



**Project Name
Phase 3 submission**

College code: 9605

College Name: Cape Institute of Technology

Technology: DS

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Introduction to Personalized Healthcare Recommendations

In the rapidly evolving field of healthcare, personalized recommendations are becoming increasingly crucial in empowering patients to take control of their well-being. By leveraging data-driven insights and incorporating individual preferences, healthcare providers can now offer tailored solutions that cater to the unique needs of each patient. This comprehensive approach not only leads to improved outcomes but also fosters a deeper sense of engagement and trust between patients and their healthcare team.



```
# Insurance HealthCare Costs
```

```
#### Acknowledgements
```

```
Data imported from []
```

```
[ ]import numpy as np  
import pandas as pd  
import seaborn as sns  
import matplotlib.pyplot as plt  
  
%matplotlib inline  
  
df = pd.read_csv('insurance.csv') # import the CSV as a pandas dataframe  
  
df.head() # show the first five rows
```

	age	sex	bmi	children	smoker	region	charges
0	19	female	27.900	0	yes	:southwest	16884.92400
1	18	male	33.770	1	no	southeast	1725.55230
2	28	male	33.000	3	no	southeast	4449.46200
3	33	male	22.705	0	no	northwest	21984.47061
4	32	male	28.880	0	no	northwest	3866.85520

```
[ ]# check for missing values
```

```

missing_values=
df.isnull().sum().sort_values(ascending = False)
missing_values = missing_values[missing_values > 0]/df.shape[0] # normalize
print(f'{missing_values *100} %')

```

No missing values, we can move on.

```

[ ]from sklearn.preprocessing import LabelEncoder

# convert str values to int using the scikit-learn encoder

st = df.apply(LabelEncoder().fit_transform)

st.head()

```

	age	sex	bmi	children	smoker	region	charges
0	19	0	197	0	1	3	1005
1	18	1	350	1	0	2	57
2	28	1	331	3	0	2	306
3	33	1	73	0	0	1	1097
4	32	1	223	0	0	1	254

Using the converted dataset, we can visualize the correlation heatmap

```

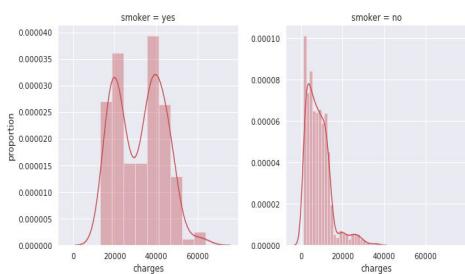
[ ]sns.set(color_codes=True)
plt.figure(figsize=(14, 12))
sns.heatmap(st.astype(float).corr(),
            linewidths=0.2,
            square=True,

```



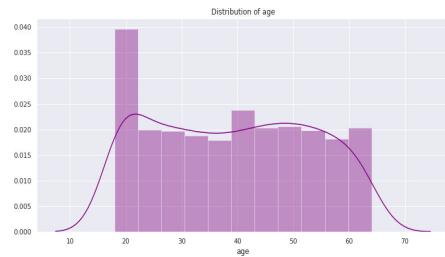
Seems like age and smoking weigh the most when looking at the charges row (or column). We expect the weights of these two to be higher than the rest.

```
[ ]g = sns.FacetGrid(df, col="smoker", size= 5, sharey=False, sharex = True)
g.map(sns.distplot, "charges", color = 'r');
g.set_axis_labels("charges", "proportion");
g.despine(left=True)
```



No surprise that smokers pay more for healthcare.

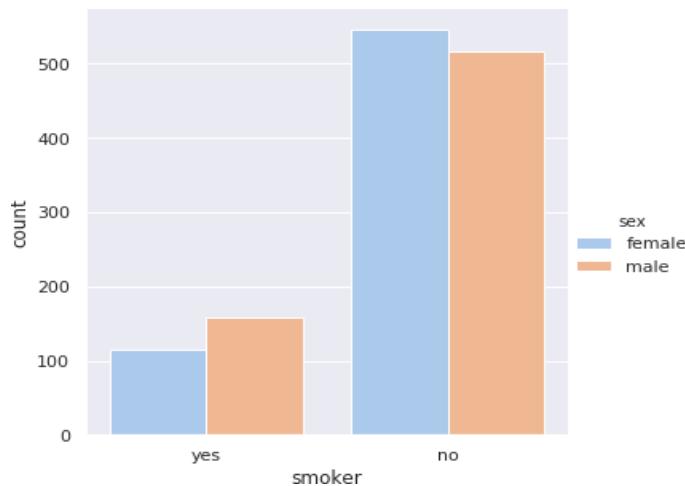
```
[ ]plt.figure(figsize=(13,6))
plt.title("Distribution of age")
ax = sns.distplot(df["age"], color = 'purple')
```



Judging by the party life at UVa, we can see why so many young adults even seek medical care.

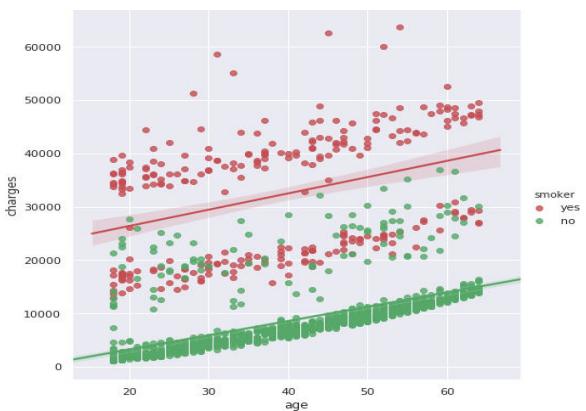
```
[ ]sns.catplot(x="smoker", kind="count", hue = 'sex', data = df , palette='pastel');
plt.show()
```

Luckily, the majority understands the downsides of smoking.



The data seems pretty balanced with a slight skew towards male.

```
[ ]sns.lmplot(x="age", y="charges", hue="smoker", data=df, palette=dict(yes="r", no="g"), size = 7);  
ax.set_title('Smokers and non-smokers');  
plt.show()
```



Perform Data Visualization

- 1 Data Exploration
Utilize interactive data visualization tools to explore and understand the complex dataset, uncovering hidden relationships and insights that can inform personalized healthcare recommendations.
- 2 Trends and Patterns
Identify meaningful trends and patterns within the data, allowing healthcare providers to tailor their recommendations to the specific needs and preferences of each individual patient.
- 3 Effective Communication
Present the data visualizations in a clear and compelling manner, enabling healthcare providers to effectively communicate the insights and recommendations to their patients, fostering shared understanding and informed decision-making.

Incorporating Patient Preferences and Lifestyle Factors

Patient Engagement

Actively engage patients in the decision-making process, encouraging them to share their preferences, concerns, and lifestyle factors. This collaborative approach ensures that the personalized recommendations align with the patient's values and goals.

Holistic Approach

Consider the patient's overall well-being, including their physical, mental, and social factors, when developing personalized healthcare recommendations. This holistic view helps to address the unique needs and challenges faced by each individual.

Adaptability

Recognize that patient needs and preferences can change over time, and design the personalized healthcare recommendations to be adaptable and responsive to these changes. This ensures that the recommendations remain relevant and effective.

Shared Decision-Making

Facilitate shared decision-making processes, where healthcare providers and patients work together to develop and refine the personalized healthcare recommendations. This collaborative approach empowers patients and builds trust in the healthcare system.

Graph

Personalized Recommendations	Improved Outcomes	Patient Engagement
Customized treatment plans based on individual data	Increased adherence to treatment plans	Shared decision-making between patients and providers
Lifestyle and behavioral modifications	Reduced risk of chronic conditions	Improved communication and trust
Proactive disease prevention strategies	Enhanced overall well-being and quality of life	Empowerment of patients in their healthcare journey

Conclusion

The integration of personalized healthcare recommendations into the healthcare system represents a significant step forward in empowering patients and improving overall health outcomes. By leveraging data-driven insights, incorporating patient preferences, and fostering collaborative partnerships, healthcare providers can deliver tailored solutions that address the unique needs of each individual. As this field continues to evolve, the potential for transformative change in the way we approach healthcare becomes increasingly evident, paving the way for a future where personalized care is the norm rather than the exception.

