Unit 3 - Week 1 - Unit 1

Assignment 1

Due on 2020/04/23, 23:59 EST

Week 1 (Unit 1)

Lecture 1.1: Introduction to the task of learning and the role of machine learning.

Week 1 (Unit 2)

Lecture 1.2: The basics of machine learning.

Week 1 (Unit 3)

Lecture 1.3: Supervised learning.

Week 1 (Unit 4)

Lecture 1.4: Unsupervised learning.

Week 1 (Unit 5)

Lecture 1.5: Semi-supervised learning.

Week 1 (Unit 6)

Lecture 1.6: Deep learning.

Note: During the lectures, students were given the following task: to design a machine learning model for a given problem. The task was due at the end of the week.

Problem 1.1

Given a dataset containing the following features:

- Age (in years)
- Gender (M/F)
- Income (in thousands of dollars)
- Education (High School, Bachelor, Master, PhD)

The objective is to predict the probability of a person getting a loan. Design a machine learning model to solve this problem.

Problem 1.2

Consider the following dataset:

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Income</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>M</td>
<td>50</td>
<td>Bachelor</td>
</tr>
<tr>
<td>30</td>
<td>F</td>
<td>75</td>
<td>Master</td>
</tr>
<tr>
<td>35</td>
<td>M</td>
<td>90</td>
<td>PhD</td>
</tr>
<tr>
<td>40</td>
<td>F</td>
<td>100</td>
<td>Bachelor</td>
</tr>
</tbody>
</table>

Design a machine learning model to predict the income of a person based on their age, gender, and education.

Problem 1.3

Given a dataset containing the following features:

- Temperature (in degrees Celsius)
- Humidity (in percent)
- Wind Speed (in km/h)

The objective is to predict the number of customers visiting a store during a particular day. Design a machine learning model to solve this problem.

Problem 1.4

Consider the following dataset:

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Humidity</th>
<th>Wind Speed</th>
<th>Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>40</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>22</td>
<td>50</td>
<td>20</td>
<td>120</td>
</tr>
<tr>
<td>25</td>
<td>60</td>
<td>25</td>
<td>150</td>
</tr>
<tr>
<td>28</td>
<td>70</td>
<td>30</td>
<td>180</td>
</tr>
</tbody>
</table>

Design a machine learning model to predict the number of customers visiting a store based on the temperature, humidity, and wind speed.

Note: The assignment is due at the end of the week. Students are encouraged to submit their models and code for review.

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1. Problem 1.1: Design a model using a decision tree algorithm.
2. Problem 1.2: Design a model using a linear regression algorithm.
4. Problem 1.4: Design a model using a random forest algorithm.

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Expected outcomes:

- Problem 1.1: The model should achieve a good accuracy in predicting the probability of a person getting a loan.
- Problem 1.2: The model should accurately predict the income of a person based on their age, gender, and education.
- Problem 1.3: The model should accurately predict the number of customers visiting a store based on the weather conditions.
- Problem 1.4: The model should accurately predict the number of customers visiting a store based on the weather conditions.

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Note: Students are encouraged to submit their models and code for review.