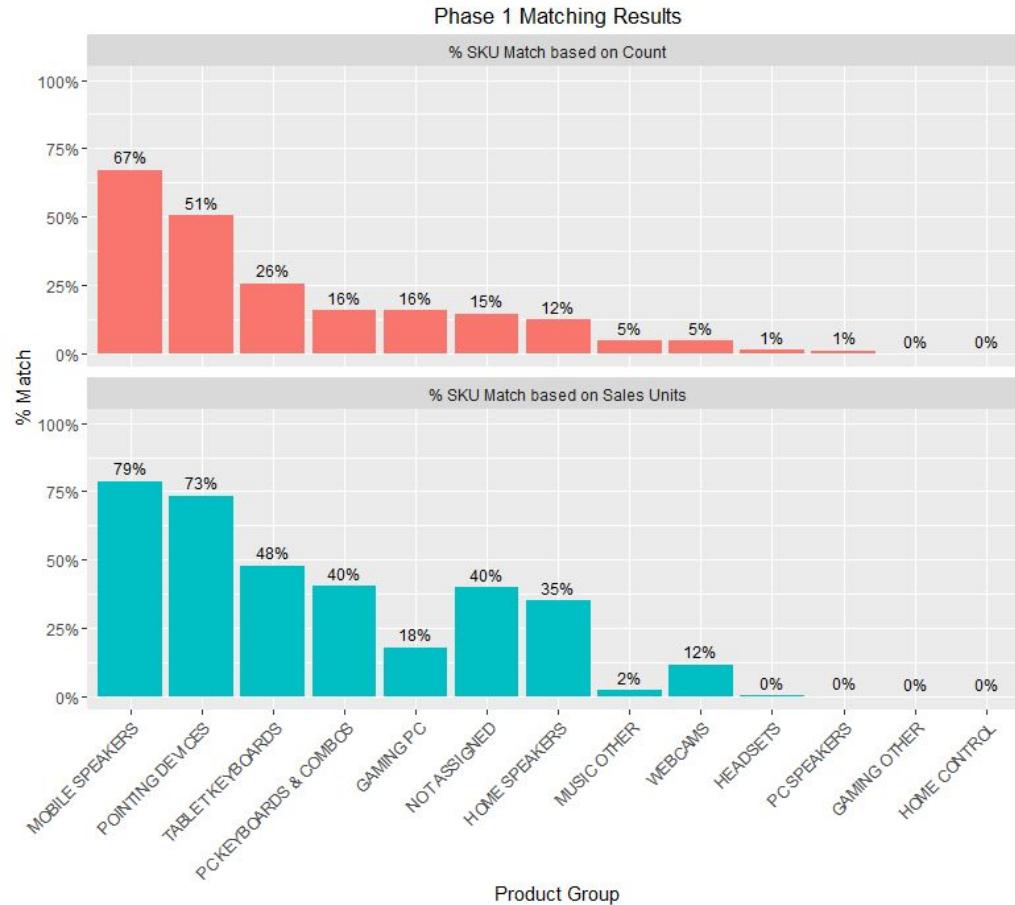
- 2 3Button M325 Wireless Optical Scroll Mouse USB
- 3 WIRELESS MOUSE M325

M325

	3Button M315 Wireless Optical Scroll Mouse USB	3Button M325 Wireless Optical Scroll Mouse USB
WIRELESS MOUSE M325	0.11	0

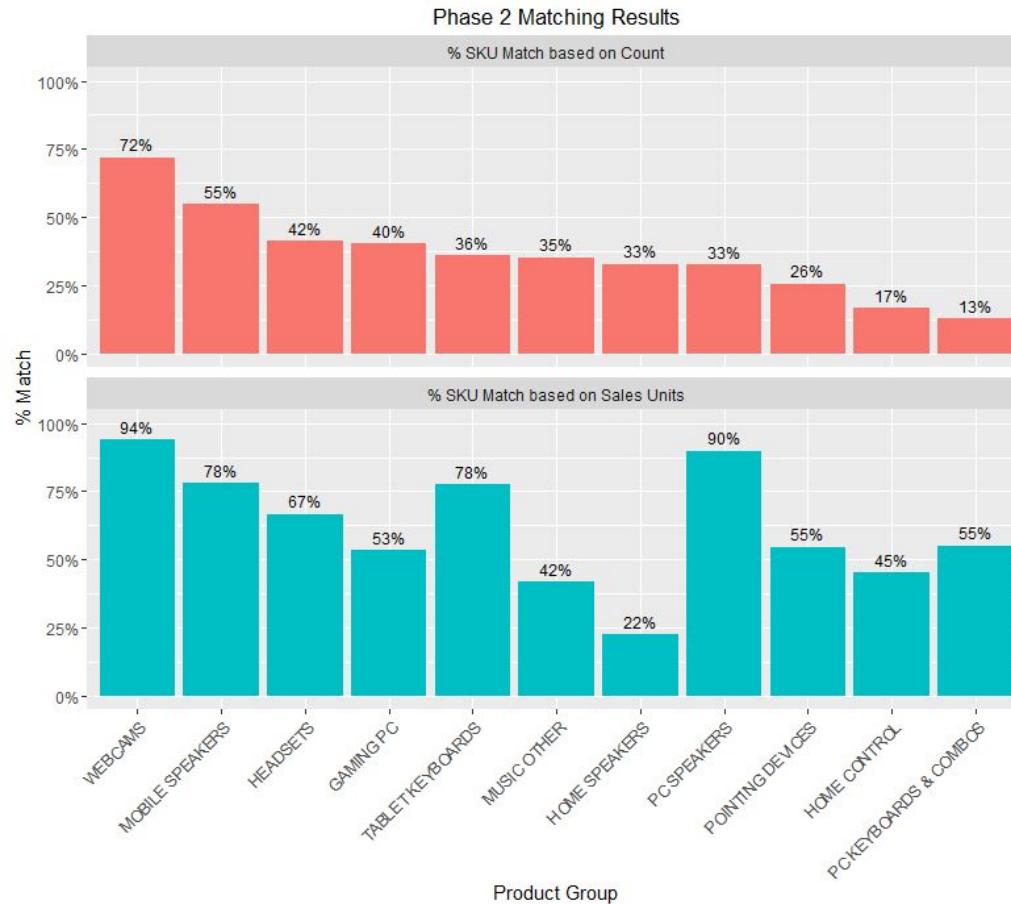
Results

Phase 1: NPD Grouping Results: FY 2016



- **Mobile Speakers, Pointing Devices, and Tablet Keyboards** had the highest percentage of SKUs that were grouped together
- **Headsets, PC Speakers, Home Control** has almost no SKU variations
- No previous method of grouping/matching (before = 0%)

Phase 2: NPD to GFK PL Matching Results: FY 2016



- Alternate Interpretation to top chart: Percentage of Global Players (as opposed to local)
- **Webcams, PC Speakers, Tablet Keyboards** had highest percentage of SKUs sold globally according to sales units
 - ~86% of Webcam market dominated by Logitech
- **PC Speakers** - 33% of SKUs represents 90% of sales
 - - Logitech and Bose dominates market

Results: Mobile Speakers Family Top 25

Before

PRODUCT_DESCRIPTION	Units Sold
GO WIRELESS PORTABLE SPEAKER	59,850
984-000551 BOOM 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	53,471
SOUNDLINK MINI II	45,085
SoundLink Mini II Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	44,698
SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	40,030
Flip 3 Portable Bluetooth Speaker for MP3 Player/Cell Phone Black	39,940
984-000504 Roll Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	38,272
Flip 3 Portable Bluetooth Speaker for MP3 Player/Cell Phone Blue	32,504
984-000436 Megaboom Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black/Gray	28,129
Onyx Studio 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	26,427
ML4M2LL/A Pill+ Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	26,162
Clip+ Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	24,937
984-000516 Roll Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Blue	24,903
984-000552 BOOM 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Blue	24,165
IBC233B Portable Bluetooth FM/CD Boombox for MP3 Player/Cell Phone Black	22,868
SoundLink III Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Silver/Black	22,612
UE BOOM 2	22,508
SoundLink Mini II Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Silver	22,262
CHARGE II PLUS	21,050
Flip 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone Black	19,229
SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Blue	18,904
SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Green	18,273
IBT74BC Portable Bluetooth Color Changing Speaker for MP3 Player/Cell Phone/Tablet Black	18,164
SoundLink Color Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Red	17,166
HX-P140BK Hangtime Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	17,110

After

Unique Identifier	Units Sold
SOUNDLINK MINI II	118,964
SOUNDLINK COLOR	116,823
UE BOOM 2	114,948
FLIP 3	98,677
ROLL	79,769
GO WIRELESS PORTABLE SPEAKER	60,518
CLIP PLUS	52,740
CHARGE II PLUS	48,817
MEGABOOM	48,068
Pill+ Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet	37,545
Mini H2O Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet	36,992
Jam Portable Wireless Bluetooth Speaker for MP3 Player/Cell Phone/Tablet	30,695
Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet	29,869
CANZ Portable Bluetooth Speaker for MP3 Player/Cell Phone	27,740
SOUNDLINK WIRELESS BLUETOOTH MOBILE SPEAKER III	27,729
FLIP 2	26,673
Onyx Studio 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	26,427
Portable Bluetooth Color Changing Speaker for MP3 Player/Cell Phone/Tablet	24,964
Portable Bluetooth Speaker for MP3 Player/Cell Phone	23,124
IBC233B Portable Bluetooth FM/CD Boombox for MP3 Player/Cell Phone Black	22,868
SRS-X11	22,397
Pill 2.0 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet	21,153
Hangtime Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet	19,725
Mini LifeJacket 2 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet	17,849
PULSE 2	17,786

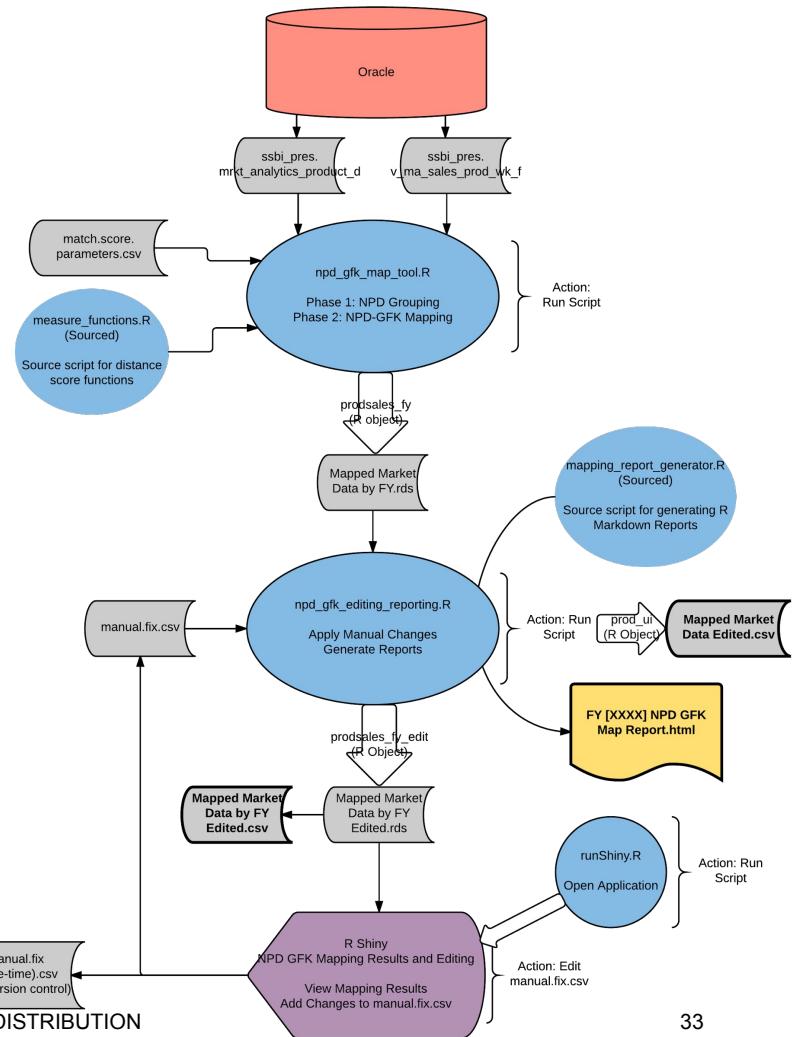
Overview of Tool

Accurate - Large coverage of data grouping/matching, inspected by MA team

Reproducible - Able to rerun algorithm/procedure at the click of a button (written in R)

Scalable - Robust to new observations, Performance improves with more comprehensive data

Maintainable - Complete and organized R scripts with documentation, and interactive R Shiny dashboards to evaluate performance/make modifications



R Shiny Dashboard

NPD GFK Mapping Results and Editing [Coverage](#) [Top Products](#) [Table Editor](#) [Editing Rules](#) [All Data](#)

Phase 1 and 2 Coverages

Fiscal Year (Multi Select):

- 2013
- 2014
- 2015
- 2016
- 2017

Group	Units Sold	Units Grouped	% Units Grouped	Product Count	Products Grouped	% Products Grouped
1 GAMING OTHER	2727034	0	0.000	351	0	0.000
2 GAMING PC	10594353	1623872	0.153	2289	335	0.146
3 HEADSETS	11579025	41104	0.004	1766	26	0.015
4 HOME CONTROL	11985312	0	0.000	711	0	0.000
5 HOME SPEAKERS	9570500	2448239	0.256	3337	350	0.105
6 MOBILE SPEAKERS	38867072	29834225	0.768	4821	3248	0.674
7 MUSIC OTHER	11848583	448458	0.038	3179	153	0.048
8 NOT ASSIGNED	23119058	7707025	0.333	3288	469	0.143
9 PC KEYBOARDS & COMBOS	41720904	16075757	0.385	3525	552	0.157
10 PC SPEAKERS	9303047	24832	0.003	894	10	0.011
11 POINTING DEVICES	77743463	57704722	0.742	4800	2397	0.499
12 TABLET KEYBOARDS	8325850	3327093	0.400	1519	362	0.238
13 WEBCAMS	5619160	729042	0.130	732	41	0.056

Showing 1 to 13 of 13 entries



R Shiny Dashboard

NPD GFK Mapping Results and Editing Coverage [Top Products](#) Table Editor Editing Rules All Data

Top: 25

Fiscal Year (Multi Select): 2013 2014 2015 2016

Family (Multi Select): AUDIO - PC & WEARABLES FAMILY GAMING FAMILY HOME CONTROL FAMILY MOBILE SPEAKERS FAMILY OTHER FAMILY PC KEYBOARDS & COMBOS FAMILY PC WEBCAMAS FAMILY POINTING DEVICES FAMILY TABLET & OTHER ACCESSORIES FAMILY

Group (Multi Select): MOBILE SPEAKERS GROUP

Type (Multi Select): MOBILE SPEAKERS TYPE

Brand (Multi Select): 3E 3SIXT 808 ACCESSORY POWER ACME ACOUSTIC RESEAR ACOUSTIC RESEARCH ADDON ADDTRON TECHNOL ADESSO ADIN

Download Current Table

Search:

	Product Family	Product Group	Product Type	Brand	Unique Identifier	Units Sold
1	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	BOSE	SOUNDLINK MINI II	3248646
2	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	BOSE	SOUNDLINK COLOR	3090704
3	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	JAM AUDIO	Jam Portable Wireless Bluetooth Speaker for MP3 Player/Cell Phone/Tablet	2385994
4	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	ULTIMATE EARS	UE BOOM	2138104
5	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	JBL	FLIP 3	1604444
6	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	BOSE	SOUNDLINK MINI BLUETOOTH	1384069
7	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	JBL	FLIP 2	1327187
8	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	JBL	GO WIRELESS PORTABLE SPEAKER	1255295
9	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	BEATS	Pill 2.0 Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet	1081128
10	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	JBL	CHARGE	1011160
11	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	JAM AUDIO	Jam Plus Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet	931983
12	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	808	CANZ Portable Bluetooth Speaker for MP3 Player/Cell Phone	922199
13	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	BOSE	SOUNDLINK WIRELESS BLUETOOTH MOBILE SPEAKER III	827923
14	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	JBL	CLIP	699764
15	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	HARMAN KARDON	Onyx Studio Portable Bluetooth Speaker for MP3 Player/Cell Phone/Tablet Black	672833
16	MOBILE SPEAKERS FAMILY	MOBILE SPEAKERS GROUP	MOBILE SPEAKERS TYPE	IHOME	Portable Bluetooth Mini Speaker for MP3 Player/Cell Phone/Tablet	636529

Algorithm does not perform well when...

- Data does not follow the general assumptions
 - GFK at Product Line
 - (i.e. JBL Charge 2 Plus vs. JBL Charge II +)
 - SKU-specific words come at end of string
 - (i.e. G502 Proteus Core vs. G502 Proteus Spectrum)
- Product naming convention do not stay the same
 - Type Cover Keyboard for Microsoft Surface Pro 3 Red
 - Type Cover for Microsoft Surface Pro Blue

Recommendation

Recommendation for Future

Integrate Results in Data Warehouse

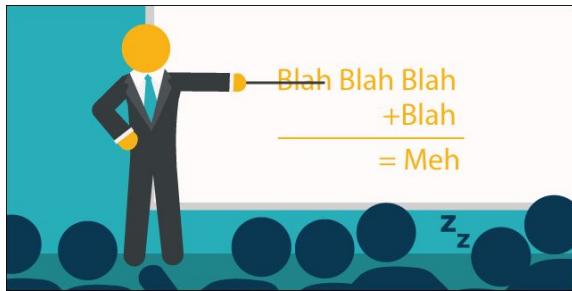
Improve and Adjust Tool Continually

Apply Tool to Data Updated Monthly

Share and Implement Method to other Data Sources



What I Learned



m i s p e l l d
m i s s p e l l e d

A diagram illustrating misspellings. The word "misspelled" is written twice. The first version has vertical lines extending from each character to the right, while the second version has lines extending to the left, visually representing the difference in character placement.

ORACLE®

The Oracle logo, featuring the word "ORACLE" in a bold, red, sans-serif font with a registered trademark symbol.



THANK YOU