

# Optimizing IT Operations with Natural Language Processing - Implementation details

Compliment to white paper at: <https://www.cognizant.com/whitepapers/optimizing-it-operations-with-natural-language-processing-codex4914.pdf>

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# Ticket similarity clustering

Objective: To find clusters of tickets that can be resolved using an SOP, by an L1.5 resource.

Approach: Tickets in a repository are clustered using text analytics of select descriptive fields. This can also be extended to include combinations of multiple text fields, categorical variables (like system or user created ticket) and raw or computed numeric fields (like ticket resolution time). The specific text analytics technique chosen is word embedding and the clustering technique is DBSCAN.

Outcome: The clusters show clearly similar tickets. A business user can improve the clustering by trying out clustering parameter settings below.

IMPORTANT: Load only an Excel file, with the second column being text column to be processed.

## Input 1

Drag and Drop or [Select Files](#)

## Input 2

eps (distance between points in the same cluster)

0.1

0.2

0.3

0.4

0.5

0.6

0.7

0.8

0.9

Minimum number of samples per cluster

1

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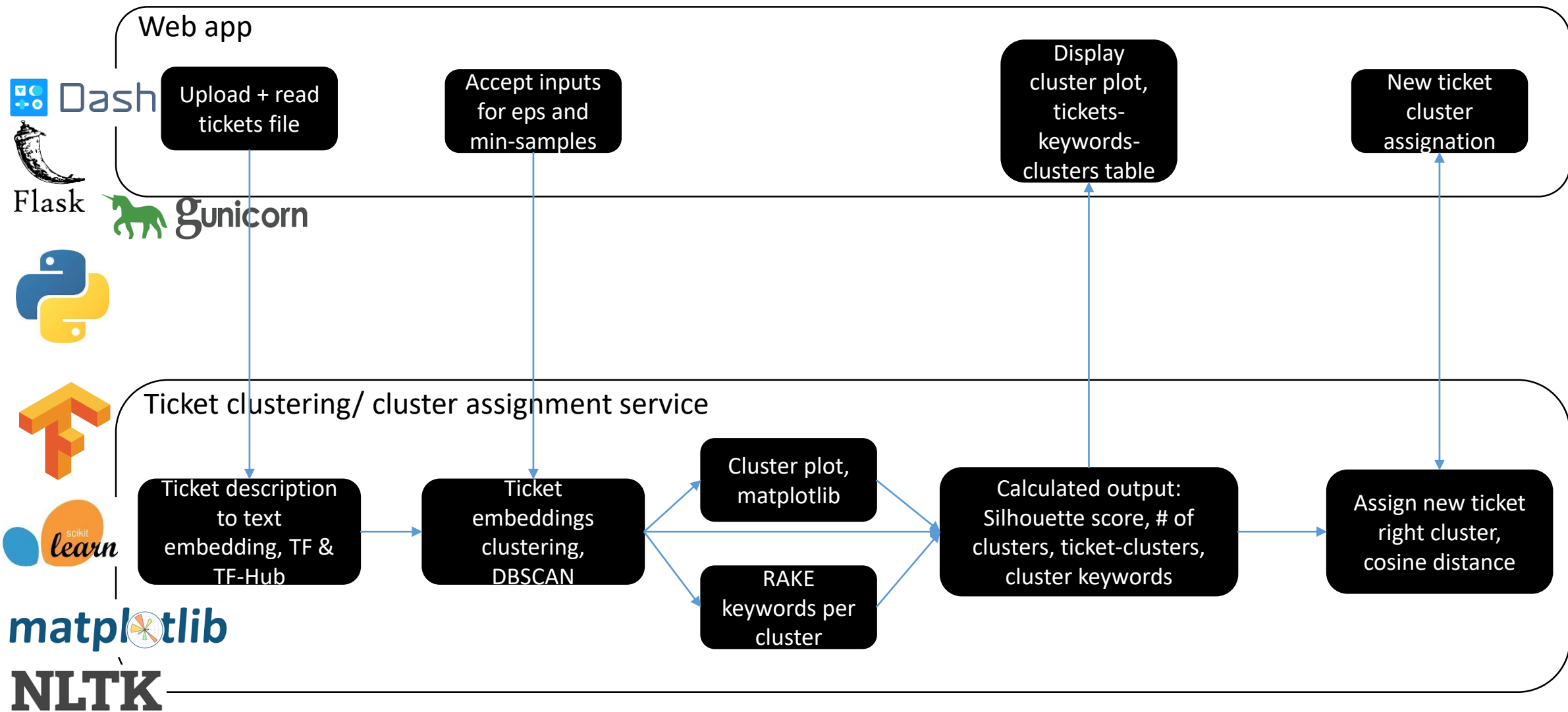
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Estimated number of clusters: 44. Silhouette Coefficient: 0.04

## Input 3

Text	ClusterKeywords	Cluster
Excellent choice for Jumper Cables!!!	jumper cables !!	0
Excellent, High Quality Starter Cables	high quality starter cables	1
nice cables	decent cable set	2
decent cable set	decent cable set	2
Nice smooth cables and solid clamps	decent cable set	2
Coleman Cable 08065 12-Foot Heavy-Duty Truck and Auto Battery Booster	coleman cable 08065 12	3
Jumper Cables - The Real Deal	real deal	4
No noticable difference	noticable difference	5
Extension Cable	extension cable	6
2 Year old Paint and Porter Cable 7424XP 6-Inch Variable-Speed Polisher	porter cable 7424xp 6	7
K&N air filter	n air flow filter	8
K&N air flow filter for G35 coupe GMT	n air flow filter	8
50% Hype, But the Remaining 50% is Still a great filter	great filter	9
Fram Honda oil filter	fram honda oil filter	10
None of my filter wrenches fit it.	-  toyota cammister filter	11
Fits my oil filters less than 3"	-  toyota cammister filter	11
Toyota cammister filter - this is what you need	-  toyota cammister filter	11
A mist have cleaner for kn filters.	kn filters	12
Must Have if you have a K&N Filter	n filter	13
Good Cleaner/Lubricator For Reusable Air Filters	reusable air filters	14
Good Filter	reusable air filters	14
Great filter - 2nd Purchase	reusable air filters	14
Great Filter!	reusable air filters	14
filter	favorite filter removal tool !  filter	15
Filter you water	favorite filter removal tool !  filter	15
My favorite filter removal tool!	favorite filter removal tool !  filter	15
KN filter oil and cleaner	favorite filter removal tool !  filter	15
Air filter service kit	favorite filter removal tool !  filter	15
A must for your filter	n drop filter	16
Easy to use for my K&N Drop filter	n drop filter	16
2006 Ford Escape - Mercury Mariner fuel filter	mercury mariner fuel filter	17
Good filter, no replacement clips included	replacement clips included	18
Fuel Filter for a Lincoln Town Car	lincoln town car	19
Motorcraft Fuel Filter	motorcraft fuel filter	20

Software Architecture



# gunicorn + flask

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Ticket similarity cluster

Objective: To find clusters of tickets that can be resolved using a similar approach. Tickets in a repository are clustered using text analysis (like system or user created ticket) and raw or computed numerical data using the DBSCAN technique.

Outcome: The clusters show clearly similar tickets. A business analyst can then use the clusters to find patterns in the data.

IMPORTANT: Load only an Excel file, with the second column being the ticket text.

Input 1

Input 2

eps (distance between points in the same cluster)

Minimum number of samples per cluster

Estimated number of clusters: 44. Silhouette Coefficient: 0.04

Input 3

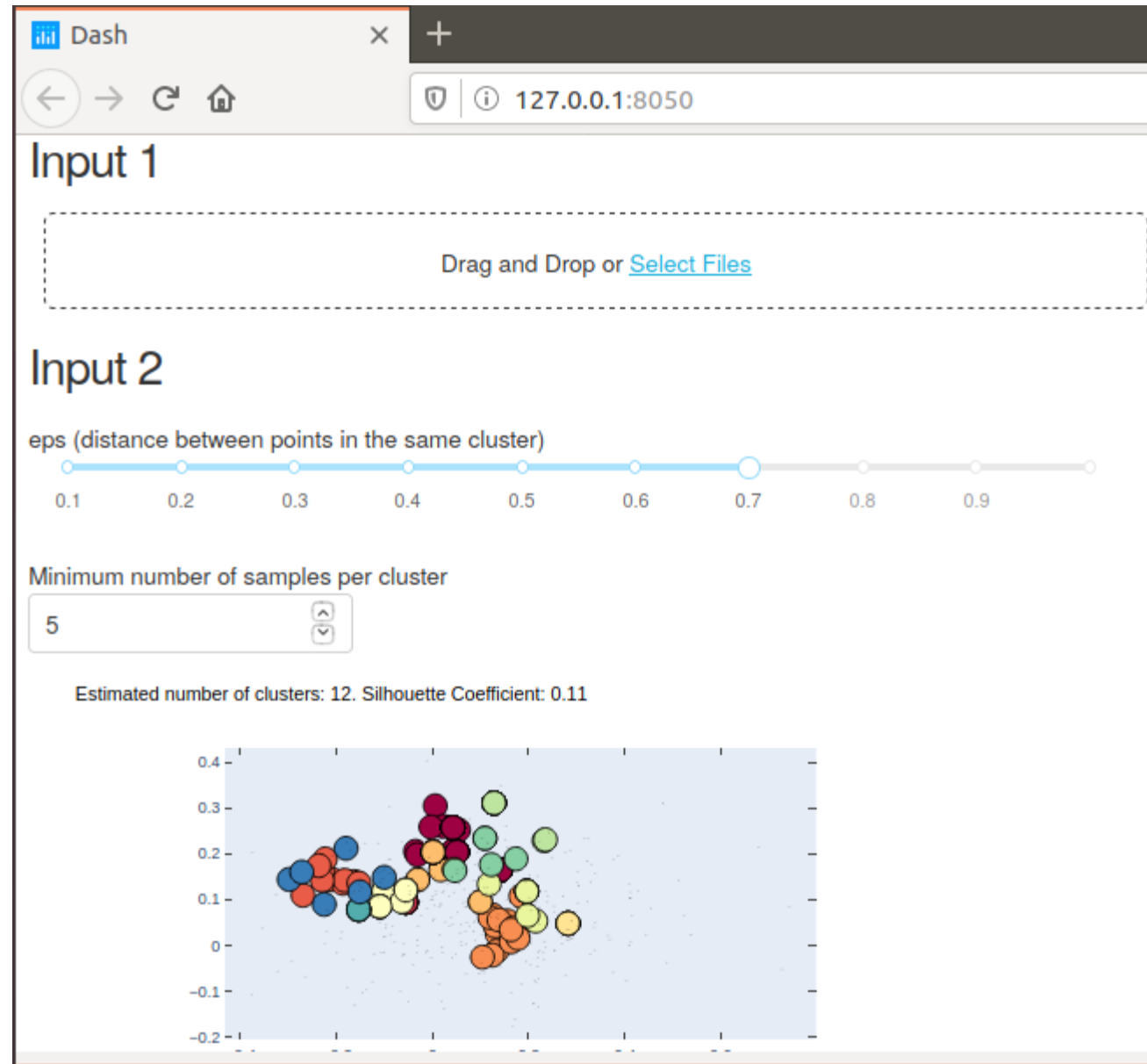
bala@bala-VirtualBox: ~/Documents/TicketSimilarity/Pfizer

File Edit View Search Terminal Help

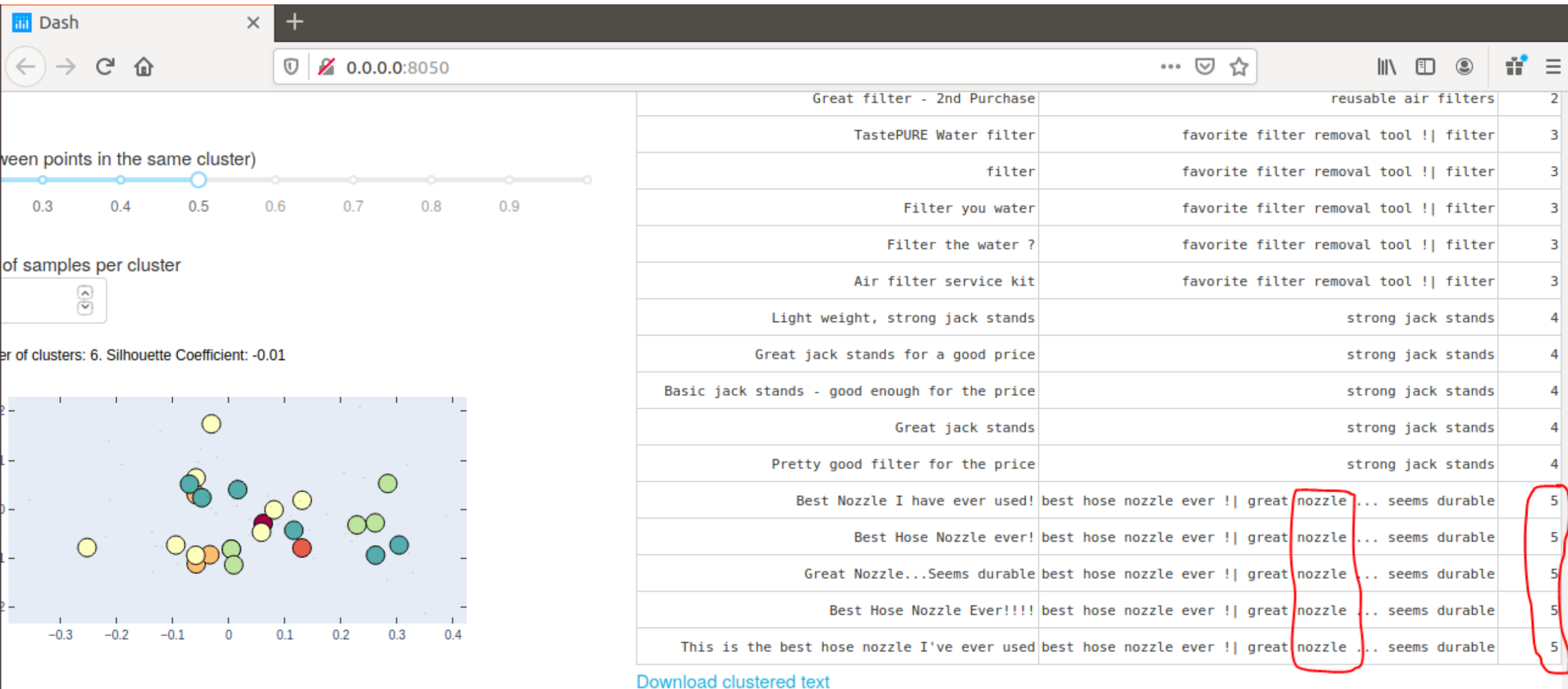
^C[2020-07-15 09:26:06 +0530] [8883] [INFO] Shutting down: Master  
(dockerVM) bala@bala-VirtualBox:~/Documents/TicketSimilarity/Pfizer\$ gunicorn --workers=2 callPfizerTicketSimilarity20200706:server -b :8050  
[2020-07-15 09:26:08 +0530] [8974] [INFO] Starting gunicorn 20.0.4  
[2020-07-15 09:26:08 +0530] [8974] [INFO] Listening at: http://0.0.0.0:8050 (8974)  
[2020-07-15 09:26:08 +0530] [8974] [INFO] Using worker: sync  
[2020-07-15 09:26:08 +0530] [8977] [INFO] Booting worker with pid: 8977  
[2020-07-15 09:26:08 +0530] [8978] [INFO] Booting worker with pid: 8978

Text	ClusterKeywords	Cluster
Cables!!!	jumper cables !!!	0
er Cables	high quality starter cables	1
ce cables	decent cable set	2
able set	decent cable set	2
id clamps	decent cable set	2
y Booster	coleman cable 8885 12	3
Deal Deal	real deal	4
ifference	noticeable difference	5
ion Cable	extension cable	6
Polisher	porter cable 7424xp 6	7
ir filter	n air flow filter	8
coupe GMT	n air flow filter	8
et filter	great filter	9
al filter	fram honda oil filter	10
None of my filter wrenches fit it.	-  toyota cannister filter	11
Fits my oil filters less than 3"	-  toyota cannister filter	11
Toyota cannister filter - this is what you need	-  toyota cannister filter	11
A mist have cleaner for kn filters.	kn filters	12
Must Have if you have a K&N Filter	n filter	13
Good Cleaner/Lubricator For Reusable Air Filters	reusable air filters	14
Good Filter	reusable air filters	14
Great filter - 2nd Purchase	reusable air filters	14
Great Filter!	reusable air filters	14
filter	favorite filter removal tool !! filter	15
Filter you water	favorite filter removal tool !! filter	15
My favorite filter removal tool!	favorite filter removal tool !! filter	15
KN filter oil and cleaner	favorite filter removal tool !! filter	15
Air filter service kit	favorite filter removal tool !! filter	15
A must for your filter	n drop filter	16
Easy to use for my K&N Drop filter	n drop filter	16
2008 Ford Escape - Mercury Mariner fuel filter	mercury mariner fuel filter	17
Good filter, no replacement clips included	replacement clips included	18
Fuel Filter for a Lincoln Town Car	lincoln town car	19
Motorcraft Fuel Filter	motorcraft fuel filter	20

Dash web app  
running on local  
host. Allows  
uploading a  
ticket file,  
choosing  
clustering  
parameters and  
produces  
clustering output



# Clustered tickets - output



# New ticket cluster assignment with similarity score

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# similarity clustering

clusters of tickets that can be resolved using an SOP, by an L1.5 resource.

in a repository are clustered using text analytics of select descriptive fields. extended to include combinations of multiple text fields, categorical variables (like ticket resolution or created ticket) and raw or computed numeric fields (like ticket resolution or created ticket). The text analytics technique chosen is word embedding and the clustering algorithm is K-MEANS.

clusters show clearly similar tickets. A business user can improve the clustering by adjusting the clustering parameter settings below.

and only an Excel file, with the second column being text column to be

## Input 3

Enter new ticket text here

jumper cables

Suggested cluster for new ticket: 0

Similarity score for new ticket with those in the suggested cluster: 0.42

Text	ClusterKeywords	Cluster
nice cables	decent cable set	0
decent cable set	decent cable set	0
Nice smooth cables and solid clamps	decent cable set	0
None of my filter wrenches fit it.	.  toyota cannister filter	1
Toyota cannister filter - this is what you need	.  toyota cannister filter	1
Fits my oil filters less than 3"	.  toyota cannister filter	1