

Reshaping with melt

RESHAPING DATA WITH PANDAS



Maria Eugenia Inzaugarat
Data Scientist

Wide to long transformation

- Perform analytics
- Plot different variables in the same graph

Wide to long transformation

	first	last	age	height	weight
0	John	Wick	50	185	70
1	Mary	Shelley	25	164	60
2	Alice	Liddell	16	155	58



	first	last	variable	value
0	John	Wick	age	50
1	Mary	Shelley	age	25
2	Alice	Liddell	age	16
3	John	Wick	height	185
4	Mary	Shelley	height	164
5	Alice	Liddell	height	155
6	John	Wick	weight	70
7	Mary	Shelley	weight	60
8	Alice	Liddell	weight	58

`df.melt(` `)`

Melt

	first	last	age	height	weight
0	John	Wick	50	185	70
1	Mary	Shelley	25	164	60
2	Alice	Liddell	16	155	58




	first	last	variable	value
0	John	Wick	age	50
1	Mary	Shelley	age	25
2	Alice	Liddell	age	16
3	John	Wick	height	185
4	Mary	Shelley	height	164
5	Alice	Liddell	height	155
6	John	Wick	weight	70
7	Mary	Shelley	weight	60
8	Alice	Liddell	weight	58

```
df.melt(id_vars=| )
```

Melt

	first	last	age	height	weight
0	John	Wick	50	185	70
1	Mary	Shelley	25	164	60
2	Alice	Liddell	16	155	58




	first	last	variable	value
0	John	Wick	age	50
1	Mary	Shelley	age	25
2	Alice	Liddell	age	16
3	John	Wick	height	185
4	Mary	Shelley	height	164
5	Alice	Liddell	height	155
6	John	Wick	weight	70
7	Mary	Shelley	weight	60
8	Alice	Liddell	weight	58

```
df.melt(id_vars=["first", "last"])
```

Melt

	first	last	age	height	weight
0	John	Wick	50	185	70
1	Mary	Shelley	25	164	60
2	Alice	Liddell	16	155	58




	first	last	variable	value
0	John	Wick	age	50
1	Mary	Shelley	age	25
2	Alice	Liddell	age	16
3	John	Wick	height	185
4	Mary	Shelley	height	164
5	Alice	Liddell	height	155
6	John	Wick	weight	70
7	Mary	Shelley	weight	60
8	Alice	Liddell	weight	58

```
df.melt(id_vars=["first", "last"])
```

Melt

	first	last	age	height	weight
0	John	Wick	50	185	70
1	Mary	Shelley	25	164	60
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	first	last	variable	value
0	John	Wick	age	50
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2	Alice	Liddell	age	16
3	John	Wick	height	185
4	Mary	Shelley	height	164
5	Alice	Liddell	height	155
6	John	Wick	weight	70
7	Mary	Shelley	weight	60
8	Alice	Liddell	weight	58

```
df.melt(id_vars=["first", "last"])
```

Melting data

```
books
```

	title	isbn	language	pages
0	Mostly Harmless	074	eng	260
1	The Hitchhiker's Guide	072	eng	215
2	El restaurante del fin del mundo	071	spa	250

```
books.melt(id_vars='title')
```

	title	variable	value
0	Mostly Harmless	isbn	074
1	The Hitchhiker's Guide	isbn	072
2	El restaurante del fin del mundo	isbn	071
3	Mostly Harmless	language	eng
4	The Hitchhiker's Guide	language	eng
5	El restaurante del fin del mundo	language	spa
6	Mostly Harmless	pages	260
7	The Hitchhiker's Guide	pages	215
8	El restaurante del fin del mundo	pages	250

Values and variables

	first	last	age	height	weight
0	John	Wick	50	185	70
1	Mary	Shelley	25	164	60
2	Alice	Liddell	16	155	58




	first	last	feature	amount
0	John	Wick	age	50
1	Mary	Shelley	age	25
2	Alice	Liddell	age	16
3	John	Wick	height	185
4	Mary	Shelley	height	164
5	Alice	Liddell	height	155

```
df.melt(id_vars=["first", "last"], value_vars=           , var_name=           , value_name=           )
```

Values and variables

	first	last	age	height	weight
0	John	Wick	50	185	70
1	Mary	Shelley	25	164	60
2	Alice	Liddell	16	155	58




	first	last	feature	amount
0	John	Wick	age	50
1	Mary	Shelley	age	25
2	Alice	Liddell	age	16
3	John	Wick	height	185
4	Mary	Shelley	height	164
5	Alice	Liddell	height	155

```
df.melt(id_vars=["first", "last"], value_vars=["age", "height"], var_name=, value_name=)
```

Values and variables

	first	last	age	height	weight
0	John	Wick	50	185	70
1	Mary	Shelley	25	164	60
2	Alice	Liddell	16	155	58




	first	last	feature	amount
0	John	Wick	age	50
1	Mary	Shelley	age	25
2	Alice	Liddell	age	16
3	John	Wick	height	185
4	Mary	Shelley	height	164
5	Alice	Liddell	height	155

```
df.melt(id_vars=["first", "last"], value_vars=["age", "height"], var_name="feature", value_name="amount")
```

Values and variables

	first	last	age	height	weight
0	John	Wick	50	185	70
1	Mary	Shelley	25	164	60
2	Alice	Liddell	16	155	58



	first	last	feature	amount
0	John	Wick	age	50
1	Mary	Shelley	age	25
2	Alice	Liddell	age	16
3	John	Wick	height	185
4	Mary	Shelley	height	164
5	Alice	Liddell	height	155

```
df.melt(id_vars=["first", "last"], value_vars=["age", "height"], var_name="feature", value_name="amount")
```

Specifying values to melt

```
books.melt(id_vars='title', value_vars=['language_code', 'num_pages'])
```

	title	variable	value
0	Mostly Harmless	language	eng
1	The Hitchhiker's Guide	language	eng
2	El restaurante del fin del mundo	language	spa
3	Mostly Harmless	pages	260
4	The Hitchhiker's Guide	pages	215
5	El restaurante del fin del mundo	pages	250

Naming values and variables

```
books.melt(id_vars='title', value_vars=['language_code', 'isbn'], var_name='feature', value_name='code')
```

	title	feature	code
0	Mostly Harmless	isbn	074
1	The Hitchhiker's Guide	isbn	072
2	El restaurante del fin del mundo	isbn	071
3	Mostly Harmless	language	eng
4	The Hitchhiker's Guide	language	eng
5	El restaurante del fin del mundo	language	spa

Let's practice!
RESHAPING DATA WITH PANDAS

Wide to long function

RESHAPING DATA WITH PANDAS



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Data Scientist

Wide to long transformation

	name	age2019	weight2019	age2020	weight2020
0	John Wick	50	70	51	72
1	Mary Shelley	25	60	26	61
2	Alice Liddell	16	58	17	57

Wide to long transformation

	name	age2019	weight2019	age2020	weight2020
0	John Wick	50	70	51	72
1	Mary Shelley	25	60	26	61
2	Alice Liddell	16	58	17	57



		age	weight
name	year		
John Wick	2019	50	70
Mary Shelley	2019	25	60
Alice Liddell	2019	16	58
John Wick	2020	51	72
Mary Shelley	2020	26	61
Alice Liddell	2020	17	57

`pd.wide_to_long(` `)`

Wide to long function

	name	age2019	weight2019	age2020	weight2020
0	John Wick	50	70	51	72
1	Mary Shelley	25	60	26	61
2	Alice Liddell	16	58	17	57



		age	weight
name	year		
John Wick	2019	50	70
Mary Shelley	2019	25	60
Alice Liddell	2019	16	58
John Wick	2020	51	72
Mary Shelley	2020	26	61
Alice Liddell	2020	17	57

`pd.wide_to_long(df, stubnames = , i = , j =)`

Wide to long function

	name	age2019	weight2019	age2020	weight2020
0	John Wick	50	70	51	72
1	Mary Shelley	25	60	26	61
2	Alice Liddell	16	58	17	57



		age	weight
name	year		
John Wick	2019	50	70
Mary Shelley	2019	25	60
Alice Liddell	2019	16	58
John Wick	2020	51	72
Mary Shelley	2020	26	61
Alice Liddell	2020	17	57

```
pd.wide_to_long(df, stubnames = ["age", "weight"], i = , j = )
```

Wide to long function

	name	age2019	weight2019	age2020	weight2020
0	John Wick	50	70	51	72
1	Mary Shelley	25	60	26	61
2	Alice Liddell	16	58	17	57



		age	weight
name	year		
John Wick	2019	50	70
Mary Shelley	2019	25	60
Alice Liddell	2019	16	58
John Wick	2020	51	72
Mary Shelley	2020	26	61

```
pd.wide_to_long(df, stubnames = ["age", "weight"], i = , j = "year")
```

Wide to long function

	name	age2019	weight2019	age2020	weight2020
0	John Wick	50	70	51	72
1	Mary Shelley	25	60	26	61
2	Alice Liddell	16	58	17	57



		age	weight
	name	year	
	John Wick	2019	50
	Mary Shelley	2019	25
	Alice Liddell	2019	16
	John Wick	2020	51
	Mary Shelley	2020	26
	Alice Liddell	2020	17

```
pd.wide_to_long(df, stubnames = ["age", "weight"], i = "name", j = "year")
```

Reshaping data

books

	title	ratings2019	sold2019	ratings2020	sold2020
0	Mostly Harmless	4.2	456	4.3	436
1	The Hitchhiker's Guide	4.8	980	4.9	998
2	El restaurante del fin del mundo	4.5	678	4.6	638

Reshaping data

```
pd.wide_to_long(books, )
```


Reshaping data

```
pd.wide_to_long(books, stubnames=['ratings', 'sold'])
```

Reshaping data

```
pd.wide_to_long(books, stubnames=['ratings', 'sold'], i='year', j='year')
```

Reshaping data

```
pd.wide_to_long(books, stubnames=['ratings', 'sold'], i='title', j='year')
```

			ratings	sold
	title	year		
0	Mostly Harmless	2019	4.2	456
1	The Hitchhiker's Guide	2019	4.8	980
2	El restaurante del fin del mundo	2019	4.5	678
3	Mostly Harmless	2020	4.4	436
4	The Hitchhiker's Guide	2020	4.9	998
5	El restaurante del fin del mundo	2020	4.6	638

DataFrame with index

```
books_with_index
```

```
          title          author  ratings2019  sold2019
0  To Kill a Mockingbird  Harper Lee         4.7      456
1  The Hitchhiker's Guide  Douglas Adams        4.8      980
2      The Black Cat  Edgar Allan Poe         4.5      678
```

```
pd.wide_to_long(books_with_index, stubnames=['ratings', 'sold'], i='author', j='year')
```

```
          author  year  ratings  sold
0    Harper Lee  2019     4.2    456
1  Douglas Adams  2019     4.8    980
2  Edgar Allan Poe  2019     4.5    678
```

DataFrame with index

```
books_with_index.reset_index(drop=False, inplace=True)
pd.wide_to_long(books_with_index, stubnames=['ratings', 'sold'], i=['author', 'title'], j='year')
```

	title	author	year	ratings	sold
0	To Kill a Mockingbird	Harper Lee	2019	4.7	456
1	The Hitchhiker's Guide	Douglas Adams	2019	4.8	980
2	The Black Cat	Edgar Allan Poe	2019	4.5	678

sep argument

```
new_books
```

```
      title      author  ratings_2019  sold_2019  ratings_2020  sold_2020
0  A Murder Is Announced  Agatha Christie         4.4        796         4.8        856
1      Sherlock Holmes  Sir A. Conan Doyle         4.5        780         4.8        818
2      The Sparrow  Mary Doria Russell         4.2        178         4.1        238
```

sep argument

```
pd.wide_to_long(new_books, stubnames=['ratings', 'sold'], i=['title', 'author'], j='year')
```

```
           sold_2020 ratings_2020 ratings_2019 sold_2019 ratings sold
title author year
```

sep argument

```
pd.wide_to_long(new_books, stubnames=['ratings', 'sold'], i=['title', 'author'], j='year', sep='_')
```

				ratings	sold
	title	author	year		
0	A Murder Is Announced	Agatha Christie	2019	4.4	796
1	Sherlock Holmes	Sir A. Conan Doyle	2019	4.5	780
2	The Sparrow	Mary Doria Russell	2019	4.2	178
3	A Murder Is Announced	Agatha Christie	2020	4.8	856
4	Sherlock Holmes	Sir A. Conan Doyle	2020	4.8	818
5	The Sparrow	Mary Doria Russell	2020	4.1	238

suffix argument

```
another_books
```

```
      title  ratings_one  sold_one  ratings_two  sold_two
0  A Murder Is Announced      4.4      796      4.8      856
1    Sherlock Holmes      4.5      780      4.8      818
2      The Sparrow      4.2      178      4.1      238
```

suffix argument

```
pd.wide_to_long(another_books, stubnames=['ratings', 'sold'], i='title', j='edition', sep='_')
```

```
           sold_one ratings_one ratings_two sold_two  ratings sold  
title  year
```

suffix argument

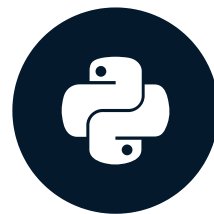
```
pd.wide_to_long(another_books, stubnames=['ratings', 'sold'], i='title', j='edition', sep='_', suffix='\w+')
```

			ratings	sold
	title	edition		
0	A Murder Is Announced	one	4.4	796
1	Sherlock Holmes	one	4.5	780
2	The Sparrow	one	4.2	178
3	A Murder Is Announced	two	4.8	856
4	Sherlock Holmes	two	4.8	818
5	The Sparrow	two	4.1	238

Let's practice!
RESHAPING DATA WITH PANDAS

Working with string columns

RESHAPING DATA WITH PANDAS



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Columns with strings

```
books
```

```
      title  ratings_2015  sold_2015  ratings_2016  sold_2016
0  The Civil War:Vol. 1      4.3      234         4.2      254
1  The Civil War:Vol. 2      4.5      525         4.3      515
2  The Civil War:Vol. 3      4.1      242         4.2      251
```

```
books['title'].dtypes
```

```
dtype('O')
```

String methods

- `pandas` Series string processing methods
- Access easily by `str` attribute

Splitting into two columns

```
books
```

```
      title  ratings_2015  sold_2015  ratings_2016  sold_2016
0  The Civil War:Vol. 1      4.3      234      4.2      254
1  The Civil War:Vol. 2      4.5      525      4.3      515
2  The Civil War:Vol. 3      4.1      242      4.2      251
```

```
books['title']
```


Splitting into two columns

```
books
```

```
      title  ratings_2015  sold_2015  ratings_2016  sold_2016
0  The Civil War:Vol. 1      4.3      234      4.2      254
1  The Civil War:Vol. 2      4.5      525      4.3      515
2  The Civil War:Vol. 3      4.1      242      4.2      251
```

```
books['title'].str.split(':')
```

```
0    [The Civil War, Vol. 1]
1    [The Civil War, Vol. 2]
2    [The Civil War, Vol. 3]
```

Splitting into two columns

```
books
```

```
      title  ratings_2015  sold_2015  ratings_2016  sold_2016
0  The Civil War:Vol. 1      4.3      234      4.2      254
1  The Civil War:Vol. 2      4.5      525      4.3      515
2  The Civil War:Vol. 3      4.1      242      4.2      251
```

```
books['title'].str.split(":").str.get(0)
```

```
0    The Civil War
1    The Civil War
2    The Civil War
```

Splitting into two columns

```
books
```

```
      title  ratings_2015  sold_2015  ratings_2016  sold_2016
0  The Civil War:Vol. 1      4.3      234      4.2      254
1  The Civil War:Vol. 2      4.5      525      4.3      515
2  The Civil War:Vol. 3      4.1      242      4.2      251
```

```
books['title'].str.split(":", expand=True)
```

```
      0      1
0  The Civil War  Vol. 1
1  The Civil War  Vol. 2
2  The Civil War  Vol. 3
```

Splitting into two columns

```
books[['main_title', 'subtitle']] = books['title'].str.split(":", expand=True)
```

```
books.drop('title', axis=1, inplace=True)
```

```
pd.wide_to_long(books, stubnames=['ratings', 'sold'], i=['main_title', 'subtitle'], j='year')
```

			ratings	sold
main_title	subtitle	year		
The Civil War	Vol. 1	2015	4.3	234
		2016	4.2	254
	Vol. 2	2015	4.5	525
		2016	4.3	515
	Vol. 3	2015	4.1	242
		2016	4.2	251

Concatenate two columns

```
books_new
```

```
   name_author  lastname_author  nationality  number_books
0   Virginia         Wolf      British         50
1  Margaret      Atwood    Canadian         40
2    Harper         Lee     American          2
```

Concatenate two columns

```
books_new
```

```
   name_author  lastname_author  nationality  number_books
0   Virginia         Wolf        British           50
1  Margaret         Atwood      Canadian           40
2   Harper         Lee         American            2
```

```
books_new['name_author'].str.cat(books_new['lastname_author'], sep=' ')
```

```
0   Virginia Wolf
1  Margaret Atwood
2   Harper Lee
```

Concatenate two columns

```
books_new
```

```
   name_author  lastname_author  nationality  number_books
0   Virginia         Wolf        British           50
1  Margaret         Atwood      Canadian           40
2   Harper         Lee         American            2
```

```
books_new['author'] = books_new['name_author'].str.cat(books_new['lastname_author'], sep=' ')
```

```
books_new
```

```
   name_author  lastname_author  nationality  number_books      author
0   Virginia         Wolf        British           50  Virginia Wolf
1  Margaret         Atwood      Canadian           40  Margaret Atwood
2   Harper         Lee         American            2    Harper Lee
```

Concatenate two columns

```
books_new
```

```
   name_author  lastname_author  nationality  number_books
0   Virginia      Wolf         British         50
1  Margaret      Atwood        Canadian         40
2   Harper      Lee           American          2
```

```
books_new.melt(id_vars='author', value_vars=['nationality', 'number_books'], var_name='feature', value_name='value')
```

```
   author      feature  value
0  Virginia Wolf  nationality  British
1 Margaret Atwood  nationality  Canadian
2   Harper Lee    nationality  American
3  Virginia Wolf  number_books    50
4 Margaret Atwood  number_books    40
5   Harper Lee    number_books     2
```


Concatenate index

```
comics_marvel
```

```
      subtitle  year  ratings  sold
main_title
Avengers      Next  1992      4.5   234
Avengers  Forever  1998      4.6   224
Avengers      2099  1999      4.8   141
```

Concatenate index

```
comics_marvel.head(2)
```

	subtitle	year	ratings	sold
main_title				
Avengers	Next	1992	4.5	234
Avengers	Forever	1998	4.6	224

```
comics_marvel.index = comics_marvel.index.str.cat(comics_marvel['subtitle'], sep='-')  
books
```

	subtitle	year	ratings	sold
main_title				
Avengers-Next	Next	1992	4.5	234
Avengers-Forever	Forever	1998	4.6	224
Avengers-2099	2099	1999	4.8	141

Split index

```
comics_marvel.index = comics_marvel.index.str.split('-', expand=True)  
comics_marvel
```

		subtitle	year	ratings	sold
Avengers	Next	Next	1992	4.5	234
	Forever	Forever	1998	4.6	224
	2099	2099	1999	4.8	141

Concatenate Series

```
books_new['name_author']
```

```
0    Virginia  
1    Margaret  
2      Harper
```

```
new_list = ['Wolf', 'Atwood', 'Lee']  
books_new['name_author'].str.cat(new_list, sep=' ')
```

```
0    Virginia Wolf  
1    Margaret Atwood  
2      Harper Lee
```

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