Professor: Sylvain Jaume

Name: Spoorthi Kondagadapu

Date: Friday, Feb 3

Assignment: 2

Course: Big data and Business analytics[Capstone]

Idea: How to make weather predictions more accurate

The state of the weather is uncertain. Daily we face challenges

regarding how to equip ourselves appropriately. The greatest factor

which is used in studying the weather conditions is the solar radiation.

The weather forecasters use supercomputers. Satellite data has contributed

to the weather predictions. If the supercomputers improve in resolution,

the weather predictions will become accurate. Warm temperatures are easy to predict.

All the weather predictions are based on the data from the US National weather service.

Wet bias is when the weather forecasters predict more rain than the actual rain.

Weather predictions are based on sound decisions to help people in their day to day activities.

Super computers are used to study the mysteries of weather and climate.

Weather forecasting has led to safe transportation, productivity and resilience.

There will be more benefits to the individuals if the weather forecasting techniques are improved.

The warnings of weather conditions have increased from 13 minutes to 69 percent over time.

Researches have developed a Radar which predicts the weather more accurately.

Accurate forecasts helps in optimizing the staff in the various areas of business and sectors of the industry.

Weather forecasting may undermine people’s ability in the day to day activities.

Predicting the rain is harder. Global warming affects every nation.

Businesses like Walmart, JPMorgan Chase have developed their own statistical models to predict extreme weather conditions.

Weather forecasting is a complex process which needs reliable data to make accurate

predictions. Weather forecasting developed meteorology as Science, where meteorologists are

extensively used in making the weather predictions.

weather data is collected to study weather forecasting. Weather prediction makes use of numerical data such as temperature, atmospheric pressure and humidity.

The different forecast range types are short range forecast, extended forecast, Medium

forecast, Long range forecast.

weather forecasts need more improvement even though the modern technology

is being used. The earth’s atmosphere is a complex process where rain or snow cannot always

be predicted.

Temperature warnings are used to protect life and property. The data about the state

of the atmosphere is calculated. The back propagation neural networks which comes

under Neural networks is used to calculate the temperature which supports various algorithms.

A neural network is the efficient data model used to study the input/output relationships.

A neural network represents the human brain in functioning. The neural network collects the

Input data called the testing data and processes it to make classification and prediction.

The several steps in prediction are data collection, data analysis, prediction, output processing

The support vector machines are also used for weather prediction. The time series data is used

to calculate the maximum temperatures of two to three days. The parameters which need to

be analyzed are: Atmospheric pressure, Temperature, Humidity, wind velocity and wind direction.

We start with the initial conditions and put them in the statistical models and we get the predictions.

Bayesian probabilistic arguments are used for numerical weather prediction. The supervised learning

techniques are applied to the prediction problems. The weather prediction is achieved by the projection of uncertainities. The green house effect was discovered by Joseph Fourier in 1824.

The increased levels of greenhouse gases warms the earth. The number of high temperature events has been increasing since 1950. Global warming is permanently changing the Earth’s climate.

Fourty two percent of the scientists think that the Global warming is happening.

The Global warming results in rising sea levels due to the melting of the polar ice caps.

The amount of the water in the atmosphere affects the temperature. The factors affecting the weather conditions are temperature, pressure, humidity, precipitation and wind.

Meteorology is the study of the weather. Certain weather features indicate the respective

weather conditions. Over the years the study of the weather patterns has influenced the weather

predictions. Weather forecasting is done by the study of the science and technology to give

weather predictions. The meteorological information is produced by the models, which are

computer programs to give the future predictions. The techniques of weather forecasting are

persistence, use of a barometer, looking at the sky, nowcasting, use of forecast models and

Analog technique.

Persistence is the study of today’s weather conditions to predict tomorrow’s weather.

Nowcasting is the forecasting of the weather in the next six hours.

Accurate weather forecasting are required since the Aviation industry is sensitive to the weather.

The agricultural industry depends on the weather forecasting to decide what to do on a particular

day. The forestry department uses weather forecasting to prevent and to control wildfires.

The navy has a special team of forecasters and weather observers for the study of the

weather conditions.

The factors that influence weather are solar distance, Latitudinal location, Air pressure, water presence.

The latitudinal location also affects the weather. The presence of water plays an important

role in weather. The places near the oceans are cooler than the areas away from them.

Climate is the description of the weather over a period of years. Solar energy is received

by the earth by the process known as radiation. Weather is categorized into equatorial, tropical, polar

and arctic. Air pressure is the gravity on air mass. It is measured in millibars. Areas closest to the equator receive most of the sunlight. The heat energy is trapped by the element carbon and carbon dioxide. The collection of ice crystals and water droplets form the clouds.

Higher latitudes get lower solar radiation. The moisture content of air is called humidity. The ocean side facing areas receive more rain. The minimum temperatures occur during the early morning hours. Deforestation, urbanization, green house gases effect the weather conditions.

Weather refers to the atmospheric conditions over a short period of time and climate refers to the conditions over a longer duration of time. The important elements of the weather are temperature

, relative humidity, precipitation, pressure and winds.

The temperature is affected by the solar radiation. The factors that affect solar radiation are latitude, altitude and cloud cover.

The temperature at poles and equator are different because sun’s rays travel the earth’s surface

at different angles. The poles experience low temperatures than the regions closer to the equator.

The sun’s rays are less intense at the poles, so they have lower temperatures.

The high altitudes have lower temperatures, since they have smaller concentration of

gases to trap heat. The amount of water vapor in air is called humidity.

Humidity indicates the happening of precipitation, dew or fog.

The maximum amount of water vapor indicates saturation. Rain is most likely to occur

in the high humidity areas. Relative humidity and temperature are inversely proportional.

The water falling from the atmosphere is called precipitation. The movement of air from high

Pressure region to a low pressure region is called wind.

Weather, Climate affects the tourist industry. The seasonal movement of large air masses

are called Monsoon winds. The cold winds of Asia blow towards the areas of Australia.

The heavy rain to Southwestern India and Bangladesh is bought by the moisture carried by the wind.

The winds bring rain to India and Bangladesh blowing across the Asian continent. The condition

Of the atmosphere is called weather and its study is called meteorology. The experts in meteorology

are called meteorologists. The different layers of the atmosphere are Thermosphere, Mesosphere,

stratosphere and Troposphere.

Wind velocity describes the wind speed and the wind direction.

Wind speed is measured by the device called anemometer. North wind is the wind coming from the north. Rain gauge is the instrument which measures the amount of rainfall. Barometer is used

to measure Air Pressure. We have cool summers and mild winters in Britain. Both the temperature of the ground and the temperature of the air are recorded by the weather stations. Beaufort scale is used to measure wind strength. In summers the southern areas get warmer as we go further down.

The weather systems called depressions bring about the rain in Britain. The areas where

Cold air and warm air meet are called depressions. The air masses move in two types of fronts. Computers are used for the modern forecasts based on the careful observations from the

weather stations.

Satellite images and radar give better weather predictions.

The six major controls of the climate are latitude, altitude, pressure and wind system, distance from the sea and ocean currents. High mountains pose as barriers for cold or hot wind. When the rainfall

Continues for several days, it is known as the burst of monsoon. The vertical movement of air

Is called air current and the horizontal movement is known as winds.

Weather forecasts are being made more accurate to protect life and property.   
Technological apps are making weather predictions accessible to people immediately.

Super computing is used extensively to study the mysteries of weather forecasting and climate.

During the hurricanes like Katrina and sandy, five day forecasts were given to make

People comfortable to face the hurricanes. A daily weather forecastsis the work of thousands

of observers and machines. Supercomputers are helping the people with accurate predictions.

The different types of forecasting are: persistence forecasting, synoptic forecasting, statistical

Forecasting and computer forecasting. Clouds and precipitation are watched by the

meteorologists all around the world. Records of Average temperature, average rainfall

indicate how the weather is going to be on a particular day. Synoptic forecasting

is used to make short term forecast. The myths about weather forecasting are:

1.weather forecasters are usually wrong, 2. It is possible to accurately predict

the weather weeks or months in advance

The process of condensing out into a particular airmass of the water at a particular temperature is called dew point. The amount of water vapor in air is called humidity. The ratio of water vapor contained in the air to the maximum amount of moisture it can hold is known as relative humidity.

The four air mass classifications are categorized into polar, tropical, continental and marine.

The boundary between different air masses causing stormy weather is known as front.

The boundary between different air masses causing stormy weather is known as front.

The boundary between the air masses, one cold and the other warm is called cold front.

Clustering is used in the processing of the output. The data science and Machine learning techniques are constantly improved to provide good weather forecasting. The data collected over time is called time series data.

The different time series modeling options are: linear vs nonlinear, parametric vs nonparametric

The algorithms which learn from data represents the machine learning , a branch of computer science.

The other machine learning algorithms which contribute to weather forecasting are artificial neural networks,deep learning, association rules and decision trees.

Self driving cars, Fraud and spam detection are conceptualized using the machine mearning applications.

The time series based data mining appear in the machine learning techniques.

The machine learning techniques can improve accuracy in the weather forecasting

problems.

The weather.gov is the website where we get accurate weather forecast. The bbc weather service is an example of other website for weather forecast. Weather forecasts are likely be accurate

For today or tomorrow rather than for two weeks from now.

The use of computers to make a forecast is called numerical weather prediction.

Computer models, observations and a knowledge of trendsare involved

in weather forecasting.

Some accurate observations were made Aristotle with significant errors.

In order to study the atmosphere, properties like moisture, temperature and pressure are used.

IN 1952, Galileo Galilei invented the thermometer.

Theophrastus, wrote a book of signs when to expect rain, wind and other kinds of weather.

National weather service in United States is responsible for weather forecasting.

The data collected from more than 1000 observation points is sent to the world meteorological organization, a division of the United Nations. Persistent forecast is when the weather remains constant over a period of time.

References:

<https://books.google.com/books?hl=en&lr=&id=NxaPAgAAQBAJ&oi=fnd&pg=PP1&dq=journals+on+weather++and+climate&ots=O3LntDjyVd&sig=PzzqAQmlCu_MLyCjbYjFugBtAQY#v=onepage&q=journals%20on%20weather%20%20and%20climate&f=false>

<http://science.sciencemag.org/content/310/5746/248>

<http://amstat.tandfonline.com/doi/abs/10.1198/016214504000001051>

<http://search.proquest.com/openview/63cf1400c9882dc321e09239f82774e3/1?pq-origsite=gscholar&cbl=2027401>

<http://amstat.tandfonline.com/doi/abs/10.1198/016214504000001051>

<http://iopscience.iop.org/article/10.1088/0034-4885/63/2/201/meta>

<http://onlinelibrary.wiley.com/doi/10.1002/qj.49712051802/full>

<http://www.nature.com/nclimate/journal/v4/n7/full/nclimate2258.html>