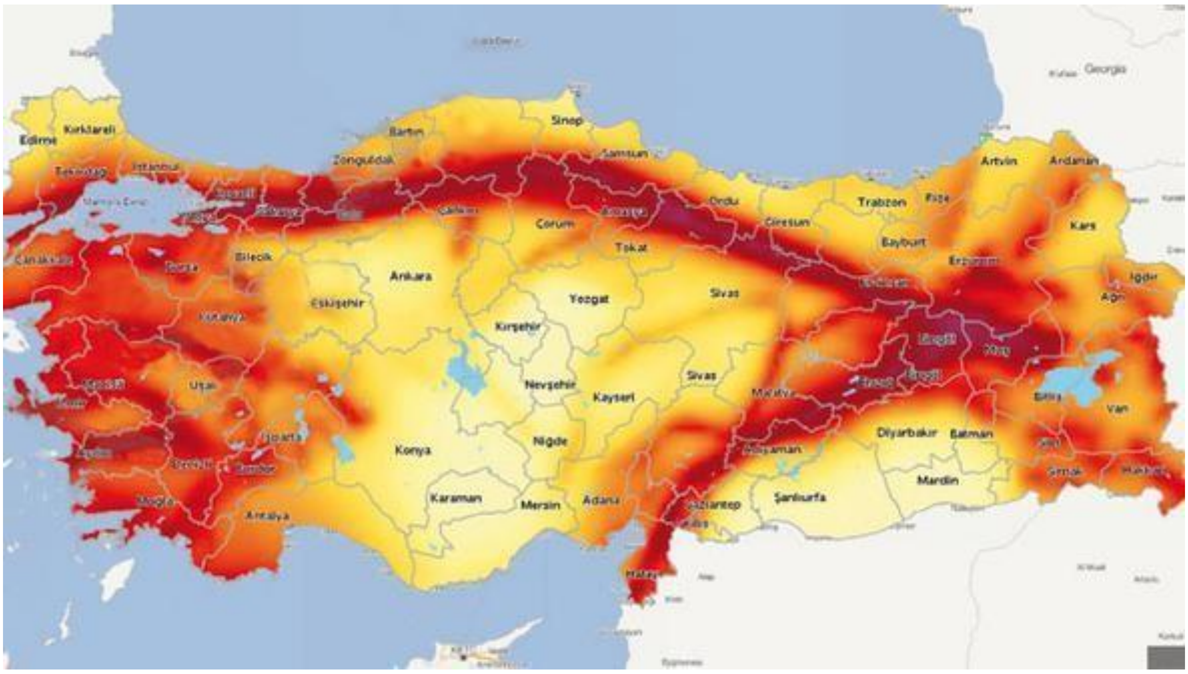
TABLE OF CONTENT

1- EARTHQUAKE ON TURKEY



Turkey or the Mediterranean Environment of the Alpine-Himalayan Belt and the world every year, called the earthquake the earthquake occurred in approximately 20% - 25 's is located in the most dangerous parts of the region is formed. When geological periods, historical periods and instrumental current period earthquake activities are examined, it is clear that the earthquake hazard in this country is extremely high.

Turkey West Aegean starting from the sea extending up to Lake Van dextral strike-slip North Anatolian Fault, Dead Sea fault extending to Hatay, starting from the Red Sea in the south, starting from Hatay Erzincan near the North Anatolian Fault intersects the East Anatolian Fault and the Aegean It is controlled by the fault systems that make up the Graben System,and there are large earthquakes due to the faults forming the said fault systems. In addition,the Ecemiş fault, which starts from Niğde and extends to Mersin, starts from Niğde and extends to Ankara. it is coiled.

Turkey's tectonic characteristics, both geological, historical and instrumental both in thecurrent period is a major cause of devastating earthquakes often live. Archaeological evidenceproves the existence of large earthquakes that have led to the destruction of ancient civilizations, particularly in the West, Inner West, North West Anatolia and the Eastern Mediterranean. Earthquakes are natural geological phenomena, and people turn into disasters.

For the transformation of earthquakes into disasters; errors in site selection, errors in project design, errors in material selection, application errors during construction, inadequacies in inspection play a major role.

For these reasons and I focused on Turkey earthquake. This project based on the data we calculated that Turkey should be more cautious against earthquakes which of the province. After that we have formed our research question.

In preparing my project, I used the Mercalli intensity scale as the earthquake intensity scale. Based on the values of 4 and above, we have created the necessary and unnecessary classes.

2- PROJECT RESEARCH QUESTION:

Based on data from 1910-2017, does the cities should make preventions against the earthquake in Turkey?

3- MERCALLI INTENSITY SCALE

The effect of an earthquake on the Earth's surface is called the intensity. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and finally - total destruction. Although numerous*intensity scales* have been developed over the last several hundred years to evaluate the effects of earthquakes, the one currently used in the United States is the Modified Mercalli (MM) Intensity Scale. It was developed in 1931 by the American seismologists Harry Wood and Frank Neumann. This scale, composed of increasing levels of intensity that range fromimperceptible shaking to catastrophic destruction, is designated by Roman numerals. It does not have a mathematical basis; instead it is an arbitrary ranking based on observed effects.

The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the non-scientist than the magnitude because intensity refers to the effects actually experienced at that place.

The **lower** numbers of the intensity scale generally deal with the manner in which the earthquake is felt by people. The **higher** numbers of the scale are based on observed structural damage. Structural engineers usually contribute information for assigning intensity values of VIII or above.

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest,especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

4- WHAT IS WEKA AND HOW USE WEKA

Weka contains a collection of visualization tools and algorithms for data analysis and predictive modeling, together with graphical user interfaces for easy access to these functions. The original non-Java version of Weka was a Tcl/Tk front-end to (mostly third-party) modeling algorithms implemented in other programming languages, plus data preprocessing utilities in C, and a Makefile-based system for running machine learning experiments. This original version was primarily designed as a tool for analyzing data from agricultural domains, but the more recent fully Java-based version (Weka 3), for which development started in 1997, is now used in many different application areas, in particular for educational purposes and research. Advantages of Weka include:

- Free availability under the GNU General Public License.
- Portability, since it is fully implemented in the Java programming language and thus runs on almost any modern computing platform.
- A comprehensive collection of data preprocessing and modeling techniques.
- Ease of use due to its graphical user interfaces.

Weka supports several standard data mining tasks, more specifically, data preprocessing, clustering, classification, regression, visualization, and feature selection. All of Weka's techniques are predicated on the assumption that the data is available as one flat file orrelation, where each data point is described by a fixed number of attributes (normally, numeric or nominal attributes, but some other attribute types are also supported). Weka provides access to SQL databases using Java Database Connectivity and can process the result returned by a database query. Weka provides access to deep learning with Deeplearning4j. Itis not capable of multi-relational data mining, but there is separate software for converting a collection of linked database tables into a single table that is suitable for processing using Weka. Another important area that is currently not covered by the algorithms included in the Weka distribution is sequence modeling.

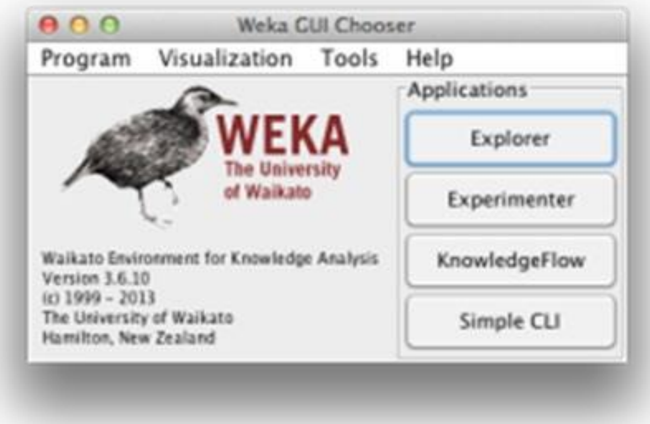
4.2 HOW USE WEKA with EXAMPLE

1. Download Weka and Install

Visit the Weka Download page and locate a version of Weka suitable for your computer (Windows, Mac, or Linux).Weka requires Java. You may already have Java installed and if not, there are versions of Weka listed on the download page (for Windows) that include Java and will install it for you. I’m on a Mac myself, and like everything else on Mac, Weka just works out of the box.If you are interested in machine learning, then I know you can figure out how to download and install software into your own computer. If you need help installing Weka, see the following post that provides step-by-step instructions:

2. Start Weka

Start Weka. This may involve finding it in program launcher or double clicking on the weka.jar file. This will start the Weka GUI Chooser.



The Weka GUI Chooser lets you choose one of the Explorer, Experimenter, KnowledgeExplorer and the Simple CLI (command line interface).

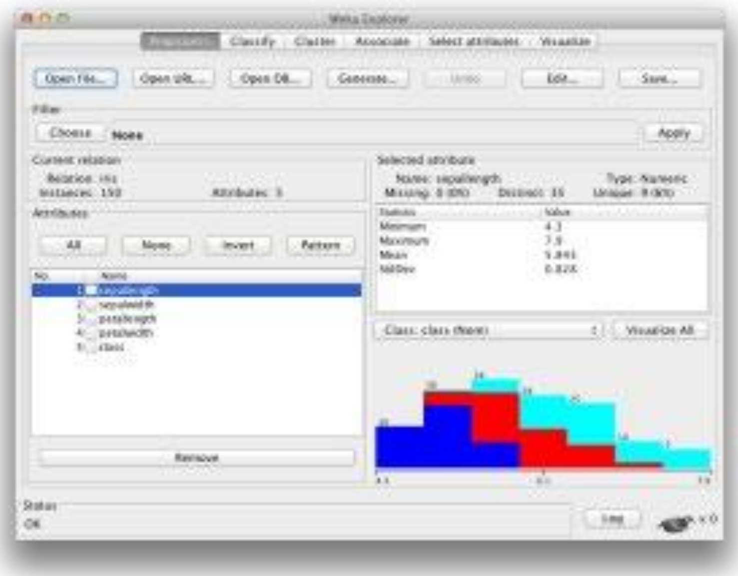
Click the “Explorer” button to launch the Weka Explorer.

This GUI lets you load datasets and run classification algorithms. It also provides other features, like data filtering, clustering, association rule extraction, and visualization, but we won’t be using these features right now.

3. Open the data/iris.arff Dataset

Click the “Open file…” button to open a data set and double click on the “data” directory.

Weka provides a number of small common machine learning datasets that you can use to practice on.



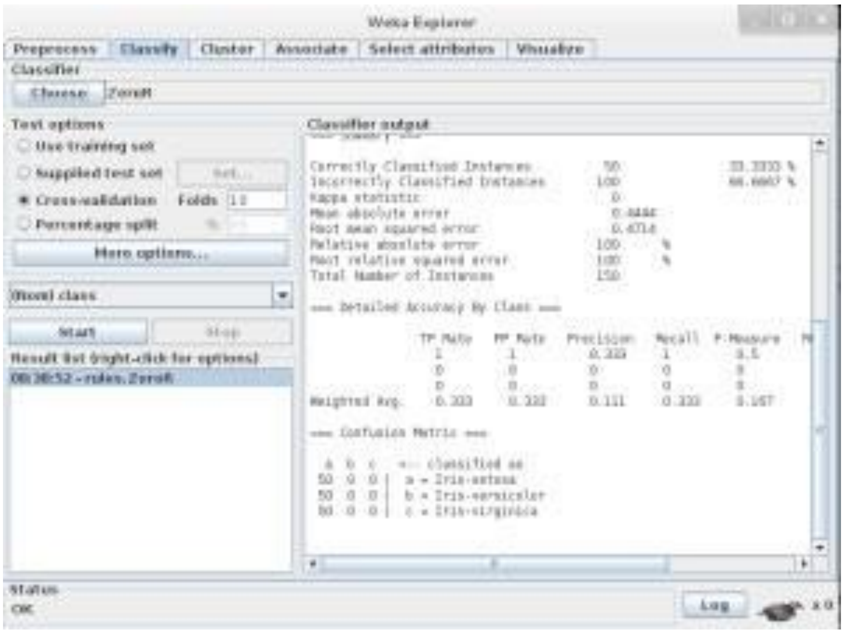
Select the “iris.arff” file to load the Iris dataset.

The Iris Flower dataset is a famous dataset fromstatistics and is heavily borrowed by researchers in machine learning. It contains 150 instances (rows) and 4 attributes (columns) and a class attribute for the species of iris flower (one of setosa, versicolor, and virginica). You can read more about Iris flower dataset on Wikipedia.

4. Select and Run an Algorithm

Now that you have loaded a dataset, it’s time to choose a machine learning algorithm to model the problem and make predictions.

Click the “Classify” tab. This is the area for running algorithms against a loaded dataset in Weka.



You will note that the “ZeroR” algorithm is selected by default.

Click the “Start” button to run this algorithm.

Weka Results for the ZeroR algorithm on the Iris flower dataset.The ZeroR algorithm selects the majority class in the dataset (all three species of iris are equally present in the data, so it picks the first one: setosa) and uses that to make all predictions. This is the baseline for the dataset and the measure by which all algorithms can be compared. The result is 33%, as expected (3 classes, each equally represented, assigning one of the three to each prediction results in 33% classification accuracy).

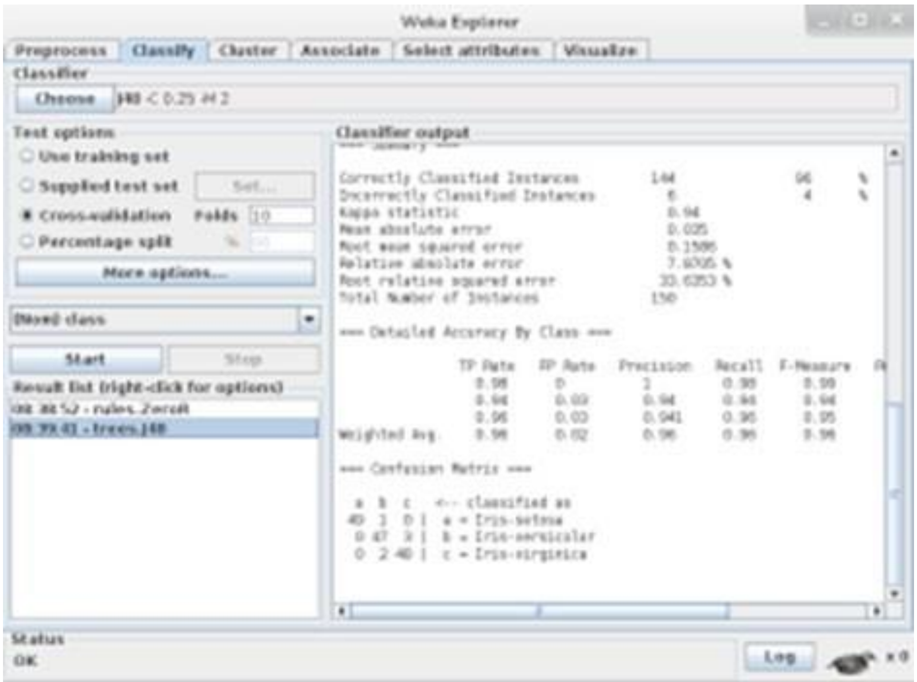
You will also note that the test options selects Cross Validation by default with 10 folds. This means that the dataset is split into 10 parts: the first 9 are used to train the algorithm, and the 10th is used to assess the algorithm. This process is repeated, allowing each of the 10 parts of the split dataset a chance to be the held-out test set. You can read more about cross validation here.

The ZeroR algorithm is important, but boring.

Click the “Choose” button in the “Classifier” section and click on “trees” and click on the “J48” algorithm.

This is an implementation of the C4.8 algorithm in Java (“J” for Java, 48 for C4.8, hence the J48 name) and is a minor extension to the famous C4.5 algorithm. You can read more about the C4.5 algorithm here.

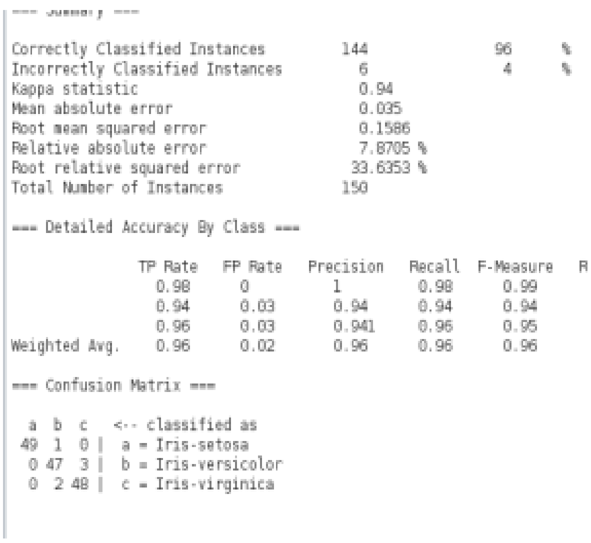
Click the “Start” button to run the algorithm.



5. Review Results

After running the J48 algorithm, you can note the results in the “Classifier output” section.

The algorithm was run with 10-fold cross-validation: this means it was given an opportunity to make a prediction for each instance of the dataset (with different training folds) and the presented result is a summary of those predictions.Just the results of the J48 algorithm on the Iris flower dataset in Weka



```
=== Summary ===

Correctly Classified Instances         144               96      %
Incorrectly Classified Instances         6                4      %
Kappa statistic                          0.94
Mean absolute error                      0.035
Root mean squared error                  0.1586
Relative absolute error                  7.8705 %
Root relative squared error             33.6353 %
Total Number of Instances              150

=== Detailed Accuracy By Class ===

               TP Rate   FP Rate   Precision   Recall  F-Measure   R
                 0.98      0          1         0.98      0.99
                 0.94      0.03       0.94      0.94      0.94
                 0.96      0.03       0.941     0.96      0.95
Weighted Avg.    0.96      0.02       0.96      0.96      0.96

=== Confusion Matrix ===

  a  b  c   <-- classified as
 49  1  0 |  a = Iris-setosa
  0 47  3 |  b = Iris-versicolor
  0  2 48 |  c = Iris-virginica
```

Firstly, note the Classification Accuracy. You can see that the model achieved a result of 144/150 correct or 96%, which seems a lot better than the baseline of 33%.

Secondly, look at the Confusion Matrix. You can see a table of actual classes compared to predicted classes and you can see that there was 1 error where an Iris-setosa was classified as an Iris-versicolor, 2 cases where Iris- virginica was classified as an Iris-versicolor, and 3 cases where an Iris-versicolor was classified as an Iris-setosa (a total of 6 errors). This table can help to explain the accuracy achieved by the algorithm.

Summary

In this post, you loaded your first dataset and ran your first machine learning algorithm (an implementation of the C4.8 algorithm) in Weka. The ZeroR algorithm doesn't really count: it's just a useful baseline.

You now know how to load the datasets that are provided with Weka and how to run algorithms: go forth and try different algorithms and see what you come up with.

Leave a note in the comments if you can achieve better than 96% accuracy on the Iris dataset.

5-DATASET DEFINITION and PREPARING

Earthquakes have been recorded by different organizations over the years. KANDILLI OBSERVATORY AND EARTQUAKE RESEARCH INSTITUTE was the best known of these organizations.

To define our data set; The data contained within Turkey covers 81 provinces. And the earthquakes that occur are only earthquakes in these provinces. Between 1910 and 2017 in Turkey have reached thanks to Kaggle located on the earthquake information centers in all provinces.

File Table - 2:1 - File Reader

File Hilite Navigation View

Table "earthquake.csv" - Rows: 24007 | Spec - Columns: 17 | Properties | Flow Variables

Row ID	D id	S date	S time	D lat	D long	S country	S city	S area	S direction	D dist	D depth	D xm	D md	D richter	D mw	D ms	D
Row0	20,000,000,000,...	2003.05.20	12:17:44 AM	39.04	40.38	turkey	bingol	baliklicay	west	0.1	10	4.1	4.1	0	?	0	0
Row1	20,100,000,000,...	2007.08.01	12:03:08 AM	40.79	30.09	turkey	kocaeli	bayraktar_iz...	west	0.1	5.2	4	3.8	4	?	0	0
Row2	19,800,000,000,...	1978.05.07	12:41:37 AM	38.58	27.61	turkey	manisa	hamzabeyli	south_west	0.1	0	3.7	0	0	?	0	3.7
Row3	20,000,000,000,...	1997.03.22	12:31:45 AM	39.47	36.44	turkey	sivas	kahvepinar_...	south_west	0.1	10	3.5	3.5	0	?	0	0
Row4	20,000,000,000,...	2000.04.02	12:57:38 AM	40.8	30.24	turkey	sakarya	meseli_serdi...	south_west	0.1	7	4.3	4.3	0	?	0	0
Row5	20,100,000,000,...	2005.01.21	12:04:03 AM	37.11	27.75	turkey	mugla	demirciler_m...	south_west	0.1	32.8	3.5	3.5	0	?	0	0
Row6	20,100,000,000,...	2012.06.24	12:07:22 AM	38.75	43.61	turkey	van	ilikaynak	south_west	0.1	9.4	4.5	0	4.5	?	0	0
Row7	19,900,000,000,...	1987.12.31	12:49:54 AM	39.43	27.98	turkey	balikesir	dikkonak_bi...	south_east	0.1	26	3.8	3.8	0	?	0	0
Row8	20,000,000,000,...	2000.02.07	12:11:45 AM	40.05	34.07	turkey	kirikkale	kocabas_delice	south_east	0.1	1	3.8	3.8	0	?	0	0
Row9	20,100,000,000,...	2011.10.28	12:47:56 AM	38.76	43.54	turkey	van	degirmenozu	south_east	0.1	3.1	4.3	0	4.2	?	0	4.3
Row10	20,100,000,000,...	2013.05.01	12:47:56 AM	37.31	37.11	turkey	kahramanm...	ordekdede_...	south_east	0.1	9.5	3.5	0	3.5	?	0	0
Row11	19,900,000,000,...	1989.04.27	12:45:19 AM	37.04	28.04	turkey	mugla	kultak_milas	south	0.1	9	3.6	3.6	0	?	0	0
Row12	20,000,000,000,...	1999.11.26	12:42:20 AM	37.77	38.54	turkey	adiyaman	zeytin_kahta	south	0.1	13	3.6	3.6	0	?	0	0
Row13	20,000,000,000,...	1999.12.20	12:41:56 AM	40.86	30.99	turkey	duzce	adakoy_gu...	south	0.1	9	3.6	3.6	0	?	0	0
Row14	19,800,000,000,...	1984.02.02	12:10:29 AM	37.21	30.81	turkey	antalya	kayadibi_aksu	north_west	0.1	15	3.7	0	0	?	0	3.7
Row15	20,100,000,000,...	2011.05.22	12:49:49 AM	39.13	29.04	turkey	kutahya	kapikaya_si...	north_west	0.1	7.2	3.9	0	3.9	?	0	0
Row16	19,700,000,000,...	1971.05.20	12:08:46 AM	37.72	30	turkey	burdur	kavacik	north_east	0.1	5	3.5	3.5	0	?	0	0
Row17	19,900,000,000,...	1985.01.28	12:20:56 AM	38.85	29.06	turkey	manisa	karakozan_s...	north_east	0.1	4	3.7	0	0	?	0	3.7
Row18	20,000,000,000,...	1997.05.31	12:59:03 AM	39.89	39.79	turkey	erzincan	baskoy_cayirli	north_east	0.1	26	3.5	3.5	0	?	0	0
Row19	20,100,000,000,...	2005.07.24	12:36:10 AM	36.96	36.03	turkey	hatay	turunclu_erzin	north_east	0.1	22	4.1	0	4.1	?	0	0
Row20	19,700,000,000,...	1966.08.19	12:03:55 AM	39.21	41.4	turkey	mus	tasci_varto	east	0.1	14	5	4.7	4.7	5	4.7	4.7
Row21	19,900,000,000,...	1990.07.05	12:43:04 AM	37.87	29.18	turkey	denizli	eldenizli	east	0.1	5	3.7	3.7	0	?	0	0
Row22	19,900,000,000,...	1990.07.05	12:47:37 AM	37.87	29.18	turkey	denizli	eldenizli	east	0.1	6	3.7	3.7	0	?	0	0
Row23	19,900,000,000,...	1985.01.07	12:37:08 AM	39.24	27.8	turkey	manisa	bademli_kirk...	west	0.2	5	3.7	0	0	?	0	3.7
Row24	19,900,000,000,...	1988.06.24	12:35:29 AM	39.51	26.19	turkey	canakkale	camkalabak...	west	0.2	14	3.5	0	0	?	0	3.5
Row25	20,000,000,000,...	1999.11.16	12:49:39 AM	40.7	31.63	turkey	bolu	ilicakinik	west	0.2	4	4	4	0	?	0	0
Row26	20,100,000,000,...	2006.06.09	12:53:05 AM	39.67	38.99	turkey	erzincan	tandirbasi_k...	west	0.2	3.3	3.7	3.7	0	?	0	0
Row27	19,700,000,000,...	1966.08.19	12:41:18 AM	39.13	41.48	turkey	mus	yedikavak_v...	south_west	0.2	50	5	4.7	4.7	5	4.7	4.7
Row28	19,700,000,000,...	1966.12.30	12:57:09 AM	40.74	30.74	turkey	sakarya	suleymaniye...	south_west	0.2	31	4.5	4.3	4.3	4.5	4.2	4.2
Row29	19,700,000,000,...	1967.05.22	12:46:02 AM	36.59	29.35	turkey	mugla	cobanlar_fe...	south_west	0.2	54	4.9	4.7	4.6	4.9	4.6	4.6
Row30	19,800,000,000,...	1975.05.30	12:22:42 AM	38.75	27.6	turkey	manisa	hacirahmanli...	south_west	0.2	9	4.2	0	4.2	?	0	0
Row31	19,800,000,000,...	1977.08.04	12:27:34 AM	39.06	29.48	turkey	kutahya	guzungulu_...	south_west	0.2	0	3.7	0	0	?	0	3.7
Row32	19,800,000,000,...	1984.10.14	12:20:04 AM	38.75	27.6	turkey	manisa	hacirahmanli...	south_west	0.2	10	3.6	0	0	?	0	3.6
Row33	20,000,000,000,...	1996.06.30	12:22:53 AM	40.89	36.63	turkey	tokat	beykaya_er...	south_west	0.2	31	3.5	3.5	0	?	0	0
Row34	20,000,000,000,...	1997.01.22	12:36:51 AM	36.25	36.09	turkey	hatay	kesecik	south_west	0.2	18	3.6	3.6	0	?	0	0
Row35	20,000,000,000,...	1999.11.13	12:59:21 AM	40.9	31.09	turkey	duzce	yenivakif_cilimli	south_west	0.2	2	4.2	4.2	0	?	0	0
Row36	20,000,000,000,...	2000.10.04	12:58:53 AM	37.9	28.95	turkey	denizli	duacili_sara...	south_west	0.2	8	3.7	3.7	0	?	0	0
Row37	20,100,000,000,...	2005.01.27	12:23:23 AM	37.78	44.23	turkey	van	ogulveren_b...	south_west	0.2	9	4.1	4.1	0	?	0	0

The data set we reached consisted of too many columns that would not lead to my research question. First of all, I have set specific objectives to separate the data that will lead to our research question.

For this purpose, examined 107 years, in Turkey, located in 81 provinces, which occurs several times earthquake in each, they have identified avoid the Mercalli intensity tests based is 4 or above, and was an annual average of the earthquake in the province.

In order to achieve this goal, I have made the data more meaningful for mr by using column and row filter operations via Knime.

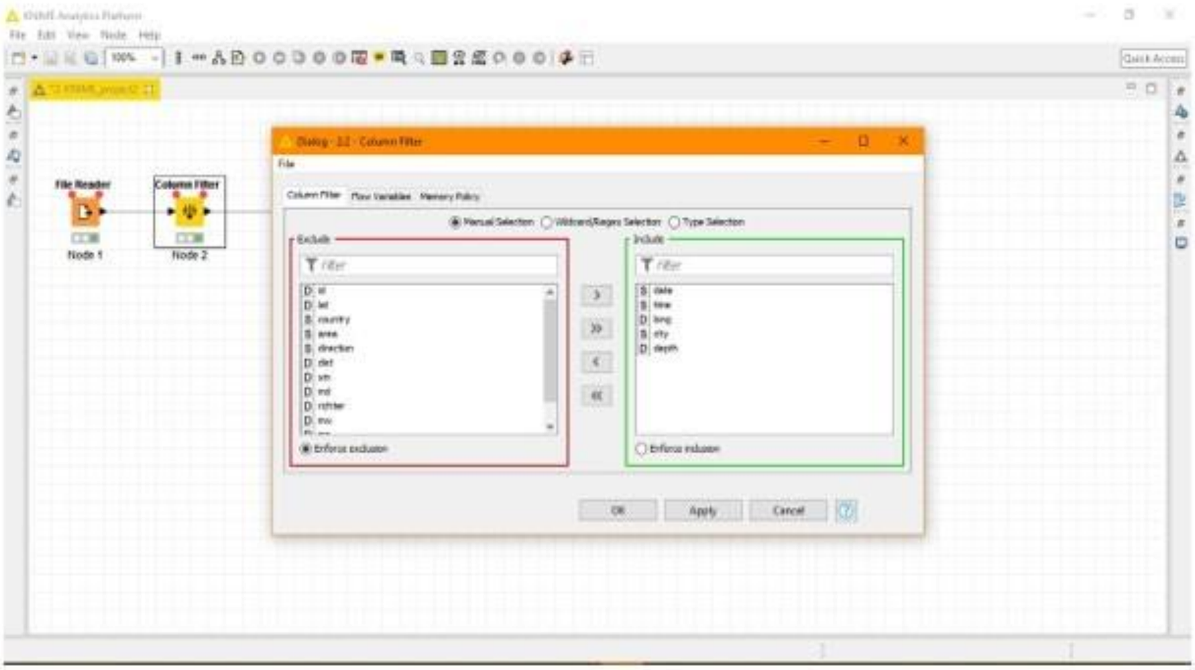


Figure 1

In the process in Figure 1, I made a column filter by including the date, time, long, city and depth columns in our data set, which excludes all remaining columns from my data set.

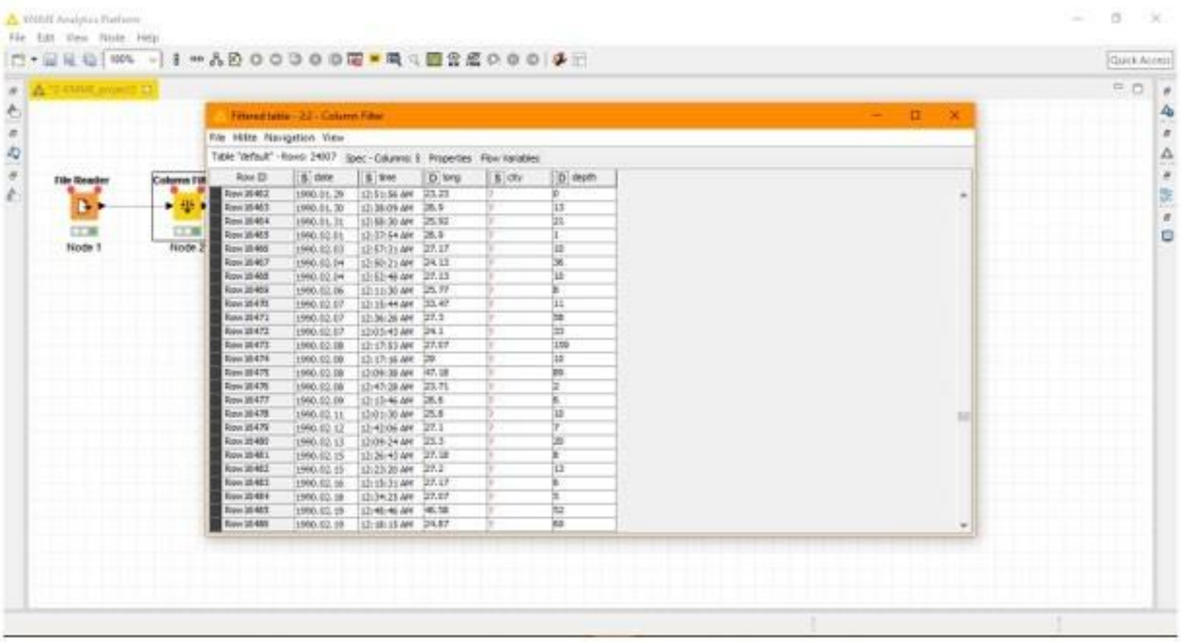


Figure 2

Here I see that there is pointless data in the city column. To get rid of this situation, I need to make row filter to our data set.

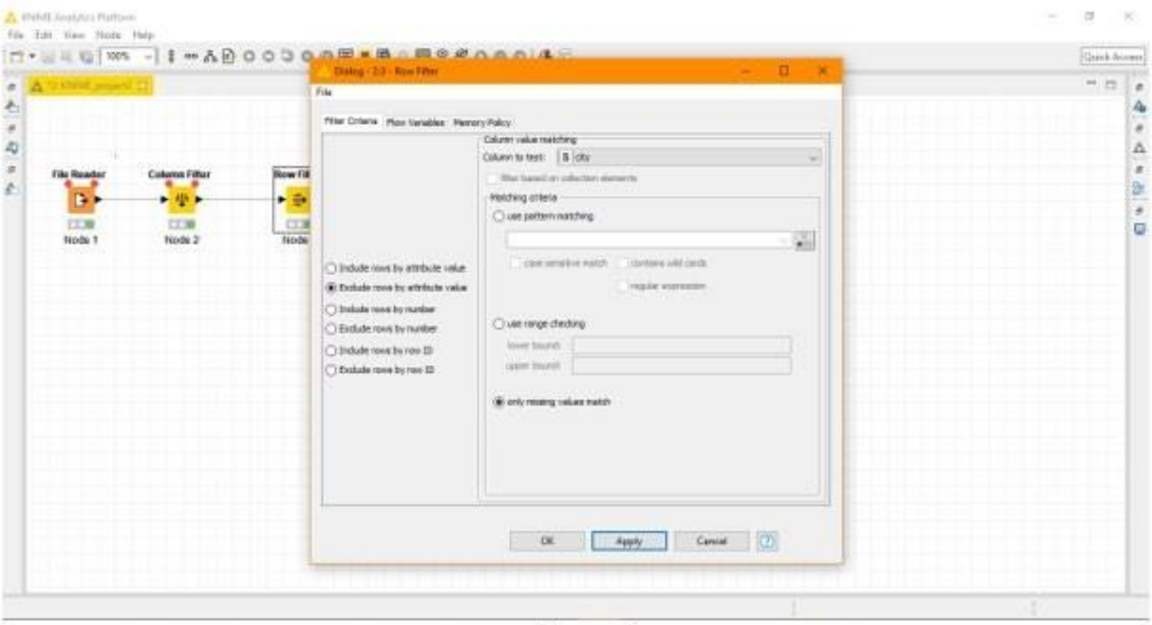


Figure 3

In the row filter feature in Figure 3, I select option “exlude rows by attribute value” to separate these meaningless lines from our data set. Since I will do this from our “city”column, I also select to “column to test: city”. The values that I want to delete were values with no meaning, so I select “only missing values match”. In this way, I convert our data set into the columns and rows I want.

Filtered - 2:3 - Row Filter

File Hilite Navigation View

Table "default" - Rows: 11754 | Spec - Columns: 5 | Properties | Flow Variables

Row ID	S date	S time	D long	S city	D depth
Row0	2003.05.20	12:17:44 AM	40.38	bingol	10
Row1	2007.08.01	12:03:08 AM	30.09	kocaeli	5.2
Row2	1978.05.07	12:41:37 AM	27.61	manisa	0
Row3	1997.03.22	12:31:45 AM	36.44	sivas	10
Row4	2000.04.02	12:57:38 AM	30.24	sakarya	7
Row5	2005.01.21	12:04:03 AM	27.75	mugla	32.8
Row6	2012.06.24	12:07:22 AM	43.61	van	9.4
Row7	1987.12.31	12:49:54 AM	27.98	balikesir	26
Row8	2000.02.07	12:11:45 AM	34.07	kirikkale	1
Row9	2011.10.28	12:47:56 AM	43.54	van	3.1
Row10	2013.05.01	12:47:56 AM	37.11	kahramanm...	9.5
Row11	1989.04.27	12:45:19 AM	28.04	mugla	9
Row12	1999.11.26	12:42:20 AM	38.54	adiyaman	13
Row13	1999.12.20	12:41:56 AM	30.99	duzce	9
Row14	1984.02.02	12:10:29 AM	30.81	antalya	15
Row15	2011.05.22	12:49:49 AM	29.04	kutahya	7.2
Row16	1971.05.20	12:08:46 AM	30	burdur	5
Row17	1985.01.28	12:20:56 AM	29.06	manisa	4
Row18	1997.05.31	12:59:03 AM	39.79	erzincan	26
Row19	2005.07.24	12:36:10 AM	36.03	hatay	22
Row20	1966.08.19	12:03:55 AM	41.4	mus	14
Row21	1990.07.05	12:43:04 AM	29.18	denizli	5
Row22	1990.07.05	12:47:37 AM	29.18	denizli	6
Row23	1985.01.07	12:37:08 AM	27.8	manisa	5
Row24	1988.06.24	12:35:29 AM	26.19	canakkale	14
Row25	1999.11.16	12:49:39 AM	31.63	bolu	4
Row26	2006.06.09	12:53:05 AM	38.99	erzincan	3.3
Row27	1966.08.19	12:41:18 AM	41.48	mus	50
Row28	1966.12.30	12:57:09 AM	30.74	sakarya	31
Row29	1967.05.22	12:46:02 AM	29.35	mugla	54
Row30	1975.05.30	12:22:42 AM	27.6	manisa	9
Row31	1977.08.04	12:27:34 AM	29.48	kutahya	0
Row32	1984.10.14	12:20:04 AM	27.6	manisa	10
Row33	1996.06.30	12:22:53 AM	36.63	tokat	31
Row34	1997.01.22	12:36:51 AM	36.09	hatay	18
Row35	1999.11.13	12:59:21 AM	31.09	duzce	2
Row36	2000.10.04	12:58:53 AM	28.95	denizli	8
Row37	2005.01.27	12:23:23 AM	44.23	van	9
Row38	2008.02.24	12:48:41 AM	38.6	sanliurfa	9.5
Row39	2008.03.29	12:12:30 AM	34.76	corum	8.5

City	Total Earthquakes	Probability of medium and over level earthquake	Probability of earthquakes	Prevetion
Ankara	216	0.13	(2.01)	Unnecessary
Istanbul	26	0.27	(0.24)	Necessary
Izmir	700	0.19	(6.54)	Necessary
Sakarya	171	0.33	(1.59)	Necessary
Adana	169	0.13	(1.59)	Unnecessary
Bursa	215	0.20	2	Necessary
Antalya	413	0.15	3.85	Unnecessary
Balikesir	374	0.19	3.49	Necessary
Agri	103	0.097	0.96	Unnecessary
Aksaray	10	0.10	0.093	Unnecessary
Amasya	84	0.04	0.78	Unnecessary
Ardahan	39	0.12	0.36	Unnecessary
Artvin	14	0.35	0.13	Unnecessary
Aydin	225	0.18	2.10	Necessary
Bartin	33	0.36	0.30	Unnecessary
Batman	12	0.33	0.11	Unnecessary
Bayburt	15	0.13	0.14	Unnecessary
Bilecik	13	0.53	(0.12)	Unnecessary
Bingol	346	0.13	(2.95)	Unnecessary
Bitlis	82	0.19	(0.70)	Necessary
Bolu	55	0.23	(0.47)	Necessary
Burdur	357	0.25	(3.05)	Necessary
Canakkale	525	0.29	4.48	Necessary
Cankiri	162	0.19	1.38	Necessary
Corum	97	0.16	(1.20)	Unnecessary
Denizli	437	0.19	(3.73)	Necessary
Diyarbakir	87	0.08	(0.74)	Unnecessary
Duzce	131	0.11	(1.11)	Unnecessary
Edirne	45	0.17	(0.38)	Unnecessary
Elazig	259	0.17	(2.21)	Necessary
Erzincan	166	0.25	(1.41)	Necessary
Erzurum	134	0.17	(2.85)	Necessary
Eskisehir	45	0.22	(0.38)	Unnecessary
Gaziantep	32	0.21	(0.27)	Unnecessary
Giresun	18	0.27	(0.15)	Unnecessary
Gumushane	25	0	0.21	Unnecessary
Hakkari	126	0.23	(1.07)	Necessary
Hatay	101	0.16	0.86	Unnecessary
Igdir	26	0.15	0.22	Unnecessary
Isparta	109	0.13	0.93	Unnecessary
Maras	108	0.25	0.923	Necessary
Karabuk	19	0.31	0.17	Unnecessary
Karaman	7	0.14	0.06	Unnecessary
Kars	50	0.20	0.46	Unnecessary

Kastamonu	56	0.41	0.52	Necessary
Kayseri	58	0.17	0.54	Necessary
Kilis	8	0.12	(0.07)	Unnecessary
Kirikkale	24	0.20	0.22	Unnecessary
Kirklareli	11	0.09	(0.1)	Unnecessary
Kirsehir	21	0.28	0.19	Unnecessary
Kocaeli	79	0.15	0.73	Unnecessary
Konya	137	0.18	1.28	Necessary
Kutahya	687	0.34	6.42	Necessary
Malatya	137	0.17	1.28	Necessary
Manisa	457	0.26	4.27	Necessary
Mardin	4	0.50	0.03	Unnecessary
Mersin	61	0.14	0.57	Unnecessary
Mugla	1095	0.22	(10.23)	Necessary
Mus	96	0.41	0.89	Necessary
Nevsehir	3	0.33	0.02	Unnecessary
Nigde	14	0.14	0.13	Unnecessary
Ordu	8	0.37	0.07	Unnecessary
Osmaniye	95	0.12	0.88	Unnecessary
Rize	2	0	0.01	Unnecessary
Samsun	25	0.28	0.23	Unnecessary
Urfa	45	0.17	0.42	Unnecessary
Siirt	14	0.21	0.13	Unnecessary
Sinop	4	0.75	(0.03)	Unnecessary
Sirnak	53	0.18	0.49	Necessary
Sivas	111	0.18	(1.03)	Necessary
Tekirdag	81	0.28	0.75	Necessary
Trabzon	5	0.20	(0.02)	Unnecessary
Tunceli	94	0.17	0.87	Necessary
Usak	55	0.52	0.51	Necessary
Van	900	0.29	8.4	Necessary
Yalova	76	0.09	0.71	Unnecessary
Yozgat	24	0.29	0.22	Unnecessary
Zonguldak	19	0.21	0.17	Unnecessary
Afyon	333	0.13	(3.11)	Unnecessary
Tokat	54	0.25	(0.50)	Necessary

Earthquakes occurred in all cities were examined in 107 years. I calculated the probability by looking at the number of earthquakes greater than 4 according to the Mercalli Intensity Scale. There are two important criteria for taking prevention for earthquakes in cities. The total number of earthquakes in 107 years and the high rate of earthquakes (the magnitude of earthquakes greater than 4) are the critical points.

First, I looked at the total number of earthquakes. If the total number of earthquakes realized is less than 50, we do not need to take prevention for the earthquake directly.

However, if the number of earthquakes is greater than 50,I am also looking at the magnitude of the earthquake intensity. If total earthquakes are more than 50 and the probability of high-intensity earthquakes are more than 16 percent, I said that prevention is necessary.

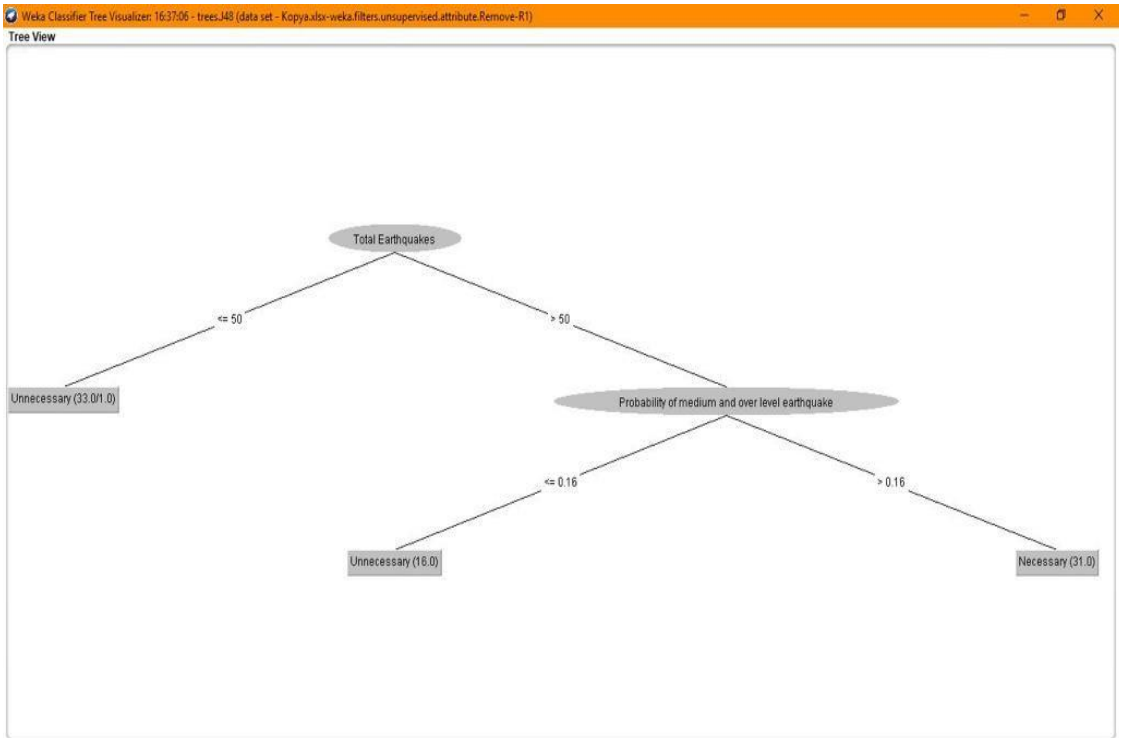
For example, Let's look at the Aksaray. Total earthquakes are 10 in 107 years. I will say, prevention is unnecessary for the Aksaray because Total number of earthquakes are less than 50.

Let's look at the Sivas. Total number of earthquakes are 111. Therefore, I should look at the probability of earthquakes(greater than 4 degree) is 0.18. That means ,the probability of earthquakes is greater than 0.16. I will say, te prevention is necessary for the Sivas.

Let's look at the Osmaniye. Total number of earthquakes are 95.However, when I look at the probabilitity of earthquakes is less than 0.16,it means 0.12. I will say,the prevention is unnecessary for the Osmaniye.

As I said before, I am not just looking the total number of earthquakes.Also I are looking the probability of high degree earthquakes

5-DECISION TREE VIEW



6-RESULT

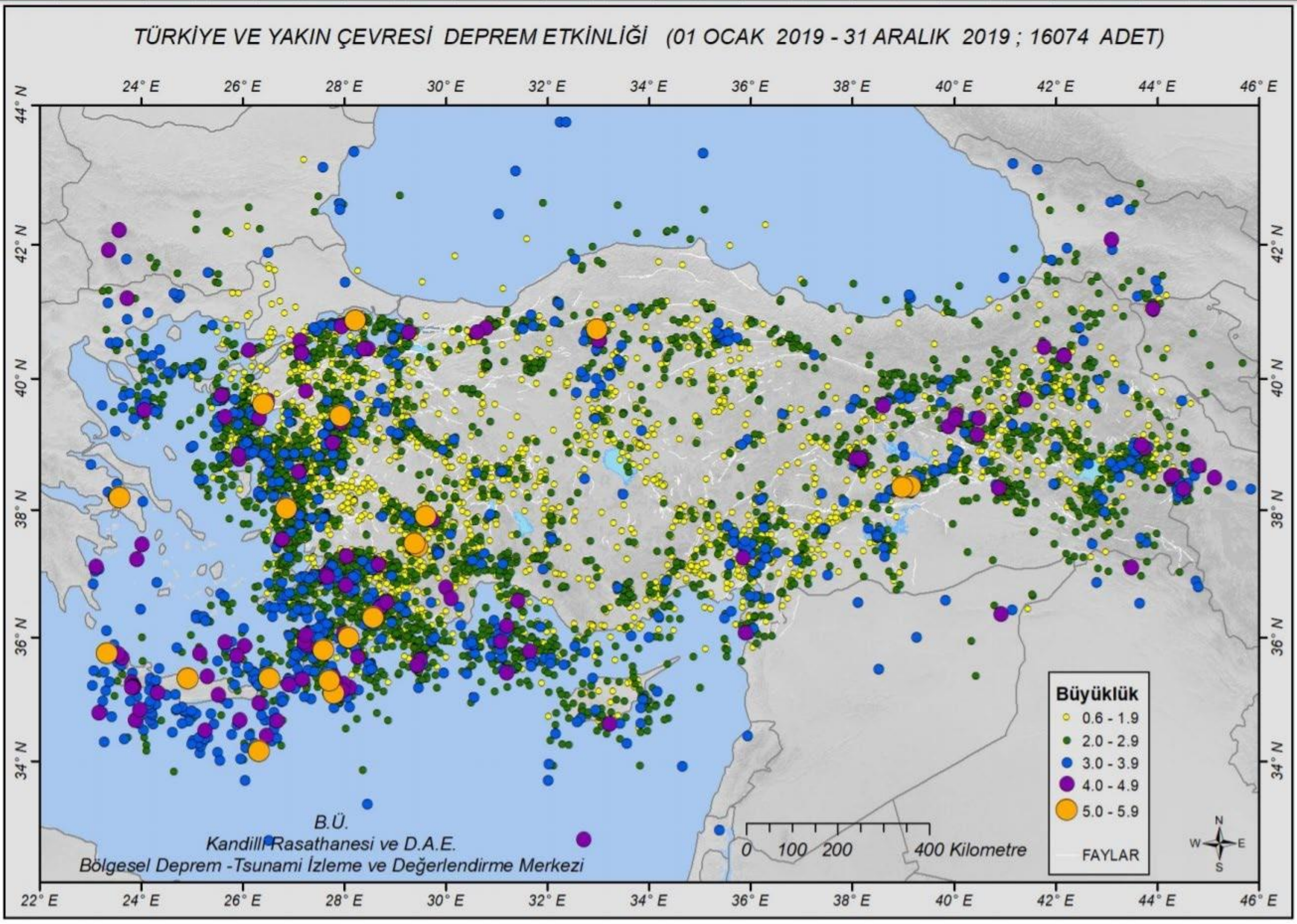
```
Time taken to build model: 0.02 seconds

=== Stratified cross-validation ===
=== Summary ===

Correctly Classified Instances          78               97.5    %
Kappa statistic                          0.9479
Mean absolute error                      0.0376
Root mean squared error                  0.1598
Relative absolute error                  7.8113 %
Root relative squared error             32.5899 %
Total Number of Instances               80

=== Detailed Accuracy By Class ===

                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
                 0,979    0,031    0,979      0,979    0,979      0,948    0,966     0,959     Unnecessary
                 0,969    0,021    0,969      0,969    0,969      0,948    0,966     0,951     Necessary
Weighted Avg.    0,975    0,027    0,975      0,975    0,975      0,948    0,966     0,956

=== Confusion Matrix ===

  a  b   <-- classified as
 47  1 |  a = Unnecessary
  1 31 |  b = Necessary
```

CORRECTLY CLASSIFIED INSTANCE: 97.5

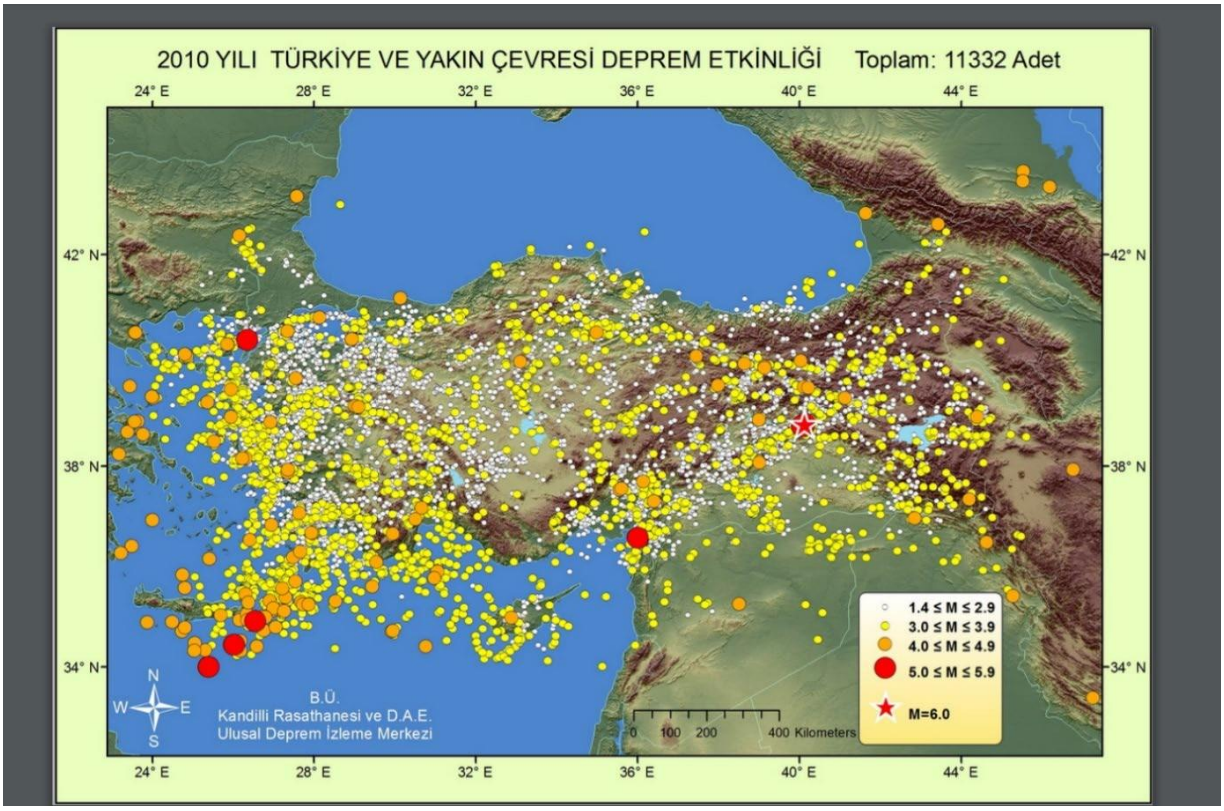
My error rate is %2.5. This means that I have made a very successful assumption.

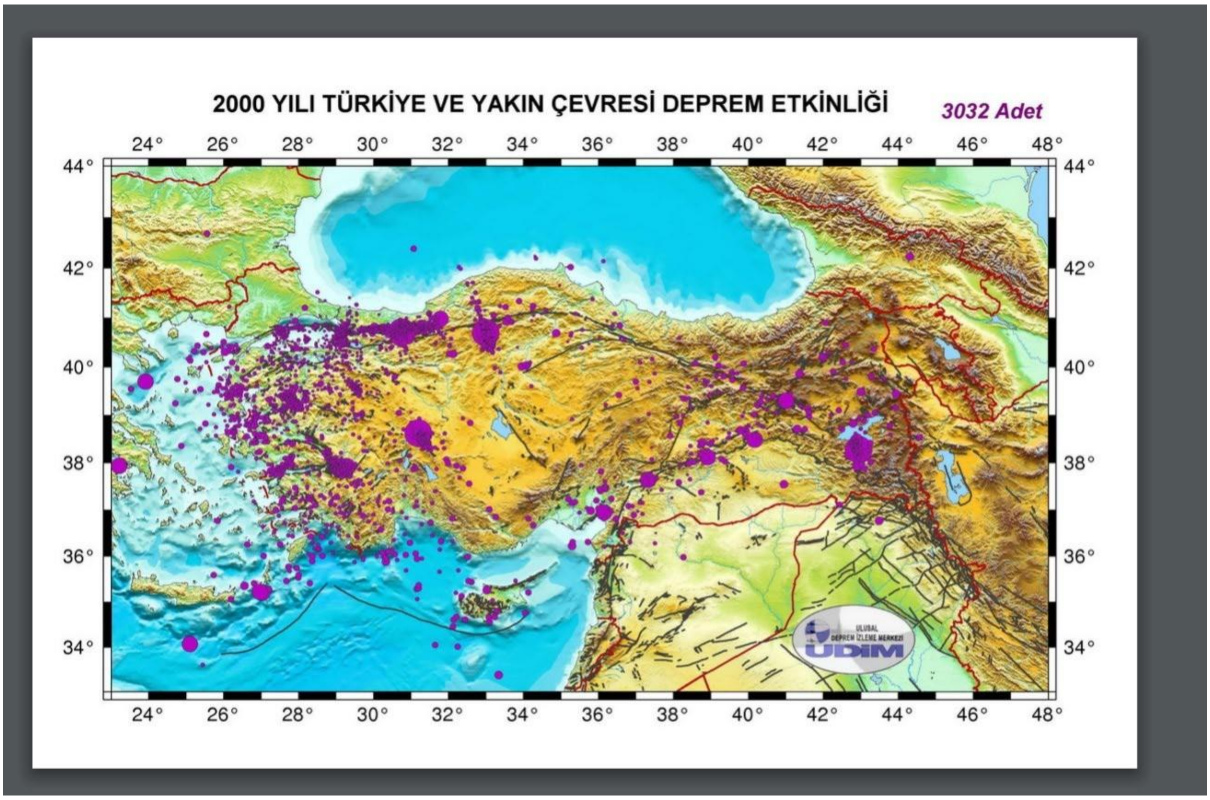
In the CONFUSION MATRIX, the outputs that I make mistakes are indicated.For 48 cities, I have said that measures are unnecessary and one of them has been wrong,it should benecessary for one city. Prevention are necessary for 32 cities according to our class. However,one of them should be unnecessary according to confusion matrix.Also Precision rate is more nearth to 1. This mean is this decision tree algorithm is near to correct,and this work is realand true. Also in this result we can see unnecessary number and necessary number.Also I use Weka data analyse application.

7- COMPARISON with EARTHQUAKE MAPS



This map is an earthquake map prepared by the Boğaziçi Kandilli Observatory in 2019. When we look at this map, we first see that there is an intense earthquake in the Marmara, Mediterranean and Aegean parts. We see that the data and this map match, as seen in the data set I have prepared. We see the accuracy of the data set when it is compared in the data set that I have created by working on the data set containing the earthquakes from 1910 to 2017 and which is decided to be important or not. For example Izmir in data set. As a result of the calculations I made according to mathematical and earthquake charts, it was revealed that Izmir should take precautions. When we compare this result with the map, we see that the result is correct and the density ratio is high. When we test the accuracy by making comparisons like these, we see that there is an accuracy margin of up to 95 percent. Given the data we follow the city needed to take action on the result of the data sets you have createdcan be drawn in fact, we see the major fault lines in Turkey. In this context, we can increase the frequency and adequacy of pre- and post-earthquake measures.





This fact has not changed much in three years, and maps of earthquakes in Turkey, we may notice that hard. And we can see that the prepared data set confirms this and that measures are required in this context.

Years	Total Annual Earthquake	M > 2.4 and M < 2.9 Earthquakes	M > 3.0 and M < 3.9 Earthquakes	M > 4.0 and M < 7.9 Earthquakes
2000	3032	1429	1541	62
2001	2563	1430	1047	86
2002	3268	1622	1549	97
2003	3925	1812	1992	121
2004	5331	2610	2582	139
2005	4514	2500	2472	143
2006	4656	2667	1868	121
2007	5834	3010	2665	159
2008	8139	5142	2824	173
2009	8783	6250	2375	158
2010	11332	9012	2178	142
2011	18040	14356	3340	344
2012	20608	18400	2003	205
2013	16317	14731	1408	178
2014	14830	5230	9424	176
2015	15357	13918	1276	163
2016	13346	12076	1079	191
2017	34009	31913	1808	288
2018	15352	14418	811	123
2019	16074	14809	1089	176

In addition, we can see the number and intensity of earthquakes in the last ten years in this table. This table has been made as a result of the analysis of earthquake maps. The Comparison of the number of earthquakes with intensity when the number of earthquakes in Turkey and throughout the last decade, we see by the notion of residual comfort of violence.

8-PREVENTIONS

As a result of the researches, the provinces that need to take priority measures for theearthquake have been identified and it is aimed to warn the state and municipalities for these places. In addition, public awareness and what to do before, during and after the earthquake are explained. This data can be expanded and more specific control can be determined. In line with the information given by the current data set, we have reached 47 provinces that should take earthquake prevention first. First, the government should take precautions for the earthquake and then what the public should do are explained.

What Government Should Take Against The Earthquake

A detailed examination of the causes of life and property losses as a result of the devastating earthquakes in the past years and the indicators of the results can be understood more clearly where mistakes are made. The main causes of these errors are as follows.

1) Uncontrolled and Fast Growth

Most of the buildings were made vulnerable to earthquakes due to the increasing number of building structures as a result of industrialization and migration from rural to urban areas. When we look at these buildings in general, it is observed that sea sand is used as building material and this has the potential to disperse immediately during the earthquake. Therefore, the state should detect such structures and take precautions against earthquake risk.

2) Audit Problem

It is unfortunately not enough to detect and demolish uncontrolled structures. It is alsonecessary to monitor the supervision of new buildings to be built in stages and to intervene ina wrong movement. Numerous structures were manufactured as illegal or uncontrolled due to the fact that the auditee selected the auditor and gave the fee, the audit was not carried out by the state and the persons did not fulfill their duties. It is still in the hands of the state to pay attention to all these and to be attentive and to dismiss those who do not perform their duties properly.

3) Poor Ground Work

This is an important issue and it is a problem related to building without examining the structure of the ground thoroughly. It is an inevitable end to try to build a building before the ground is thoroughly researched and its structure is understood, and as a result, the displacement or demolition of the building even in the slightest earthquake. Therefore, the state should assign those who have detailed information on this subject and make it suitable for the ground work for each building. Although Japan is a country that has been subjected to frequent and severe earthquakes, it does not suffer loss of lives or property in most earthquakes. Because they can plan the strength of their buildings according to the earthquakes with the highest intensity. To do this, they lay a rail system under some buildings and allow the building to shake with the earthquake but not to collapse. Even if there is no railsystem in our country, we should be able to do the soil analysis well and try to minimize the risk.

4) Disaster Management Problem

In case of an emergency after an earthquake, all rescue units should be able to gather immediately and be able to transfer to the region. This process can be done as quickly as possible and with complete equipment. For example, AFAT teams, emergency vehicles such as firefighters, ambulances and aid boxes should be kept in case of a possible earthquake inthe earthquake zones we have detected. An environment in which everyone can declare mobilization should be created. Especially in metropolitan areas, emergency gathering areas should be established. As a result of distorted urbanization, large areas have been reduced and their access limited. Therefore, the state should check its deficiency in these areas and take measures accordingly.

5) Earthquake Awareness in Society

Although our society does not know exactly what to do before, during and after the earthquake, it can be extremely panic and do self-harm. In order to prevent all of these, public awareness should be made in every province, especially in priority provinces. It may not be enough to distribute brochures or conferences. Educational contents should be prepared, earthquake simulation should be done and what should be done in the form of living specimens should be shown.

What To Do Before, During And After The Earthquake

1) Before the Earthquake

First you need to prepare an earthquake bag. Water, packaged food, lanterns, whistles and other items that can be used in case of an earthquake should be put in this bag. You can apply to find out if the house we live in is resistant to earthquakes and if your building is vulnerable,you can apply to the relevant places to make your building earthquake resistant.

2) During Earthquake

You should try to remain as calm as possible during the earthquake. During this process, you should stay away from electrical and flammable tools and do not use elevators. Stay away from windows and objects that can be broken and if you have the opportunity, you shouldstop in an area where you can create a life triangle.

3) After the Earthquake

Again, you must maintain the same calmness, check everything and make sure that there is nodangerous situation, you need to go out quickly but carefully. You must help rescue teams, but not interfere with their work.

If you are under the wreckage; to help rescue teams find you, you must hit your hands or feet somewhere or make a sound. You should control your energy and try not to panic, no matter what.

Finally, 92% that carries the risk of earthquakes in Turkey, and we should not forget that at any moment can be experienced losses of life and property in an earthquake. We believe that measures to be taken against this should not be ignored and efforts should be made to raise awareness of everyone. A sudden situation can cause deep wounds to the economy of the country and cause great harm to the society. It is of great importance to take precautions and minimize earthquake risk.