

Sleep Analysis

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A large, abstract decorative shape in the bottom right corner of the slide. It is a gradient of teal and blue, starting from a lighter blue on the left and transitioning to a darker teal on the right, forming a shape that resembles a rising curve or a stylized 'L'.

Overview

Questions to answer with the data

- Which behaviors contribute to quality sleep?
- How does one quantify “good sleep”?
- What will my sleep quality be?
- How well rested will I be?

Database

cloud.mongodb.com/v2/61b14efb77cb51de7de3e1e#clusters

Megan's Org - 2021-... Access Manager Billing

Project 0 Atlas Realm Charts

DEPLOYMENT

Databases

Data Lake

DATA SERVICES

Triggers

Data API PREVIEW

SECURITY

Database Access

Network Access

Advanced

MEGAN'S ORG - 2021-12-09 > PROJECT 0

Database Deployments

Find a database deployment...

GetSleepy Connect View Monitoring Browse Collections ...

R 0 W 0 Last 6 hours 100.0/s

Connections 0 Last 6 hours 100.0

In 0.0 B/s Out 0.0 B/s Last 6 hours 100.0 B/s

Data Size 287.6 KB Last 19 days 512.0 MB

app.quickdatabasediagrams.com/#/

FILE EDIT EXPORT IMPORT DOCS SAVE

```
1 Sleep_Data
2 -
3 ID int
4 Start datetime
5 End datetime
6 Sleep_Quality percent
7 Time_in_Bed time
8 Wake_Up varchar
9 Sleep_Notes varchar
10 Heart_Rate int
11 Activity(Steps) int
12
13
```

Sleep_Data

ID	int
Start	datetime
End	datetime
Sleep_Quality	percent
Time_in_Bed	time
Wake_Up	varchar
Sleep_Notes	varchar
Heart_Rate	int
Activity(Steps)	int

- Free
- Simple
- High Speed
- Flexible

Data discovery and selection

Original Kaggle Data Set - Sleep Cycle iOS App

Starting Data

Start	End	Sleep quality	Time in bed	Wake up	Sleep Notes	Heart rate	Activity (steps)
12/29/2014 22:57	12/30/2014 7:30	1	8:32:00 AM			59	0
12/30/2014 21:17	12/30/2014 21:33	0.03	12:16:00 AM		Stressful day	72	0
12/30/2014 22:42	12/31/2014 7:13	0.98	8:30:00 AM			57	0
12/31/2014 22:31	1/1/2015 6:03	0.65	7:32:00 AM				0
1/1/2015 22:12	1/2/2015 4:56	0.72	6:44:00 AM		Drank coffee:Drank tea	68	0
1/3/2015 0:34	1/3/2015 7:47	0.83	7:12:00 AM		Drank coffee:Drank tea	60	0
1/4/2015 0:23	1/4/2015 7:37	0.78	7:14:00 AM		Drank tea		0
1/4/2015 21:34	1/5/2015 4:53	0.78	7:18:00 AM		Ate late:Drank coffee	57	0
1/5/2015 21:32	1/6/2015 5:00	0.69	7:27:00 AM		Drank coffee:Drank tea:Worked out	56	0
1/6/2015 21:24	1/7/2015 5:00	0.74	7:35:00 AM		Drank tea:Worked out	64	0
1/7/2015 20:59	1/8/2015 6:19	0.81	9:19:00 AM		Drank coffee:Drank tea:Stressful day	62	0
1/8/2015 22:58	1/9/2015 6:14	0.88	7:16:00 AM		Drank coffee:Drank tea	58	0
1/9/2015 22:27	1/10/2015 7:29	0.77	9:01:00 AM		Drank coffee:Drank tea	65	0
1/10/2015 22:38	1/11/2015 7:28	0.89	8:50:00 AM		Drank coffee:Drank tea	65	0
1/11/2015 22:12	1/12/2015 6:20	0.78	8:08:00 AM		Drank tea	53	0
1/12/2015 21:01	1/13/2015 6:13	1	9:11:00 AM		Drank tea:Worked out	65	0
1/13/2015 22:14	1/14/2015 6:20	1	8:06:00 AM		Drank coffee:Drank tea	55	0
1/14/2015 21:48	1/15/2015 5:02	0.88	7:13:00 AM		Drank coffee:Drank tea:Worked out	60	0
1/15/2015 21:32	1/16/2015 4:54	0.87	7:22:00 AM		Drank tea	60	0
1/17/2015 2:11	1/17/2015 9:03	0.83	6:51:00 AM		Drank coffee:Drank tea	94	0
1/17/2015 23:55	1/18/2015 7:47	0.93	7:51:00 AM		Drank coffee:Drank tea	57	0
1/18/2015 21:51	1/19/2015 5:04	0.58	7:12:00 AM		Drank coffee	67	0
1/19/2015 5:06	1/19/2015 6:20	0.16	1:13:00 AM			58	0
1/19/2015 21:45	1/20/2015 5:45	0.75	8:00:00 AM		Drank coffee:Drank tea:Worked out	54	0
1/20/2015 21:42	1/21/2015 5:45	0.8	8:02:00 AM		Drank coffee:Drank tea:Worked out	60	0

Modified Data

Start	End	Sleep quality	Time in bed	Wake up	Heart rate	Activity (steps)	Stressful day	Drank coffee	Drank tea	Ate late	Total	Worked out	Total
12/29/2014 22:57	12/30/2014 7:30	100%	8:32		59	0	0	0	0	0	0	0	0
12/30/2014 21:17	12/30/2014 21:33	3%	0:16		72	0	1	0	0	0	0	0	0
12/30/2014 22:42	12/31/2014 7:13	98%	8:30		57	0	0	0	0	0	0	0	0
12/31/2014 22:31	1/1/2015 6:03	65%	7:32			0	0	0	0	0	0	0	0
1/1/2015 22:12	1/2/2015 4:56	72%	6:44		68	0	0	1	1	0	0	0	0
1/3/2015 0:34	1/3/2015 7:47	83%	7:12		60	0	0	1	1	0	0	0	0
1/4/2015 0:23	1/4/2015 7:37	78%	7:14			0	0	0	1	0	0	0	0
1/4/2015 21:34	1/5/2015 4:53	78%	7:18		57	0	0	1	0	0	1	0	0
1/5/2015 21:32	1/6/2015 5:00	69%	7:27		56	0	0	1	0	0	1	0	1
1/6/2015 21:24	1/7/2015 5:00	74%	7:35		64	0	0	1	0	0	1	0	1
1/7/2015 20:59	1/8/2015 6:19	81%	9:19		62	0	1	1	1	0	0	0	0
1/8/2015 22:58	1/9/2015 6:14	88%	7:16		58	0	0	1	1	0	0	0	0
1/9/2015 22:27	1/10/2015 7:29	77%	9:01		65	0	0	1	1	0	0	0	0
1/10/2015 22:38	1/11/2015 7:28	89%	8:50		65	0	0	1	1	0	0	0	0
1/11/2015 22:12	1/12/2015 6:20	78%	8:08		53	0	0	0	1	0	0	0	0
1/12/2015 21:01	1/13/2015 6:13	100%	9:11		65	0	0	0	1	0	0	1	1
1/13/2015 22:14	1/14/2015 6:20	100%	8:06		55	0	0	1	1	0	0	0	0
1/14/2015 21:48	1/15/2015 5:02	88%	7:13		60	0	0	1	1	0	0	1	1
1/15/2015 21:32	1/16/2015 4:54	87%	7:22		60	0	0	0	1	0	0	0	0
1/17/2015 2:11	1/17/2015 9:03	83%	6:51		94	0	0	1	1	0	0	0	0
1/17/2015 23:55	1/18/2015 7:47	93%	7:51		57	0	0	1	1	0	0	0	0
1/18/2015 21:51	1/19/2015 5:04	58%	7:12		67	0	0	1	0	0	0	0	0
1/19/2015 5:06	1/19/2015 6:20	16%	1:13		58	0	0	0	0	0	0	0	0
1/19/2015 21:45	1/20/2015 5:45	75%	8:00		54	0	0	1	1	0	0	1	1
1/20/2015 21:42	1/21/2015 5:45	80%	8:02		60	0	0	1	1	0	0	1	1

Data Cleaning

	Start	End	Sleep quality	Time in bed	Wake up	Heart rate	Activity (steps)	Stressful day Total	Drank coffee Total	Drank tea Total	Ate late Total	Worked out Total
0	12/29/2014 22:57	12/30/2014 7:30	100%	8:32	:)	59	0	0	0	0	0	0
1	12/30/2014 21:17	12/30/2014 21:33	3%	0:16	:	72	0	1	0	0	0	0
2	12/30/2014 22:42	12/31/2014 7:13	98%	8:30	:	57	0	0	0	0	0	0
3	12/31/2014 22:31	1/1/2015 6:03	65%	7:32			0	0	0	0	0	0
4	1/1/2015 22:12	1/2/2015 4:56	72%	6:44	:)	68	0	0	1	1	0	0
...
882	2/12/2018 21:54	2/13/2018 7:02	91%	9:08			56	0	0	0	0	0
883	2/13/2018 23:49	2/14/2018 7:00	81%	7:11			64	0	0	0	0	0
884	2/14/2018 21:24	2/15/2018 6:20	71%	8:56			3316	0	0	0	0	0
885	2/15/2018 21:36	2/16/2018 6:50	80%	9:13			6555	0	0	0	0	0
886	2/16/2018 22:52	2/17/2018 7:48	91%	8:55			2291	0	0	0	0	0

887 rows × 13 columns

```
#Check data types to prepare for preporcessing
df.dtypes
```

```
Start          object
End            object
Sleep quality  object
Time in bed    object
Wake up        object
Heart rate     object
Activity (steps) object
Stressful day Total object
Drank coffee Total object
Drank tea Total object
Ate late Total object
Worked out Total object
dtype: object
```

Emoji Estimator



Start

User input, 24-hr time

End

User input, 24-hr time

Heart Rate

User input, if applicable (smart watch required)

Activity

User input, if applicable (step counter required)

Stressful Day ☐

User input, checkbox

Drank coffee ☐

User input, checkbox

drank tea ☐

User input, checkbox

ate late ☐

User input, checkbox

Worked out ☐

User input, checkbox

SUBMIT

User input, BUTTON

Sleep Quality

Computed based on Start/end time

Time in Bed

Computed based on Start/end time

Predicted mood!

EMOJI!

Pivot Direction

```
In [42]: 1 #DataFrame with the former target "Wake up"
```

```
2
```

```
Out[42]:
```

	Sleep quality	Time in bed	Wake up	Heart rate	Activity (steps)	Stressful day Total	Drank coffee Total	Drank tea Total	Ate late Total	Worked out Total	Fell asleep
0	100	512	0	59	0	0	0	0	0	0	2257
1	3	16	0	72	0	1	0	0	0	0	2117
2	98	510	0	57	0	0	0	0	0	0	2242
4	72	404	0	68	0	0	1	1	0	0	2212
5	83	432	0	60	0	0	1	1	0	0	34
...
229	93	493	0	67	0	1	0	1	0	1	2157
231	80	482	0	52	0	0	1	0	0	0	2207
235	72	480	0	56	0	0	1	1	0	1	2219
240	79	513	0	71	0	0	1	1	0	0	2353
241	85	504	0	65	0	0	1	1	0	0	2349

```
In [18]: 1 # DataFrame for the new target "Sleep quality" after dropping "Wake up" and "Heart rate" columns
```

```
2
```

```
Out[18]:
```

	Sleep quality	Time in bed	Activity (steps)	Stressful day Total	Drank coffee Total	Drank tea Total	Ate late Total	Worked out Total	Fell asleep
0	65	452	0	0	0	0	0	0	2231
1	89	530	0	0	1	1	0	0	2238
2	100	512	0	0	0	0	0	0	2257
3	87	442	0	0	0	1	0	0	2132
4	93	483	0	1	1	1	0	0	13
...
882	80	513	5184	0	0	0	0	0	2135
883	81	505	2544	0	0	0	0	0	2130
884	90	481	4529	0	0	0	0	0	2222
885	79	503	107	0	0	0	0	0	2137
886	8	36	166	0	0	0	0	0	832

887 rows x 9 columns

Linear Regression Model

```
In [67]: 1 # Instantiate the LinearRegression Model
         2 linear = LinearRegression()
         3 linear
```

```
Out[67]: LinearRegression()
```

```
In [68]: 1 # Train the Model
         2 linear.fit(X_train, y_train)
```

```
Out[68]: LinearRegression()
```

```
In [45]: 1 # Predict outcomes for test data set
         2 y_pred = linear.predict(X_test)
         3 pd.DataFrame({"Prediction": y_pred, "Actual": y_test})
```

```
Out[45]:
```

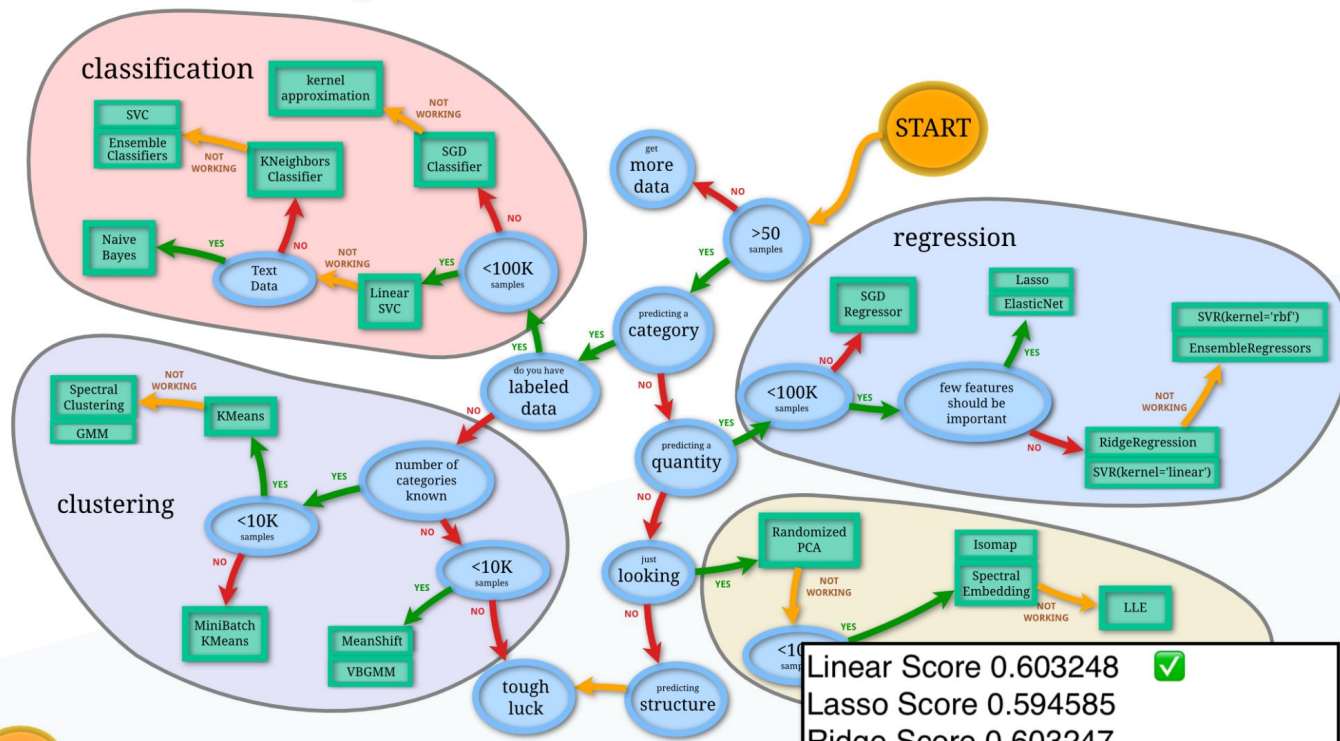
	Prediction	Actual
522	80.772393	79
314	79.054583	86
768	79.260579	73
320	71.616312	72
809	70.284922	74
...
35	76.282396	64
46	78.570687	80
265	77.138954	78
670	81.788098	96
744	82.677151	82

222 rows × 2 columns

```
In [46]: 1 # Score the Model
         2 linear.score(X_train, y_train)
         3
```

```
Out[46]: 0.603248893596652
```


Model Testing



Linear Score 0.603248 ✓
Lasso Score 0.594585
Ridge Score 0.603247
Multivariable Linear Score 0.552760
Decision Tree Regressor Score 1.0

Flask Assembly

```
app.py 2
the_rest > app.py ML
1
2 from joblib import load
3 from flask import Flask, render_template, jsonify
4 import os
5
6 app = Flask(__name__)
7 model = load('./ML/linear.joblib')
8 @app.route("/")
9 def root():
10     return render_template("index.html")
11
12 @app.route("/ML/<input1>/<input2>/<input3>/<input4>/<input5>/<input6>/<input7>/<input8>")
13 def ML(input1,input2,input3,input4,input5,input6,input7,input8):
14
15     user_input = [input1,input2,input3,input4,input5,input6,input7,input8]
16     user_input2 = list(map(int, user_input))
17
18     print(user_input2)
19
20     result = model.predict([user_input2])
21     print(type(result))
22
23     return jsonify(result[0])
24
25
26
27 if __name__ == "__main__":
28     app.run(debug=True)
```

```
index.html x
the_rest > templates > index.html > ...
1 <!DOCTYPE html>
2 <html lang="en">
3
4 <head>
5     <meta charset="UTF-8">
6     <meta name="viewport" content="width=device-width, initial-scale=1.0">
7     <meta http-equiv="X-UA-Compatible" content="ie=edge">
8     <title>Sleep Quiz</title>
9     <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap.min.css">
10    <link rel="stylesheet" href="static/css/style.css">
11 </head>
12
13 <body>
14     <div class="container">
15         <div class="row">
16             <div class="col-md-12 jumbotron text-center">
17                 <h1>What Was the Quality of My Sleep?</h1>
18                 <p>Use the interactive quiz below to find out!</p>
19             </div>
20         </div>
21         <form>
22             <table>
23                 <tr>
24                     <td><label for = 'timeInBed'>Time in Bed (min):</label></td>
25                     <td><input type = 'text' id = 'timeInBed'></td>
26                 </tr>
27                 <tr>
28                     <td><label for = 'fellAsleep'>Time fell asleep (military time)</label></td>
29                     <td><input type = 'text' id = 'fellAsleep'></td>
30                 </tr>
31                 <tr>
32                     <td><label for = 'activity'>Activity:</label></td>
33                     <td><input type = 'text' id = 'activity'></td>
34                 </tr>
35             </table>
36         </form>
37     </div>
38 </body>
39 </html>
```

Project Challenges



Final Product

[Finished Model](#)

[Web Page](#)

[Dashboard](#)

Tableau Visualizations

- [Wake Up](#)
- [Sleep Notes](#)
- [Activity](#)
- [Time in Bed](#)
- [Heart Rate](#)

Improvement Ideas:

- Save user inputs and retrain model as more data is gathered.
- Format user inputs to adhere to needed numbers or trigger an error.
- Suggest ways to improve sleep quality
- Build marketing database of users for various sponsors.

Sleep Quiz

127.0.0.1:5000

What Was the Quality of My Sleep?

Use the interactive quiz below to find out!

Time in Bed (min):

Time fell asleep (military time)

Activity:

Stressful Day?: ☐

Worked out?: ☐

Drank Coffee?: ☐

Drank Tea?: ☐

Ate Late?: ☐

Predicted Sleep Quality: