=== Run information ===

Scheme: weka.classifiers.meta.FilteredClassifier -F "weka.filters.supervised.attribute.Discretize -R first-last -precision 6" -W weka.classifiers.rules.JRip -- -F 3 -N 2.0 -O 2 -S 1

Relation: anneal-weka.filters.supervised.instance.StratifiedRemoveFolds-S0-N2-F1

Instances: 449

Attributes: 39

family

product-type

steel

carbon

hardness

temper\_rolling

condition

formability

strength

non-ageing

surface-finish

surface-quality

enamelability

bc

bf

bt

bw/me

bl

m

chrom

phos

cbond

marvi

exptl

ferro

corr

blue/bright/varn/clean

lustre

jurofm

s

p

shape

thick

width

len

oil

bore

packing

class

Test mode: evaluate on training data

=== Classifier model (full training set) ===

FilteredClassifier using weka.classifiers.rules.JRip -F 3 -N 2.0 -O 2 -S 1 on data filtered through weka.filters.supervised.attribute.Discretize -R first-last -precision 6

Filtered Header

@relation anneal-weka.filters.supervised.instance.StratifiedRemoveFolds-S0-N2-F1-weka.filters.supervised.attribute.Discretize-Rfirst-last-precision6

@attribute family {'?',GB,GK,GS,TN,ZA,ZF,ZH,ZM,ZS}

@attribute product-type {C,H,G}

@attribute steel {'?',R,A,U,K,M,S,W,V}

@attribute carbon {'\'All\''}

@attribute hardness {'\'(-inf-22.5]\'','\'(22.5-75]\'','\'(75-inf)\''}

@attribute temper\_rolling {'?',T}

@attribute condition {'?',S,A,X}

@attribute formability {'?',1,2,3,4,5}

@attribute strength {'\'(-inf-375]\'','\'(375-inf)\''}

@attribute non-ageing {'?',N}

@attribute surface-finish {'?',P,M}

@attribute surface-quality {'?',D,E,F,G}

@attribute enamelability {'?',1,2,3,4,5}

@attribute bc {'?',Y}

@attribute bf {'?',Y}

@attribute bt {'?',Y}

@attribute bw/me {'?',B,M}

@attribute bl {'?',Y}

@attribute m {'?',Y}

@attribute chrom {'?',C}

@attribute phos {'?',P}

@attribute cbond {'?',Y}

@attribute marvi {'?',Y}

@attribute exptl {'?',Y}

@attribute ferro {'?',Y}

@attribute corr {'?',Y}

@attribute blue/bright/varn/clean {'?',B,R,V,C}

@attribute lustre {'?',Y}

@attribute jurofm {'?',Y}

@attribute s {'?',Y}

@attribute p {'?',Y}

@attribute shape {COIL,SHEET}

@attribute thick {'\'(-inf-0.7995]\'','\'(0.7995-2.1]\'','\'(2.1-3.2005]\'','\'(3.2005-inf)\''}

@attribute width {'\'(-inf-1235]\'','\'(1235-1410.05]\'','\'(1410.05-inf)\''}

@attribute len {'\'(-inf-0.5]\'','\'(0.5-inf)\''}

@attribute oil {'?',Y,N}

@attribute bore {0,500,600,760}

@attribute packing {'?',1,2,3}

@attribute class {1,2,3,4,5,U}

@data

Classifier Model

JRIP rules:

===========

(steel = S) and (strength = '(375-inf)') => class=1 (3.0/0.0)

(hardness = '(75-inf)') => class=U (20.0/1.0)

(family = TN) => class=5 (34.0/0.0)

(surface-quality = ?) and (condition = S) and (thick = '(0.7995-2.1]') => class=2 (41.0/1.0)

(strength = '(375-inf)') and (shape = SHEET) => class=2 (9.0/1.0)

=> class=3 (342.0/3.0)

Number of Rules : 6

Time taken to build model: 0.02 seconds

=== Evaluation on training set ===

Time taken to test model on training data: 0 seconds

=== Summary ===

Correctly Classified Instances 443 98.6637 %

Incorrectly Classified Instances 6 1.3363 %

Kappa statistic 0.9666

Mean absolute error 0.0086

Root mean squared error 0.0656

Relative absolute error 6.3627 %

Root relative squared error 25.4014 %

Total Number of Instances 449

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.750 0.000 1.000 0.750 0.857 0.865 0.904 0.753 1

0.980 0.005 0.960 0.980 0.970 0.966 0.990 0.956 2

0.991 0.028 0.991 0.991 0.991 0.963 0.984 0.990 3

0.000 0.000 0.000 0.000 0.000 0.000 ? ? 4

1.000 0.000 1.000 1.000 1.000 1.000 1.000 1.000 5

0.950 0.002 0.950 0.950 0.950 0.948 0.979 0.905 U

Weighted Avg. 0.987 0.022 0.987 0.987 0.987 0.965 0.985 0.981

=== Confusion Matrix ===

a b c d e f <-- classified as

3 0 1 0 0 0 | a = 1

0 48 1 0 0 0 | b = 2

0 2 339 0 0 1 | c = 3

0 0 0 0 0 0 | d = 4

0 0 0 0 34 0 | e = 5

0 0 1 0 0 19 | f = U

=== Run information ===

Scheme: weka.classifiers.meta.FilteredClassifier -F "weka.filters.supervised.attribute.Discretize -R first-last -precision 6" -W weka.classifiers.rules.JRip -- -F 3 -N 2.0 -O 2 -S 1

Relation: anneal-weka.filters.supervised.instance.StratifiedRemoveFolds-S0-N2-F1

Instances: 449

Attributes: 39

family

product-type

steel

carbon

hardness

temper\_rolling

condition

formability

strength

non-ageing

surface-finish

surface-quality

enamelability

bc

bf

bt

bw/me

bl

m

chrom

phos

cbond

marvi

exptl

ferro

corr

blue/bright/varn/clean

lustre

jurofm

s

p

shape

thick

width

len

oil

bore

packing

class

Test mode: 5-fold cross-validation

=== Classifier model (full training set) ===

FilteredClassifier using weka.classifiers.rules.JRip -F 3 -N 2.0 -O 2 -S 1 on data filtered through weka.filters.supervised.attribute.Discretize -R first-last -precision 6

Filtered Header

@relation anneal-weka.filters.supervised.instance.StratifiedRemoveFolds-S0-N2-F1-weka.filters.supervised.attribute.Discretize-Rfirst-last-precision6

@attribute family {'?',GB,GK,GS,TN,ZA,ZF,ZH,ZM,ZS}

@attribute product-type {C,H,G}

@attribute steel {'?',R,A,U,K,M,S,W,V}

@attribute carbon {'\'All\''}

@attribute hardness {'\'(-inf-22.5]\'','\'(22.5-75]\'','\'(75-inf)\''}

@attribute temper\_rolling {'?',T}

@attribute condition {'?',S,A,X}

@attribute formability {'?',1,2,3,4,5}

@attribute strength {'\'(-inf-375]\'','\'(375-inf)\''}

@attribute non-ageing {'?',N}

@attribute surface-finish {'?',P,M}

@attribute surface-quality {'?',D,E,F,G}

@attribute enamelability {'?',1,2,3,4,5}

@attribute bc {'?',Y}

@attribute bf {'?',Y}

@attribute bt {'?',Y}

@attribute bw/me {'?',B,M}

@attribute bl {'?',Y}

@attribute m {'?',Y}

@attribute chrom {'?',C}

@attribute phos {'?',P}

@attribute cbond {'?',Y}

@attribute marvi {'?',Y}

@attribute exptl {'?',Y}

@attribute ferro {'?',Y}

@attribute corr {'?',Y}

@attribute blue/bright/varn/clean {'?',B,R,V,C}

@attribute lustre {'?',Y}

@attribute jurofm {'?',Y}

@attribute s {'?',Y}

@attribute p {'?',Y}

@attribute shape {COIL,SHEET}

@attribute thick {'\'(-inf-0.7995]\'','\'(0.7995-2.1]\'','\'(2.1-3.2005]\'','\'(3.2005-inf)\''}

@attribute width {'\'(-inf-1235]\'','\'(1235-1410.05]\'','\'(1410.05-inf)\''}

@attribute len {'\'(-inf-0.5]\'','\'(0.5-inf)\''}

@attribute oil {'?',Y,N}

@attribute bore {0,500,600,760}

@attribute packing {'?',1,2,3}

@attribute class {1,2,3,4,5,U}

@data

Classifier Model

JRIP rules:

===========

(steel = S) and (strength = '(375-inf)') => class=1 (3.0/0.0)

(hardness = '(75-inf)') => class=U (20.0/1.0)

(family = TN) => class=5 (34.0/0.0)

(surface-quality = ?) and (condition = S) and (thick = '(0.7995-2.1]') => class=2 (41.0/1.0)

(strength = '(375-inf)') and (shape = SHEET) => class=2 (9.0/1.0)

=> class=3 (342.0/3.0)

Number of Rules : 6

Time taken to build model: 0.02 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 433 96.4365 %

Incorrectly Classified Instances 16 3.5635 %

Kappa statistic 0.9121

Mean absolute error 0.0158

Root mean squared error 0.1032

Relative absolute error 11.6156 %

Root relative squared error 39.9674 %

Total Number of Instances 449

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.250 0.002 0.500 0.250 0.333 0.350 0.722 0.263 1

0.959 0.020 0.855 0.959 0.904 0.893 0.985 0.903 2

0.971 0.056 0.982 0.971 0.976 0.903 0.957 0.970 3

0.000 0.000 0.000 0.000 0.000 0.000 ? ? 4

1.000 0.000 1.000 1.000 1.000 1.000 1.000 1.000 5

0.950 0.002 0.950 0.950 0.950 0.948 0.957 0.875 U

Weighted Avg. 0.964 0.045 0.964 0.964 0.963 0.907 0.961 0.954

=== Confusion Matrix ===

a b c d e f <-- classified as

1 0 3 0 0 0 | a = 1

0 47 2 0 0 0 | b = 2

1 8 332 0 0 1 | c = 3

0 0 0 0 0 0 | d = 4

0 0 0 0 34 0 | e = 5

0 0 1 0 0 19 | f = U

=== Run information ===

Scheme: weka.classifiers.meta.FilteredClassifier -F "weka.filters.supervised.attribute.Discretize -R first-last -precision 6" -W weka.classifiers.rules.JRip -- -F 3 -N 2.0 -O 2 -S 1

Relation: anneal-weka.filters.supervised.instance.StratifiedRemoveFolds-S0-N2-F1

Instances: 449

Attributes: 39

family

product-type

steel

carbon

hardness

temper\_rolling

condition

formability

strength

non-ageing

surface-finish

surface-quality

enamelability

bc

bf

bt

bw/me

bl

m

chrom

phos

cbond

marvi

exptl

ferro

corr

blue/bright/varn/clean

lustre

jurofm

s

p

shape

thick

width

len

oil

bore

packing

class

Test mode: 10-fold cross-validation

=== Classifier model (full training set) ===

FilteredClassifier using weka.classifiers.rules.JRip -F 3 -N 2.0 -O 2 -S 1 on data filtered through weka.filters.supervised.attribute.Discretize -R first-last -precision 6

Filtered Header

@relation anneal-weka.filters.supervised.instance.StratifiedRemoveFolds-S0-N2-F1-weka.filters.supervised.attribute.Discretize-Rfirst-last-precision6

@attribute family {'?',GB,GK,GS,TN,ZA,ZF,ZH,ZM,ZS}

@attribute product-type {C,H,G}

@attribute steel {'?',R,A,U,K,M,S,W,V}

@attribute carbon {'\'All\''}

@attribute hardness {'\'(-inf-22.5]\'','\'(22.5-75]\'','\'(75-inf)\''}

@attribute temper\_rolling {'?',T}

@attribute condition {'?',S,A,X}

@attribute formability {'?',1,2,3,4,5}

@attribute strength {'\'(-inf-375]\'','\'(375-inf)\''}

@attribute non-ageing {'?',N}

@attribute surface-finish {'?',P,M}

@attribute surface-quality {'?',D,E,F,G}

@attribute enamelability {'?',1,2,3,4,5}

@attribute bc {'?',Y}

@attribute bf {'?',Y}

@attribute bt {'?',Y}

@attribute bw/me {'?',B,M}

@attribute bl {'?',Y}

@attribute m {'?',Y}

@attribute chrom {'?',C}

@attribute phos {'?',P}

@attribute cbond {'?',Y}

@attribute marvi {'?',Y}

@attribute exptl {'?',Y}

@attribute ferro {'?',Y}

@attribute corr {'?',Y}

@attribute blue/bright/varn/clean {'?',B,R,V,C}

@attribute lustre {'?',Y}

@attribute jurofm {'?',Y}

@attribute s {'?',Y}

@attribute p {'?',Y}

@attribute shape {COIL,SHEET}

@attribute thick {'\'(-inf-0.7995]\'','\'(0.7995-2.1]\'','\'(2.1-3.2005]\'','\'(3.2005-inf)\''}

@attribute width {'\'(-inf-1235]\'','\'(1235-1410.05]\'','\'(1410.05-inf)\''}

@attribute len {'\'(-inf-0.5]\'','\'(0.5-inf)\''}

@attribute oil {'?',Y,N}

@attribute bore {0,500,600,760}

@attribute packing {'?',1,2,3}

@attribute class {1,2,3,4,5,U}

@data

Classifier Model

JRIP rules:

===========

(steel = S) and (strength = '(375-inf)') => class=1 (3.0/0.0)

(hardness = '(75-inf)') => class=U (20.0/1.0)

(family = TN) => class=5 (34.0/0.0)

(surface-quality = ?) and (condition = S) and (thick = '(0.7995-2.1]') => class=2 (41.0/1.0)

(strength = '(375-inf)') and (shape = SHEET) => class=2 (9.0/1.0)

=> class=3 (342.0/3.0)

Number of Rules : 6

Time taken to build model: 0.03 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 437 97.3274 %

Incorrectly Classified Instances 12 2.6726 %

Kappa statistic 0.9327

Mean absolute error 0.0116

Root mean squared error 0.092

Relative absolute error 8.595 %

Root relative squared error 35.6286 %

Total Number of Instances 449

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.500 0.002 0.667 0.500 0.571 0.574 0.779 0.522 1

0.918 0.008 0.938 0.918 0.928 0.919 0.966 0.863 2

0.985 0.065 0.980 0.985 0.983 0.926 0.944 0.959 3

0.000 0.000 0.000 0.000 0.000 0.000 ? ? 4

1.000 0.000 1.000 1.000 1.000 1.000 1.000 1.000 5

0.950 0.002 0.950 0.950 0.950 0.948 0.955 0.882 U

Weighted Avg. 0.973 0.051 0.972 0.973 0.973 0.929 0.950 0.945

=== Confusion Matrix ===

a b c d e f <-- classified as

2 0 2 0 0 0 | a = 1

0 45 4 0 0 0 | b = 2

1 3 337 0 0 1 | c = 3

0 0 0 0 0 0 | d = 4

0 0 0 0 34 0 | e = 5

0 0 1 0 0 19 | f = U

=== Run information ===

Scheme: weka.classifiers.meta.FilteredClassifier -F "weka.filters.supervised.attribute.Discretize -R first-last -precision 6" -W weka.classifiers.rules.JRip -- -F 3 -N 2.0 -O 2 -S 1

Relation: anneal-weka.filters.supervised.instance.StratifiedRemoveFolds-S0-N2-F1

Instances: 449

Attributes: 39

family

product-type

steel

carbon

hardness

temper\_rolling

condition

formability

strength

non-ageing

surface-finish

surface-quality

enamelability

bc

bf

bt

bw/me

bl

m

chrom

phos

cbond

marvi

exptl

ferro

corr

blue/bright/varn/clean

lustre

jurofm

s

p

shape

thick

width

len

oil

bore

packing

class

Test mode: 20-fold cross-validation

=== Classifier model (full training set) ===

FilteredClassifier using weka.classifiers.rules.JRip -F 3 -N 2.0 -O 2 -S 1 on data filtered through weka.filters.supervised.attribute.Discretize -R first-last -precision 6

Filtered Header

@relation anneal-weka.filters.supervised.instance.StratifiedRemoveFolds-S0-N2-F1-weka.filters.supervised.attribute.Discretize-Rfirst-last-precision6

@attribute family {'?',GB,GK,GS,TN,ZA,ZF,ZH,ZM,ZS}

@attribute product-type {C,H,G}

@attribute steel {'?',R,A,U,K,M,S,W,V}

@attribute carbon {'\'All\''}

@attribute hardness {'\'(-inf-22.5]\'','\'(22.5-75]\'','\'(75-inf)\''}

@attribute temper\_rolling {'?',T}

@attribute condition {'?',S,A,X}

@attribute formability {'?',1,2,3,4,5}

@attribute strength {'\'(-inf-375]\'','\'(375-inf)\''}

@attribute non-ageing {'?',N}

@attribute surface-finish {'?',P,M}

@attribute surface-quality {'?',D,E,F,G}

@attribute enamelability {'?',1,2,3,4,5}

@attribute bc {'?',Y}

@attribute bf {'?',Y}

@attribute bt {'?',Y}

@attribute bw/me {'?',B,M}

@attribute bl {'?',Y}

@attribute m {'?',Y}

@attribute chrom {'?',C}

@attribute phos {'?',P}

@attribute cbond {'?',Y}

@attribute marvi {'?',Y}

@attribute exptl {'?',Y}

@attribute ferro {'?',Y}

@attribute corr {'?',Y}

@attribute blue/bright/varn/clean {'?',B,R,V,C}

@attribute lustre {'?',Y}

@attribute jurofm {'?',Y}

@attribute s {'?',Y}

@attribute p {'?',Y}

@attribute shape {COIL,SHEET}

@attribute thick {'\'(-inf-0.7995]\'','\'(0.7995-2.1]\'','\'(2.1-3.2005]\'','\'(3.2005-inf)\''}

@attribute width {'\'(-inf-1235]\'','\'(1235-1410.05]\'','\'(1410.05-inf)\''}

@attribute len {'\'(-inf-0.5]\'','\'(0.5-inf)\''}

@attribute oil {'?',Y,N}

@attribute bore {0,500,600,760}

@attribute packing {'?',1,2,3}

@attribute class {1,2,3,4,5,U}

@data

Classifier Model

JRIP rules:

===========

(steel = S) and (strength = '(375-inf)') => class=1 (3.0/0.0)

(hardness = '(75-inf)') => class=U (20.0/1.0)

(family = TN) => class=5 (34.0/0.0)

(surface-quality = ?) and (condition = S) and (thick = '(0.7995-2.1]') => class=2 (41.0/1.0)

(strength = '(375-inf)') and (shape = SHEET) => class=2 (9.0/1.0)

=> class=3 (342.0/3.0)

Number of Rules : 6

Time taken to build model: 0.01 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances 435 96.882 %

Incorrectly Classified Instances 14 3.118 %

Kappa statistic 0.9214

Mean absolute error 0.014

Root mean squared error 0.1003

Relative absolute error 10.3268 %

Root relative squared error 38.8133 %

Total Number of Instances 449

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

0.250 0.002 0.500 0.250 0.333 0.350 0.647 0.281 1

0.918 0.010 0.918 0.918 0.918 0.908 0.973 0.855 2

0.982 0.075 0.977 0.982 0.980 0.914 0.939 0.953 3

0.000 0.000 0.000 0.000 0.000 0.000 ? ? 4

1.000 0.000 1.000 1.000 1.000 1.000 1.000 1.000 5

0.950 0.002 0.950 0.950 0.950 0.948 0.954 0.882 U

Weighted Avg. 0.969 0.058 0.967 0.969 0.967 0.916 0.945 0.937

=== Confusion Matrix ===

a b c d e f <-- classified as

1 0 3 0 0 0 | a = 1

0 45 4 0 0 0 | b = 2

1 4 336 0 0 1 | c = 3

0 0 0 0 0 0 | d = 4

0 0 0 0 34 0 | e = 5

0 0 1 0 0 19 | f = U