

Out of range values and inaccurate data

CLEANING DATA IN SQL SERVER DATABASES

SQL

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Dataset - series and episodes

series

id	name	premiered	official_site	contact_number	rating	..
1	Adventure Time	2010-04-05	wwq.cartoonnetwork.com/video/adventuretime/	555-906-8845	8,4	..
2	Dexter	2006-01-10	ww.sho.com/sho/dexter/home	555-156-8845	8,6	..
3	Futurama	1999-03-28	www.cc.com/shows/futurama	555-210-9951	9,2	..
4	Game of Thrones	2011-04-17	www.hbo.com/game-of-thrones	555-abc-6641	9,3	..
5	Homeland	2011-10-02	www.sho.com/sho/homeland/home	555-985-6314	8,3	..
6	Westworld	2016-10-02	www.hbo.com/westworld	555-456-1234	8,6	..
7	Silicon Valley	2014-04-06	www.hbo.com/silicon-valley/	555-604-1234	11,4	..
8	The Big Bang Theory	2007-09-24	www.cbs.com/shows/big_bang_theory/	555-607-1274	8	..
9	Paw Patrol	2013-08-27	www.nickjr.com/paw-patrol/videos/	555-930-1274	11	..
...

Dataset - series and episodes

episodes

episode_id	series_id	name	season	number	airdate	runtime
1	1	Slumber Party Panic	1	1	2010-04-05	15
2	1	Trouble in Lumpy Space	1	2	2010-04-05	15
3	1	Prisoners of Love	1	3	2010-04-12	15
4	1	Tree Trunks	1	4	2010-04-12	15
5	1	The Enchiridion!	1	5	2010-04-19	15
6	1	The Jiggler	1	6	2010-04-19	15
7	1	Ricardio the Heart Guy	1	7	2010-04-26	15
8	1	Business Time	1	8	2010-04-26	15
9	1	My Two Favorite People	1	9	2010-05-03	15
...

Out of range values

- Values outside the expected range of valid data
 - e.g. person 400 inches tall
- Can disrupt the results if not detected
- Investigate!

Out of range values - example

```
SELECT * FROM series
```

id	name	premiered	official_site	contact_number	rating	...
1	Adventure Time	2010-05-04	www.cartoonnetwork.com/video/adventuretime/	555-906-8845	8,4	...
2	Dexter	2006-01-10	www.sho.com/sho/dexter/home	555-156-8845	8,6	...
3	Futurama	1999-03-03	www.cc.com/shows/futurama	555-210-9951	9,2	...
4	Game of Thrones	2011-04-04	www.hbo.com/game-of-thrones	555-543-6641	9,3	...
5	Homeland	2011-02-10	www.sho.com/sho/homeland/home	555-985-6314	8,3	...
6	Westworld	2016-02-10	www.hbo.com/westworld	555-456-1234	8,6	...
7	Silicon Valley	2014-04-06	www.hbo.com/silicon-valley/	555-604-1234	11,4	...
8	The Big Bang Theory	2007-09-24	www.cbs.com/shows/big_bang_theory/	555-607-1274	8	...
9	Paw Patrol	2013-08-27	www.nickjr.com/paw-patrol/videos/	555-930-1274	11	...
...

Out of range values - detecting the values

```
SELECT * FROM series
WHERE rating NOT BETWEEN 0 AND 10
```

id	name	premiered	official_site	contact_number	rating	...
7	Silicon Valley	2014-04-06	www.hbo.com/silicon-valley/	555-604-1234	11,4	...
9	Paw Patrol	2013-08-27	www.nickjr.com/paw-patrol/videos/	555-930-1274	11	...

```
SELECT * FROM series
WHERE rating < 0 OR rating > 10
```

id	name	premiered	official_site	contact_number	rating	...
7	Silicon Valley	2014-04-06	www.hbo.com/silicon-valley/	555-604-1234	11,4	...
9	Paw Patrol	2013-08-27	www.nickjr.com/paw-patrol/videos/	555-930-1274	11	...

Out of range values - excluding the values

```
SELECT * FROM series
WHERE rating BETWEEN 0 AND 10
```

id	name	premiered	official_site	contact_number	rating	su
1	Adventure Time	2010-05-04	wwq.cartoonnetwork.com/video/adventuretime/	555-906-8845	8,4	..
2	Dexter	2006-01-10	ww.sho.com/sho/dexter/home	555-156-8845	8,6	..
3	Futurama	1999-03-03	www.cc.com/shows/futurama	555-210-9951	9,2	..
4	Game of Thrones	2011-04-04	www.hbo.com/game-of-thrones	555-abc-6641	9,3	..
5	Homeland	2011-02-10	www.sho.com/sho/homeland/home	555-985-6314	8,3	..
6	Westworld	2016-02-10	www.hbo.com/westworld	555-456-1234	8,6	..
8	The Big Bang Theory	2007-09-24	www.cbs.com/shows/big_bang_theory/	555-607-1274	8	..
...

Out of range values - excluding the values

```
SELECT * FROM series
WHERE rating >= 0 AND rating <=10
```

id	name	premiered	official_site	contact_number	rating	su
1	Adventure Time	2010-05-04	wwq.cartoonnetwork.com/video/adventuretime/	555-906-8845	8,4	..
2	Dexter	2006-01-10	ww.sho.com/sho/dexter/home	555-156-8845	8,6	..
3	Futurama	1999-03-03	www.cc.com/shows/futurama	555-210-9951	9,2	..
4	Game of Thrones	2011-04-04	www.hbo.com/game-of-thrones	555-abc-6641	9,3	..
5	Homeland	2011-02-10	www.sho.com/sho/homeland/home	555-985-6314	8,3	..
6	Westworld	2016-02-10	www.hbo.com/westworld	555-456-1234	8,6	..
8	The Big Bang Theory	2007-09-24	www.cbs.com/shows/big_bang_theory/	555-607-1274	8	..
...

Inaccurate data

- Two or more values are contradictory
 - e.g. pregnant man
- Can disrupt the results if not detected
- Investigate!

Inaccurate data - example

series

id	name	premiered	official_site	contact_number	rating	summary
----	-----	-----	-----	-----	-----	-----

episodes

episode_id	series_id	name	season	number	airdate	runtime
-----	-----	-----	-----	-----	-----	-----

Valid: episodes.airdate >= series.premiered

Inaccurate data - example

id	name	premiered	episode_id	name	airdate
5	Homeland	2011-10-02	58	Pilot	2010-10-02
6	Westworld	2016-10-02	70	The Original	2015-10-02
6	Westworld	2016-10-02	74	Contrapasso	2015-10-30

Inaccurate data - detecting the values

```
SELECT
  series.id,
  series.name,
  series.premiered,
  episodes.episode_id,
  episodes.name,
  episodes.airdate
FROM series
INNER JOIN episodes ON series.id = episodes.series_id
WHERE episodes.airdate < series.premiered
```

id	name	premiered	episode_id	name	airdate	
----	-----	-----	-----	-----	-----	
5	Homeland	2011-10-02	58	Pilot	2010-10-02	
6	Westworld	2016-10-02	70	The Original	2015-10-02	
6	Westworld	2016-10-02	74	Contrapasso	2015-10-30	

Inaccurate data - excluding the values

```
SELECT
    series.id,
    series.name,
    series.premiered,
    episodes.episode_id,
    episodes.name,
    episodes.airdate
FROM series
INNER JOIN episodes ON series.id = episodes.series_id
WHERE episodes.airdate >= series.premiered
```

episode_id	series_id	name	season	number	airdate	runtime
1	1	Slumber Party Panic	1	1	2010-04-05	15
2	1	Trouble in Lumpy Space	1	2	2010-04-05	15
3	1	Prisoners of Love	1	3	2010-04-12	15
4	1	Tree Trunks	1	4	2010-04-12	15
...

Let's practice!

CLEANING DATA IN SQL SERVER DATABASES

Converting data with different types

CLEANING DATA IN SQL SERVER DATABASES

SQL

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Introduction to undesirable data types

```
SELECT * FROM series
WHERE rating BETWEEN 0 AND 10
```

```
SELECT * FROM series
WHERE rating >= 0 AND rating <= 10
```

id	name	rating	...
1	Adventure Time	8.4	...
2	Dexter	8.6	...
3	Futurama	9.2	...
4	Game of Thrones	9.3	...
...

Column_name	Type
id	int
name	varchar
premiered	date
official_site	varchar
contact_number	varchar
rating	float
summary	varchar

Introduction to undesirable data types

Column_name	Type
id	int
name	varchar
premiered	date
official_site	varchar
contact_number	varchar
rating	varchar
summary	varchar

Undesirable data types - examples

```
SELECT * FROM series  
WHERE rating BETWEEN 0 AND 10
```

```
SELECT * FROM series  
WHERE rating >= 0 AND rating <= 10
```

Conversion failed when converting the varchar value '8.4' to data type int.

Undesirable data types - examples

```
SELECT AVG(rating)
FROM series
```

Operand data type varchar is invalid for avg operator.

Solving type conversion problems

```
SELECT * FROM series
WHERE CAST(rating AS FLOAT) BETWEEN 0 AND 10
```

```
SELECT * FROM series
WHERE CONVERT(FLOAT, rating) BETWEEN 0 AND 10
```

id	name	premiered	contact_number	rating	...
1	Adventure Time	2010-04-05	555-906-8845	8.4	...
2	Dexter	2006-01-10	555-156-8845	8.6	...
3	Futurama	1999-03-28	555-210-9951	9.2	...
4	Game of Thrones	2011-04-17	555-543-6641	9.3	...
...

Solving type conversion problems

```
SELECT AVG(CAST(rating AS FLOAT)) AS rating_casted
FROM series
WHERE CAST(rating AS FLOAT) BETWEEN 0 AND 10
```

```
SELECT AVG(CONVERT(FLOAT, rating)) AS rating_casted
FROM series
WHERE CONVERT(FLOAT, rating) BETWEEN 0 AND 10
```

```
| rating_casted |
|-----|
| 8,62857142857143 |
```

Let's practice!

CLEANING DATA IN SQL SERVER DATABASES

Pattern matching

CLEANING DATA IN SQL SERVER DATABASES



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Pattern matching - Introduction

```
SELECT * FROM series
```

id	name	contact_number	...
1	Adventure Time	555-906-8845	...
2	Dexter	555-156-8845	...
3	Futurama	555-210-9951	...
4	Game of Thrones	555-543-6641	...
...

- Valid numbers: ###-###-####
 - first and fourth numbers between 2 and 9
 - the rest between 0 and 9
- Invalid number: 555-156-8845

Pattern matching - Introduction

- SQL Server doesn't provide full blown set of regular expressions.
- SQL Server can match patterns using `LIKE`.
- To have the full blown set of regular expressions -> create and install extensions.

Pattern matching - LIKE

- Determines if a string matches a specified pattern

Wildcard character	Description	Example
%	Any string of zero or more characters	WHERE contact_number LIKE '555-%'
_ (underscore)	Any single character	WHERE contact_number LIKE '____-____-____'
[]	Any single character within the specified range or set	WHERE contact_number LIKE '[2-9][0-9][0-9]-[2-9][0-9][0-9]-[0-9][0-9][0-9][0-9]'
[^]	Any single character not within the specified range or set	WHERE contact_number LIKE '[^2-9]'

Pattern matching - example with %

```
SELECT name, contact_number
FROM series
WHERE contact_number LIKE '555%'
```

name	contact_number	
-----	-----	
Adventure Time	555-906-8845	
Dexter	555-156-8845	
Futurama	555-210-9951	
Game of Thrones	555-abc-6641	
...	...	

Pattern matching - example with %

```
SELECT
  name,
  contact_number
FROM series
WHERE contact_number NOT LIKE '555%'
```

name	contact_number
The Good Doctor	000-930-1274

Pattern matching - example with [] (brackets)

```
SELECT
    name,
    contact_number
FROM series
WHERE contact_number LIKE '[2-9][0-9][0-9]-[2-9][0-9][0-9]-[0-9][0-9][0-9][0-9]'
```

name	contact_number	
-----	-----	
Adventure Time	555-906-8845	
Futurama	555-210-9951	
Homeland	555-985-6314	
Westworld	555-456-1234	
...	...	

Pattern matching - example with [] (brackets)

```
SELECT
  name,
  contact_number
FROM series
WHERE contact_number NOT LIKE '[2-9][0-9][0-9]-[2-9][0-9][0-9]-[0-9][0-9][0-9][0-9]'
```

name	contact_number	
-----	-----	
Dexter	555-156-8845	
Game of Thrones	555-abc-6641	
The Good Doctor	000-930-1274	

Let's practice!

CLEANING DATA IN SQL SERVER DATABASES