Bendi et al. [1] authors used two different input

dataset and evaluate that the AP datasets has better

than UCLA dataset for all the different selected

algorithms. Based on performance on their

classification KNN, Backward propagation and

SVM are giving better results. The AP data set is

better than UCLA for the entire selected algorithm.

And found out Naïve Bayes, C4.5, KNN,

Backward propagation and SVM has 95.07, 96.27,

96.93, 97.47, & 97.07% accuracy respectively.

• Bendi et al. [2] proposed a paper based on

Modified Rotation Forest, used two dataset as an

input UCI liver dataset and Indian liver dataset.

And results show that MLP algorithm with random

subset gives better accuracy of 94.78% for UCI

dataset than CFS achieved accuracy of 73.07% for

Indian liver dataset.

• Yugal Kuma & G. Sahoo [3] proposed a paper

based on different classification technique and used

north east area of Andhra Pradesh (India) liver

dataset. And the results shows that Decision

tree(DT) algorithm has better than other algorithm

and provide accuracy of 98.46%.

• S.Dhamodharan [4] proposed a paper based on two

classification technique naïve Bayes and FT tree

and used WEKA (Waikato Environment for

Knowledge and Analysis) dataset. Naïve Bayes is

75.54% accuracy and FT Tree is 72.6624%

accuracy and concluded Naïve Bayes gas better

algorithm compare to other algorithms.

• Han Ma et al. [9] in this paper 11 different

classification are evaluated and Demonstrated in

China Zhejiang University, College of medicine

and concluded Bayesian network accuracy of 83%,

specificity 83%, sensitivity of 0.878 and F-measure

of 0.655.

• Heba Ayeldeen et al. [5] propose a paper for

prediction of liver fibrosis stages using decision

tree technique and used Cario university data set

and result shows that decision tree classifier

accuracy is 93.7%.

• D.Sindhuja & R. Jemina Priyadarsini [6] survey a

paper for classification of liver disease. In this

survey different classification techniques of data

mining are study and used dataset of dataset of AP

liver has better than Dataset of UCLA, and

concluded C4.5 achieved better results than other

algorithms.

2020 International Conference on Intelligent Engineering and Management (ICIEM)

339

• Somaya Hashem et al. [8] presented a paper for

diagnosis of liver disease. In this paper they used

two algorithms, SVM & Backpropagation and

used

UCI machine repository dataset. And concluded

SVM has accuracy 71% better result than

Backpropagation accuracy 73.2%.

• Joel Jacob et al. [10] proposed a paper to

diagnosis of liver disease by using three different

algorithms, Logistic regression, K-NN, SVM,

and ANN and used Indian Liver Patient Dataset

comprised of 10 different attributes of 583

patients. And concluded Logistic regression, K-

NN, SVM,& ANN has 73.23, 72.05, 75.04 &

92.8% accuracy respectively.

• Sivakumar D et al. [11] proposed a paper for

prediction of chronic liver disease by using two

different techniques K-means and C4.5. UCI

repository.

• Mehtaj Banu H [12] in this paper authors study

different machine learning technique,

Supervised, unsupervised & reinforcement and

also analysis UCI dataset database and concluded

that KNN and SVM improved better

performance and exactness of liver disease

prediction.

• Vasan Durai et al. [13] proposed a paper based

on liver disease prediction by using three

different techniques, SVM, NB & J48 using UCI

repository dataset and concluded that J48

algorithm has better performance in terms of

Feature selection and has accuracy of 95.04%.

Table 1: Comparison table on existing machine learning technique

Sl

no

Authors Year Disease Machine

learning

algorithm

Dataset

input

Remarks Conclusion

1 Bendi

Venkata

Ramana et al.

[1]

2011 Liver disease Naïve Bayes,

C4.5, Backward

propagation, KNN

and SVM

AP liver dataset and UCLA

liver dataset

Naïve Bayes, C4.5

KNN, Backward

propagation and SVM

has 95.07, 96.27,

96.93, 97.47, &

97.07% accuracy

respectively

KNN, Backward

propagation and SVM

are giving more better

results. AP data set are

better than UCLA for

all the selected

algorithm

2 Bendi

Venkata

Ramana and

M.Surendra

Prasad Babu

[2]

2012 Liver disease Modified Rotation

Forest

UCI liver dataset and

Indian dataset

MLP algorithm with

random subset gives

better accuracy 74.78%

than NN with CFS of

accuracy 73.07%

MLP algorithm with

UCI liver dataset has

better accuracy than

NN with Indian liver

dataset

3 Yugal

KUMA & G.

Sahoo [3]

2013 Liver disease DT, SVM, NB and

ANN

north east area of Andhra

Pradesh (India) liver

dataset

Decision tree(DT) has

better accuracy of

98.46%

Rule based

classification with DT

algorithm has better

accuracy

4 S.Dhamodhar

an [4]

2014 Liver cancer,

Cirrhosis and

Hepatitis

Naïve-Bayes, FT

Tree

WEKA (Waikato

Environment for

Knowledge and Analysis)

dataset

Naïve Bayes is 75.54%

accuracy and FT Tree

is 72.6624% accuracy

Naïve Bayes algorithm

has better compare to

other algorithms

5 Heba

Ayeldeen et

al. [5]

2015 Liver

fibrosis

Decision tree department of Medical

Biochemistry and

Molecular Biology, Faculty

of Medicine,

Cairo University.

decision tree classifier

accuracy is 93.7%

6 D Sindhuja &

R jemina

Priyadarsini

[6]

2016 Liver disease

disorder

C4.5,Naïve Bayes,

SVM, BPNN

,Regression and

DT

Data

AP has better dataset

result than UCLA

Survey paper suggest

C4.5 has better results

than others

C4.5 has better

accuracy result than

other algorithms

7 Somaya

Hashem et al

[8]

2016 Liver

fibrosis

PSO, GA, MReg

& ADT

Egyptian national

committee for control of

viral hepatitis database

PSO, GA, MReg &

ADT are 66.4,

69.6.69.1, & 84.4%

ADT has more

accuracy result than

other algorithms

2020 International Conference on Intelligent Engineering and Management (ICIEM)

340

accuracy respectively

8 Sumedh

Sontakke et al

2017 Liver disease SVM &

Backpropagation

(UCI)Machine Learning

Repository

SVM ( accuracy

71%))&

Backpropagation(accur

acy 73.2%)

More accuracy result in

Back propagation

9 Han ma et al

2018 Nonalcoholic

fatty liver

disease

Using 11

classification

algorithms

First Affiliated Hospital,

Zhejiang University China,

College of medicine

First Affiliated

Bayesian network

accuracy 83%

Concluded Bayesian

network has best

performance than other

algorithms

10 Joel Jacob et

al [10]

2018 Liver disease Logistic

regression, K-NN,

SVM,&ANN

Indian Liver Patient

Dataset comprised of 10

different attributes of 583

patients.

Logistic regression, K-

NN, SVM,& ANN has

73.23, 72.05, 75.04 &

92.8% accuracy

respectively

ANN has higher

accuracy than others

11 Sivakumar D

et al [11]

2019 Liver disease K-means & C4.5

algorithms

UCI Repository C4.5 algorithm has

94.36% precision.

C4.5 has better

accuracy than K-means

algorithms

12 Mehtaj

Banu H [12]

2019 Liver disease Supervised

,unsupervised &

reinforcement

UCI repository databases. Note: Only explaining

not implementing

practically

KNN and AVM has

improved prediction

performance

accuracy

13 Vasan Durai

et al [13]

2019 Liver

disease

SVM,NB & J48 UCI repository J48 algorithm has

better feature selection

with 95.04% accuracy

J48 algorithm is

accuracy rate of

95.04%.

Table 2. Comparison table of various machine learning technique used to detect liver disease based on performance

Figure 2: Performance of various machine learning technique based on their accuracy

Methods Accuracy (%) Specificity (%) Sensitivity (%) Precision (%)

F-

Measure

(%)

Decision Tree 98.46 95.28 95.7

Bayesian

Network

83.0 87.8 67.5 65.5

ADT\* 84.4 99.0 7.0

ANN 92.8 83.0 97.23 93.78

J48 95.04

BP 73.2

SVM 71.0

2020 International Conference on Intelligent Engineering and Management (ICIEM)

341

III. CONCLUSION

This paper gives us the basic idea of past

published paper of detection and diagnosis of

liver disease based on different machine learning

algorithm. With this survey and study it has

clearly find and observed that some machine

learning algorithm such as Decision tree, J48 and

ANN provide better accuracy on detection and

prediction of liver disease. And different

algorithm has different performance based on

different scenario but most importantly the

dataset and feature selection is also very

important to get better prediction results

.

And

also the paper presents a survey on different

types of machine learning techniques used by

different authors and every machine learning

techniques has some good and bad outcomes

depend on the datasets and features selection etc.

With this survey we found out that the accuracy

and performance can be improve by using

different combination or hybrid machine learning

algorithm and in future we can also work on

more parameter which help to get better

performance than the existing technique.

Bendi et al. [1] authors used two different input

dataset and evaluate that the AP datasets has better

than UCLA dataset for all the different selected

algorithms. Based on performance on their

classification KNN, Backward propagation and

SVM are giving better results. The AP data set is

better than UCLA for the entire selected algorithm.

And found out Naïve Bayes, C4.5, KNN,

Backward propagation and SVM has 95.07, 96.27,

96.93, 97.47, & 97.07% accuracy respectively.

• Bendi et al. [2] proposed a paper based on

Modified Rotation Forest, used two dataset as an

input UCI liver dataset and Indian liver dataset.

And results show that MLP algorithm with random

subset gives better accuracy of 94.78% for UCI

dataset than CFS achieved accuracy of 73.07% for

Indian liver dataset.

• Yugal Kuma & G. Sahoo [3] proposed a paper

based on different classification technique and used

north east area of Andhra Pradesh (India) liver

dataset. And the results shows that Decision

tree(DT) algorithm has better than other algorithm

and provide accuracy of 98.46%.

• S.Dhamodharan [4] proposed a paper based on two

classification technique naïve Bayes and FT tree

and used WEKA (Waikato Environment for

Knowledge and Analysis) dataset. Naïve Bayes is

75.54% accuracy and FT Tree is 72.6624%

accuracy and concluded Naïve Bayes gas better

algorithm compare to other algorithms.

• Han Ma et al. [9] in this paper 11 different

classification are evaluated and Demonstrated in

China Zhejiang University, College of medicine

and concluded Bayesian network accuracy of 83%,

specificity 83%, sensitivity of 0.878 and F-measure

of 0.655.

• Heba Ayeldeen et al. [5] propose a paper for

prediction of liver fibrosis stages using decision

tree technique and used Cario university data set

and result shows that decision tree classifier

accuracy is 93.7%.

• D.Sindhuja & R. Jemina Priyadarsini [6] survey a

paper for classification of liver disease. In this

survey different classification techniques of data

mining are study and used dataset of dataset of AP

liver has better than Dataset of UCLA, and

concluded C4.5 achieved better results than other

algorithms.

2020 International Conference on Intelligent Engineering and Management (ICIEM)

339

• Somaya Hashem et al. [8] presented a paper for

diagnosis of liver disease. In this paper they used

two algorithms, SVM & Backpropagation and

used

UCI machine repository dataset. And concluded

SVM has accuracy 71% better result than

Backpropagation accuracy 73.2%.

• Joel Jacob et al. [10] proposed a paper to

diagnosis of liver disease by using three different

algorithms, Logistic regression, K-NN, SVM,

and ANN and used Indian Liver Patient Dataset

comprised of 10 different attributes of 583

patients. And concluded Logistic regression, K-

NN, SVM,& ANN has 73.23, 72.05, 75.04 &

92.8% accuracy respectively.

• Sivakumar D et al. [11] proposed a paper for

prediction of chronic liver disease by using two

different techniques K-means and C4.5. UCI

repository.

• Mehtaj Banu H [12] in this paper authors study

different machine learning technique,

Supervised, unsupervised & reinforcement and

also analysis UCI dataset database and concluded

that KNN and SVM improved better

performance and exactness of liver disease

prediction.

• Vasan Durai et al. [13] proposed a paper based

on liver disease prediction by using three

different techniques, SVM, NB & J48 using UCI

repository dataset and concluded that J48

algorithm has better performance in terms of

Feature selection and has accuracy of 95.04%.

Table 1: Comparison table on existing machine learning technique

Sl

no

Authors Year Disease Machine

learning

algorithm

Dataset

input

Remarks Conclusion

1 Bendi

Venkata

Ramana et al.

[1]

2011 Liver disease Naïve Bayes,

C4.5, Backward

propagation, KNN

and SVM

AP liver dataset and UCLA

liver dataset

Naïve Bayes, C4.5

KNN, Backward

propagation and SVM

has 95.07, 96.27,

96.93, 97.47, &

97.07% accuracy

respectively

KNN, Backward

propagation and SVM

are giving more better

results. AP data set are

better than UCLA for

all the selected

algorithm

2 Bendi

Venkata

Ramana and

M.Surendra

Prasad Babu

[2]

2012 Liver disease Modified Rotation

Forest

UCI liver dataset and

Indian dataset

MLP algorithm with

random subset gives

better accuracy 74.78%

than NN with CFS of

accuracy 73.07%

MLP algorithm with

UCI liver dataset has

better accuracy than

NN with Indian liver

dataset

3 Yugal

KUMA & G.

Sahoo [3]

2013 Liver disease DT, SVM, NB and

ANN

north east area of Andhra

Pradesh (India) liver

dataset

Decision tree(DT) has

better accuracy of

98.46%

Rule based

classification with DT

algorithm has better

accuracy

4 S.Dhamodhar

an [4]

2014 Liver cancer,

Cirrhosis and

Hepatitis

Naïve-Bayes, FT

Tree

WEKA (Waikato

Environment for

Knowledge and Analysis)

dataset

Naïve Bayes is 75.54%

accuracy and FT Tree

is 72.6624% accuracy

Naïve Bayes algorithm

has better compare to

other algorithms

5 Heba

Ayeldeen et

al. [5]

2015 Liver

fibrosis

Decision tree department of Medical

Biochemistry and

Molecular Biology, Faculty

of Medicine,

Cairo University.

decision tree classifier

accuracy is 93.7%

6 D Sindhuja &

R jemina

Priyadarsini

[6]

2016 Liver disease

disorder

C4.5,Naïve Bayes,

SVM, BPNN

,Regression and

DT

Data

AP has better dataset

result than UCLA

Survey paper suggest

C4.5 has better results

than others

C4.5 has better

accuracy result than

other algorithms

7 Somaya

Hashem et al

[8]

2016 Liver

fibrosis

PSO, GA, MReg

& ADT

Egyptian national

committee for control of

viral hepatitis database

PSO, GA, MReg &

ADT are 66.4,

69.6.69.1, & 84.4%

ADT has more

accuracy result than

other algorithms

2020 International Conference on Intelligent Engineering and Management (ICIEM)

340

accuracy respectively

8 Sumedh

Sontakke et al

2017 Liver disease SVM &

Backpropagation

(UCI)Machine Learning

Repository

SVM ( accuracy

71%))&

Backpropagation(accur

acy 73.2%)

More accuracy result in

Back propagation

9 Han ma et al

2018 Nonalcoholic

fatty liver

disease

Using 11

classification

algorithms

First Affiliated Hospital,

Zhejiang University China,

College of medicine

First Affiliated

Bayesian network

accuracy 83%

Concluded Bayesian

network has best

performance than other

algorithms

10 Joel Jacob et

al [10]

2018 Liver disease Logistic

regression, K-NN,

SVM,&ANN

Indian Liver Patient

Dataset comprised of 10

different attributes of 583

patients.

Logistic regression, K-

NN, SVM,& ANN has

73.23, 72.05, 75.04 &

92.8% accuracy

respectively

ANN has higher

accuracy than others

11 Sivakumar D

et al [11]

2019 Liver disease K-means & C4.5

algorithms

UCI Repository C4.5 algorithm has

94.36% precision.

C4.5 has better

accuracy than K-means

algorithms

12 Mehtaj

Banu H [12]

2019 Liver disease Supervised

,unsupervised &

reinforcement

UCI repository databases. Note: Only explaining

not implementing

practically

KNN and AVM has

improved prediction

performance

accuracy

13 Vasan Durai

et al [13]

2019 Liver

disease

SVM,NB & J48 UCI repository J48 algorithm has

better feature selection

with 95.04% accuracy

J48 algorithm is

accuracy rate of

95.04%.

Table 2. Comparison table of various machine learning technique used to detect liver disease based on performance

Figure 2: Performance of various machine learning technique based on their accuracy

Methods Accuracy (%) Specificity (%) Sensitivity (%) Precision (%)

F-

Measure

(%)

Decision Tree 98.46 95.28 95.7

Bayesian

Network

83.0 87.8 67.5 65.5

ADT\* 84.4 99.0 7.0

ANN 92.8 83.0 97.23 93.78

J48 95.04

BP 73.2

SVM 71.0

2020 International Conference on Intelligent Engineering and Management (ICIEM)

341

III. CONCLUSION

This paper gives us the basic idea of past

published paper of detection and diagnosis of

liver disease based on different machine learning

algorithm. With this survey and study it has

clearly find and observed that some machine

learning algorithm such as Decision tree, J48 and

ANN provide better accuracy on detection and

prediction of liver disease. And different

algorithm has different performance based on

different scenario but most importantly the

dataset and feature selection is also very

important to get better prediction results

.

And

also the paper presents a survey on different

types of machine learning techniques used by

different authors and every machine learning

techniques has some good and bad outcomes

depend on the datasets and features selection etc.

With this survey we found out that the accuracy

and performance can be improve by using

different combination or hybrid machine learning

algorithm and in future we can also work on

more parameter which help to get better

performance than the existing technique.

**Literature Survey**

Bendi et al. [1] authors used two different input dataset and evaluate that the AP datasets has better than UCLA dataset for all the different selected algorithms. Based on performance on their classification KNN, Backward propagation and SVM are giving better results. The AP data set is better than UCLA for the entire selected algorithm. And found out Naïve Bayes, C4.5, KNN, Backward propagation and SVM has 95.07, 96.27, 96.93, 97.47, & 97.07% accuracy respectively.

• Bendi et al. [2] proposed a paper based on Modified Rotation Forest, used two dataset as an input UCI liver dataset and Indian liver dataset. And results show that MLP algorithm with random subset gives better accuracy of 94.78% for UCI dataset than CFS achieved accuracy of 73.07% for Indian liver dataset. • Yugal Kuma & G. Sahoo [3] proposed a paper based on different classification technique and used north east area of Andhra Pradesh (India) liver dataset. And the results shows that Decision tree(DT) algorithm has better than other algorithm and provide accuracy of 98.46%.

• S.Dhamodharan [4] proposed a paper based on two classification technique naïve Bayes and FT tree and used WEKA (Waikato Environment for Knowledge and Analysis) dataset. Naïve Bayes is 75.54% accuracy and FT Tree is 72.6624% accuracy and concluded Naïve Bayes gas better algorithm compare to other algorithms.

• Han Ma et al. [9] in this paper 11 different classification are evaluated and Demonstrated in China Zhejiang University, College of medicine and concluded Bayesian network accuracy of 83%, specificity 83%, sensitivity of 0.878 and F-measure of 0.655.

• Heba Ayeldeen et al. [5] propose a paper for prediction of liver fibrosis stages using decision tree technique and used Cario university data set and result shows that decision tree classifier accuracy is 93.7%.

• D.Sindhuja & R. Jemina Priyadarsini [6] survey a paper for classification of liver disease. In this survey different classification techniques of data mining are study and used dataset of dataset of AP liver has better than Dataset of UCLA, and concluded C4.5 achieved better results than other algorithms.

Somaya Hashem et al. [8] presented a paper for diagnosis of liver disease. In this paper they used two algorithms, SVM & Backpropagation and used UCI machine repository dataset. And concluded SVM has accuracy 71% better result than Backpropagation accuracy 73.2%.

• Joel Jacob et al. [10] proposed a paper to diagnosis of liver disease by using three different algorithms, Logistic regression, K-NN, SVM, and ANN and used Indian Liver Patient Dataset comprised of 10 different attributes of 583 patients. And concluded Logistic regression, KNN, SVM,& ANN has 73.23, 72.05, 75.04 & 92.8% accuracy respectively.

• Sivakumar D et al. [11] proposed a paper for prediction of chronic liver disease by using two different techniques K-means and C4.5. UCI repository.

• Mehtaj Banu H [12] in this paper authors study different machine learning technique, Supervised, unsupervised & reinforcement and also analysis UCI dataset database and concluded that KNN and SVM improved better performance and exactness of liver disease prediction.

• Vasan Durai et al. [13] proposed a paper based on liver disease prediction by using three different techniques, SVM, NB & J48 using UCI repository dataset and concluded that J48 algorithm has better performance in terms of Feature selection and has accuracy of 95.04%.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sl no | Authors | Year | Disease | Machine  learning algorithm | Dataset input | Remarks | Conclusion |
| 1 | Bendi Venkata Ramana et al. [1] | 2011 | Liver disease | Naïve Bayes, C4.5, Backward propagation, KNN and SVM | AP liver dataset and UCLA liver dataset | Naïve Bayes, C4.5 KNN, Backward propagation and SVM has 95.07, 96.27,  96.93, 97.47, &  97.07% accuracy respectively | KNN, Backward propagation and SVM are giving more better results. AP data set are better than UCLA for  all the selected algorithm |
| 2 | Bendi Venkata Ramana and M.Surendra Prasad Babu [2] | 2012 | Liver disease | Modified Rotation Forest | UCI liver dataset and Indian dataset | MLP algorithm with random subset gives better accuracy 74.78% than NN with CFS of accuracy 73.07% | MLP algorithm with UCI liver dataset has better accuracy than NN with Indian liver dataset |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | Yugal KUMA & G.  Sahoo [3] | 2013 | Liver disease | DT, SVM, NB and ANN | north east area of Andhra Pradesh (India) liver dataset | Decision tree(DT) has better accuracy of 98.46% | Rule based classification with DT algorithm has better accuracy |
| 4 | S.Dhamodhar an [4] | 2014 | Liver cancer, Cirrhosis and Hepatitis | Naïve-Bayes, FT Tree | WEKA (Waikato Environment for Knowledge and Analysis)  dataset | Naïve Bayes is 75.54% accuracy and FT Tree is 72.6624% accuracy | Naïve Bayes algorithm has better compare to other algorithms |
| 5 | Heba Ayeldeen et al. [5] | 2015 | Liver fibrosis | Decision tree | department of Medical Biochemistry and Molecular Biology, Faculty of Medicine,  Cairo University. |  | decision tree classifier accuracy is 93.7% |
| 6 | D Sindhuja & R jemina Priyadarsini [6] | 2016 | Liver disease disorder | C4.5,Naïve Bayes, SVM, BPNN  ,Regression and DT  Data | AP has better dataset result than UCLA | Survey paper suggest C4.5 has better results than others | C4.5 has better accuracy result than other algorithms |
| 7 | Somaya Hashem et al  [8] | 2016 | Liver fibrosis | PSO, GA, MReg & ADT | Egyptian national committee for control of  viral hepatitis database | PSO, GA, MReg & ADT are 66.4,  69.6.69.1, & 84.4% | ADT has more accuracy result than  other algorithms |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | accuracy respectively |  |
| 8 | Sumedh Sontakke et al | 2017 | Liver disease | SVM &  Backpropagation | (UCI)Machine Learning Repository | SVM ( accuracy 71%))&  Backpropagation(accur acy 73.2%) | More accuracy result in Back propagation |
| 9 | Han ma et al | 2018 | Nonalcoholic fatty liver disease | Using 11 classification algorithms | First Affiliated Hospital, Zhejiang University China, College of medicine  First Affiliated | Bayesian network accuracy 83% | Concluded Bayesian network has best performance than other algorithms |
| 10 | Joel Jacob et al [10] | 2018 | Liver disease | Logistic regression, K-NN, SVM,&ANN | Indian Liver Patient Dataset comprised of 10 different attributes of 583 patients. | Logistic regression, K- NN, SVM,& ANN has 73.23, 72.05, 75.04 &  92.8% accuracy respectively | ANN has higher accuracy than others |
| 11 | Sivakumar D et al [11] | 2019 | Liver disease | K-means & C4.5 algorithms | UCI Repository | C4.5 algorithm has 94.36% precision. | C4.5 has better accuracy than K-means  algorithms |
| 12 | Mehtaj Banu H [12] | 2019 | Liver disease | Supervised  ,unsupervised & reinforcement | UCI repository databases. | Note: Only explaining not implementing practically | KNN and AVM has improved prediction  performance accuracy |
| 13 | Vasan Durai et al [13] | 2019 | Liver disease | SVM,NB & J48 | UCI repository | J48 algorithm has better feature selection with 95.04% accuracy | J48 algorithm is accuracy rate of 95.04%. |