

Tree :

```
tumorAtLeastLarge => T
  smoker => T
    ZubrodaAtLeast1 => T
      diagnosisIsDGN5 => T
        patient(lived)
      diagnosisIsDGN5 => F
        patient(died)
    ZubrodaAtLeast1 => F
      patient(lived)
  smoker => F
    patient(lived)
tumorAtLeastLarge => F
  smoker => T
    diagnosisIsDGN3 => T
      young => T
        patient(lived)
      young => F
        dyspnoeaBeforeSurgery => T
          weaknessBeforeSurgery => T
            patient(lived)
          weaknessBeforeSurgery => F
            painBeforeSurgery => T
              patient(lived)
            painBeforeSurgery => F
              ZubrodaAtLeast1 => T
                patient(died)
              ZubrodaAtLeast1 => F
                patient(lived)
          dyspnoeaBeforeSurgery => F
            diabetesMellitus => T
              painBeforeSurgery => T
                patient(lived)
              painBeforeSurgery => F
                highFVC => T
                  patient(lived)
                highFVC => F
                  old => T
                    coughBeforeSurgery => T
                      tumorAtLeastMedium => T
                        mediumVolume => T
                          middleAge => T
                            patient(died)
                          middleAge => F
                            asthmatic => T
                              patient(died)
                            asthmatic => F
                              peripheralArterialDiseases => T
                                patient(died)
                              peripheralArterialDiseases => F
                                recentMyocardialInfarction => T
                                  patient(died)
                                recentMyocardialInfarction => F
                                  tumorAtLeastSmall => T
                                    weaknessBeforeSurgery => T
                                      patient(died)
```

```

weaknessBeforeSurgery => F
  haemoptysisBeforeSurgery => T
    patient(died)
  haemoptysisBeforeSurgery => F
    ZubrodaAtLeast2 => T
      patient(died)
    ZubrodaAtLeast2 => F
      ZubrodaAtLeast1 => T
        highVolume => T
          patient(died)
        highVolume => F
          lowVolume => T
            patient(died)
          lowVolume => F
            mediumFVC => T
              lowFVC => T
                patient(died)
              lowFVC => F
                diagnosisIsDGN1 => T
                  patient(died)
                diagnosisIsDGN1 => F
                  diagnosisIsDGN7 => T
                    patient(died)
                  diagnosisIsDGN7 => F
                    diagnosisIsDGN5 => T
                      patient(died)
                    diagnosisIsDGN5 => F
                      diagnosisIsDGN6 => T
                        patient(died)
                      diagnosisIsDGN6 => F
                        diagnosisIsDGN4 => T
                          patient(died)
                        diagnosisIsDGN4 => F
                          diagnosisIsDGN2 => T
                            patient(died)
                          diagnosisIsDGN2 => F
                            patient(lived)
                        mediumFVC => F
                          patient(died)
                      ZubrodaAtLeast1 => F
                        patient(died)
                    tumorAtLeastSmall => F
                      patient(died)
                  mediumVolume => F
                    patient(died)
                tumorAtLeastMedium => F
                  patient(died)
              coughBeforeSurgery => F
                patient(lived)
            old => F
              patient(died)
          diabetesMellitus => F
            highFVC => T
              patient(died)
            highFVC => F
              tumorAtLeastSmall => T
                coughBeforeSurgery => T

```

```
ZubrodaAtLeast2 => T
patient(died)
ZubrodaAtLeast2 => F
peripheralArterialDiseases => T
patient(died)
peripheralArterialDiseases => F
painBeforeSurgery => T
patient(died)
painBeforeSurgery => F
haemoptysisBeforeSurgery => T
old => T
patient(lived)
old => F
patient(died)
haemoptysisBeforeSurgery => F
mediumVolume => T
weaknessBeforeSurgery => T
patient(died)
weaknessBeforeSurgery => F
old => T
middleAge => T
patient(died)
middleAge => F
asthmatic => T
patient(died)
asthmatic => F
recentMyocardialInfarction => T
patient(died)
recentMyocardialInfarction => F
tumorAtLeastMedium => T
ZubrodaAtLeast1 => T
highVolume => T
patient(died)
highVolume => F
lowVolume => T
patient(died)
lowVolume => F
mediumFVC => T
lowFVC => T
patient(died)
lowFVC => F
diagnosisIsDGN1 => T
patient(died)
diagnosisIsDGN1 => F
diagnosisIsDGN7 => T
patient(died)
diagnosisIsDGN7 => F
diagnosisIsDGN5 => T
patient(died)
diagnosisIsDGN5 => F
diagnosisIsDGN6 => T
patient(died)
diagnosisIsDGN6 => F
diagnosisIsDGN4 => T
patient(died)
diagnosisIsDGN4 => F
diagnosisIsDGN2 => T
```

```

        patient(died)
        diagnosisIsDGN2 => F
        patient(died)
        mediumFVC => F
        patient(died)
        ZubrodaAtLeast1 => F
        patient(died)
        tumorAtLeastMedium => F
        patient(died)
old => F
middleAge => T
asthmatic => T
    patient(died)
asthmatic => F
    recentMyocardialInfarction => T
    patient(died)
    recentMyocardialInfarction => F
    tumorAtLeastMedium => T
    ZubrodaAtLeast1 => T
    highVolume => T
    patient(died)
    highVolume => F
    lowVolume => T
    patient(died)
    lowVolume => F
    mediumFVC => T
    lowFVC => T
    patient(died)
    lowFVC => F
    diagnosisIsDGN1 => T
    patient(died)
    diagnosisIsDGN1 => F
    diagnosisIsDGN7 => T
    patient(died)
    diagnosisIsDGN7 => F
    diagnosisIsDGN5 => T
    patient(died)
    diagnosisIsDGN5 => F
    diagnosisIsDGN6 => T
    patient(died)
    diagnosisIsDGN6 => F
    diagnosisIsDGN4 => T
    patient(died)
    diagnosisIsDGN4 => F
    diagnosisIsDGN2 => T
    patient(died)
    diagnosisIsDGN2 => F
    patient(died)
    mediumFVC => F
    patient(died)
    ZubrodaAtLeast1 => F
    patient(died)
    tumorAtLeastMedium => F
    patient(died)
middleAge => F
    patient(died)
mediumVolume => F

```

```

old => T
  weaknessBeforeSurgery => T
    patient(lived)
  weaknessBeforeSurgery => F
    patient(died)
old => F
  weaknessBeforeSurgery => T
    patient(died)
  weaknessBeforeSurgery => F
    mediumFVC => T
      patient(lived)
    mediumFVC => F
      tumorAtLeastMedium => T
        patient(died)
      tumorAtLeastMedium => F
        middleAge => T
          asthmatic => T
            patient(died)
          asthmatic => F
            recentMyocardialInfarction => T
              patient(died)
            recentMyocardialInfarction => F
              ZubrodaAtLeast1 => T
                highVolume => T
                  patient(died)
                highVolume => F
                  lowVolume => T
                    lowFVC => T
                      diagnosisIsDGN1 => T
                        patient(died)
                      diagnosisIsDGN1 => F
                        diagnosisIsDGN7 => T
                          patient(died)
                        diagnosisIsDGN7 => F
                          diagnosisIsDGN5 => T
                            patient(died)
                          diagnosisIsDGN5 => F
                            diagnosisIsDGN6 => T
                              patient(died)
                            diagnosisIsDGN6 => F
                              diagnosisIsDGN4 => T
                                patient(died)
                              diagnosisIsDGN4 => F
                                diagnosisIsDGN2 => T
                                  patient(died)
                                diagnosisIsDGN2 => F
                                  patient(lived)
                              lowFVC => F
                                patient(died)
                              lowVolume => F
                                patient(died)
                              ZubrodaAtLeast1 => F
                                patient(died)
                              middleAge => F
                                patient(died)
                                coughBeforeSurgery => F
                                mediumFVC => T

```

```

patient(died)
mediumFVC => F
old => T
middleAge => T
patient(died)
middleAge => F
asthmatic => T
patient(died)
asthmatic => F
peripheralArterialDiseases => T
patient(died)
peripheralArterialDiseases => F
recentMyocardialInfarction => T
patient(died)
recentMyocardialInfarction => F
tumorAtLeastMedium => T
weaknessBeforeSurgery => T
patient(died)
weaknessBeforeSurgery => F
haemoptysisBeforeSurgery => T
patient(died)
haemoptysisBeforeSurgery => F
painBeforeSurgery => T
patient(died)
painBeforeSurgery => F
ZubrodaAtLeast2 => T
patient(died)
ZubrodaAtLeast2 => F
ZubrodaAtLeast1 => T
patient(died)
ZubrodaAtLeast1 => F
highVolume => T
patient(died)
highVolume => F
mediumVolume => T
patient(died)
mediumVolume => F
lowVolume => T
lowFVC => T
diagnosisIsDGN1 => T
patient(died)
diagnosisIsDGN1 => F
diagnosisIsDGN7 => T
patient(died)
diagnosisIsDGN7 => F
diagnosisIsDGN5 => T
patient(died)
diagnosisIsDGN5 => F
diagnosisIsDGN6 => T
patient(died)
diagnosisIsDGN6 => F
diagnosisIsDGN4 => T
patient(died)
diagnosisIsDGN4 => F
diagnosisIsDGN2 => T
patient(died)
diagnosisIsDGN2 => F

```

```

        patient(died)
        lowFVC => F
        patient(died)
        lowVolume => F
        patient(died)
        tumorAtLeastMedium => F
        patient(died)
    old => F
    patient(died)
tumorAtLeastSmall => F
mediumVolume => T
    haemoptysisBeforeSurgery => T
    weaknessBeforeSurgery => T
    patient(died)
    weaknessBeforeSurgery => F
    patient(lived)
haemoptysisBeforeSurgery => F
weaknessBeforeSurgery => T
old => T
    ZubrodaAtLeast2 => T
    middleAge => T
    patient(died)
    middleAge => F
    asthmatic => T
    patient(died)
    asthmatic => F
    peripheralArterialDiseases => T
    patient(died)
    peripheralArterialDiseases => F
    recentMyocardialInfarction => T
    patient(died)
    recentMyocardialInfarction => F
    tumorAtLeastMedium => T
    patient(died)
    tumorAtLeastMedium => F
    coughBeforeSurgery => T
    painBeforeSurgery => T
    patient(died)
    painBeforeSurgery => F
    ZubrodaAtLeast1 => T
    highVolume => T
    patient(died)
    highVolume => F
    lowVolume => T
    patient(died)
    lowVolume => F
    mediumFVC => T
    lowFVC => T
    patient(died)
    lowFVC => F
    diagnosisIsDGN1 => T
    patient(died)
    diagnosisIsDGN1 => F
    diagnosisIsDGN7 => T
    patient(died)
    diagnosisIsDGN7 => F
    diagnosisIsDGN5 => T

```

```

        patient(died)
        diagnosisIsDGN5 => F
        diagnosisIsDGN6 => T
        patient(died)
        diagnosisIsDGN6 => F
        diagnosisIsDGN4 => T
        patient(died)
        diagnosisIsDGN4 => F
        diagnosisIsDGN2 => T
        patient(died)
        diagnosisIsDGN2 => F
        patient(lived)
    mediumFVC => F
    patient(died)
    ZubrodaAtLeast1 => F
    patient(died)
    coughBeforeSurgery => F
    patient(died)
ZubrodaAtLeast2 => F
middleAge => T
    patient(died)
middleAge => F
    asthmatic => T
    patient(died)
    asthmatic => F
    peripheralArterialDiseases => T
    patient(died)
    peripheralArterialDiseases => F
    recentMyocardialInfarction => T
    patient(died)
    recentMyocardialInfarction => F
    tumorAtLeastMedium => T
    patient(died)
    tumorAtLeastMedium => F
    coughBeforeSurgery => T
    painBeforeSurgery => T
    patient(died)
    painBeforeSurgery => F
    ZubrodaAtLeast1 => T
    highVolume => T
    patient(died)
    highVolume => F
    lowVolume => T
    patient(died)
    lowVolume => F
    mediumFVC => T
    lowFVC => T
    patient(died)
    lowFVC => F
    diagnosisIsDGN1 => T
    patient(died)
    diagnosisIsDGN1 => F
    diagnosisIsDGN7 => T
    patient(died)
    diagnosisIsDGN7 => F
    diagnosisIsDGN5 => T
    patient(died)

```



```

        diagnosisIsDGN5 => F
        diagnosisIsDGN6 => T
        patient(died)
        diagnosisIsDGN6 => F
        diagnosisIsDGN4 => T
        patient(died)
        diagnosisIsDGN4 => F
        diagnosisIsDGN2 => T
        patient(died)
        diagnosisIsDGN2 => F
        patient(lived)
    mediumFVC => F
    patient(died)
    ZubrodaAtLeast1 => F
    patient(died)
    coughBeforeSurgery => F
    patient(died)
old => F
    patient(died)
weaknessBeforeSurgery => F
coughBeforeSurgery => T
    old => T
    patient(died)
old => F
    recentMyocardialInfarction => T
    patient(died)
    recentMyocardialInfarction => F
    mediumFVC => T
    middleAge => T
    asthmatic => T
    patient(died)
    asthmatic => F
    peripheralArterialDiseases => T
    patient(died)
    peripheralArterialDiseases => F
    tumorAtLeastMedium => T
    patient(died)
    tumorAtLeastMedium => F
    painBeforeSurgery => T
    patient(died)
    painBeforeSurgery => F
    ZubrodaAtLeast2 => T
    patient(died)
    ZubrodaAtLeast2 => F
    ZubrodaAtLeast1 => T
    highVolume => T
    patient(died)
    highVolume => F
    lowVolume => T
    patient(died)
    lowVolume => F
    lowFVC => T
    patient(died)
    lowFVC => F
    diagnosisIsDGN1 => T
    patient(died)
    diagnosisIsDGN1 => F

```

```

        diagnosisIsDGN7 => T
        patient(died)
        diagnosisIsDGN7 => F
        diagnosisIsDGN5 => T
        patient(died)
        diagnosisIsDGN5 => F
        diagnosisIsDGN6 => T
        patient(died)
        diagnosisIsDGN6 => F
        diagnosisIsDGN4 => T
        patient(died)
        diagnosisIsDGN4 => F
        diagnosisIsDGN2 => T
        patient(died)
        diagnosisIsDGN2 => F
        patient(died)
        ZubrodaAtLeast1 => F
        patient(died)
        middleAge => F
        patient(died)
        mediumFVC => F
        patient(died)
coughBeforeSurgery => F
old => T
        middleAge => T
        patient(died)
        middleAge => F
        asthmatic => T
        patient(died)
        asthmatic => F
        peripheralArterialDiseases => T
        patient(died)
        peripheralArterialDiseases => F
        recentMyocardialInfarction => T
        patient(died)
        recentMyocardialInfarction => F
        tumorAtLeastMedium => T
        patient(died)
        tumorAtLeastMedium => F
        painBeforeSurgery => T
        patient(died)
        painBeforeSurgery => F
        ZubrodaAtLeast2 => T
        patient(died)
        ZubrodaAtLeast2 => F
        ZubrodaAtLeast1 => T
        patient(died)
        ZubrodaAtLeast1 => F
        highVolume => T
        patient(died)
        highVolume => F
        lowVolume => T
        patient(died)
        lowVolume => F
        mediumFVC => T
        lowFVC => T
        patient(died)

```

```

        lowFVC => F
        diagnosisIsDGN1 => T
        patient(died)
        diagnosisIsDGN1 => F
        diagnosisIsDGN7 => T
        patient(died)
        diagnosisIsDGN7 => F
        diagnosisIsDGN5 => T
        patient(died)
        diagnosisIsDGN5 => F
        diagnosisIsDGN6 => T
        patient(died)
        diagnosisIsDGN6 => F
        diagnosisIsDGN4 => T
        patient(died)
        diagnosisIsDGN4 => F
        diagnosisIsDGN2 => T
        patient(died)
        diagnosisIsDGN2 => F
        patient(died)
        mediumFVC => F
        patient(died)
old => F
middleAge => T
asthmatic => T
    patient(died)
asthmatic => F
peripheralArterialDiseases => T
    patient(died)
peripheralArterialDiseases => F
recentMyocardialInfarction => T
    patient(died)
recentMyocardialInfarction => F
tumorAtLeastMedium => T
    patient(died)
tumorAtLeastMedium => F
painBeforeSurgery => T
    patient(died)
painBeforeSurgery => F
ZubrodaAtLeast2 => T
    patient(died)
ZubrodaAtLeast2 => F
ZubrodaAtLeast1 => T
    patient(died)
ZubrodaAtLeast1 => F
highVolume => T
    patient(died)
highVolume => F
lowVolume => T
    patient(died)
lowVolume => F
mediumFVC => T
lowFVC => T
    patient(died)
lowFVC => F
    diagnosisIsDGN1 => T
        patient(died)

```

```

diagnosisIsDGN1 => F
diagnosisIsDGN7 => T
patient(died)
diagnosisIsDGN7 => F
diagnosisIsDGN5 => T
patient(died)
diagnosisIsDGN5 => F
diagnosisIsDGN6 => T
patient(died)
diagnosisIsDGN6 => F
diagnosisIsDGN4 => T
patient(died)
diagnosisIsDGN4 => F
diagnosisIsDGN2 => T
patient(died)
diagnosisIsDGN2 => F
patient(died)
mediumFVC => F
patient(died)
middleAge => F
patient(died)
mediumVolume => F
patient(died)
diagnosisIsDGN3 => F
diabetesMellitus => T
old => T
peripheralArterialDiseases => T
patient(lived)
peripheralArterialDiseases => F
patient(died)
old => F
patient(lived)
diabetesMellitus => F
ZubrodaAtLeast2 => T
haemoptysisBeforeSurgery => T
patient(died)
haemoptysisBeforeSurgery => F
patient(lived)
ZubrodaAtLeast2 => F
diagnosisIsDGN6 => T
patient(died)
diagnosisIsDGN6 => F
diagnosisIsDGN4 => T
lowFVC => T
patient(lived)
lowFVC => F
patient(died)
diagnosisIsDGN4 => F
mediumVolume => T
dyspnoeaBeforeSurgery => T
patient(died)
dyspnoeaBeforeSurgery => F
peripheralArterialDiseases => T
patient(lived)
peripheralArterialDiseases => F
diagnosisIsDGN1 => T
patient(died)

```

```
diagnosisIsDGN1 => F
tumorAtLeastSmall => T
weaknessBeforeSurgery => T
  patient(died)
weaknessBeforeSurgery => F
  old => T
    patient(lived)
  old => F
    haemoptysisBeforeSurgery => T
      patient(died)
    haemoptysisBeforeSurgery => F
      tumorAtLeastMedium => T
        coughBeforeSurgery => T
          diagnosisIsDGN5 => T
            ZubrodaAtLeast1 => T
              patient(died)
            ZubrodaAtLeast1 => F
              patient(lived)
            diagnosisIsDGN5 => F
              patient(lived)
            coughBeforeSurgery => F
              patient(died)
            tumorAtLeastMedium => F
              patient(died)
      tumorAtLeastSmall => F
        old => T
          patient(died)
        old => F
          diagnosisIsDGN5 => T
            patient(lived)
          diagnosisIsDGN5 => F
            patient(died)
      mediumVolume => F
        patient(died)
smoker => F
painBeforeSurgery => T
  coughBeforeSurgery => T
    patient(died)
  coughBeforeSurgery => F
    diagnosisIsDGN3 => T
      patient(lived)
    diagnosisIsDGN3 => F
      patient(died)
painBeforeSurgery => F
  patient(died)
```

TEST DATA SET

Failed Examples :

Example failed : postTestEx1
Example failed : negTestEx7
Example failed : negTestEx13
Example failed : postTestEx2
Example failed : negTestEx15
Example failed : postTestEx3
Example failed : postTestEx4
Example failed : postTestEx5
Example failed : postTestEx6
Example failed : negTestEx46
Example failed : negTestEx56
Example failed : postTestEx8
Example failed : negTestEx60
Example failed : postTestEx10
Example failed : postTestEx11
Example failed : postTestEx12
Example failed : negTestEx73

Accuracy : 80.0%

Fraction : (68/85)

The tree seems to have generalized moderately well. Based on reading some previous Moodle conversations, the accuracy could be greater. I found myself interested in the features that seemed to show very strong correlations and made sense medically, such as : A T for recentMyocardialInfarction basically indicates the patient died – but this was never true for a test example to haemoptysisBeforeSurgery also provides high probability of death. This type of learning can really improve healthcare.

An example of a patient who lived, but was classified as died :

postTestEx1

This appears to have failed because of the diagnosis5 feature. This actually is not surprising to me as we only have binary attributes, which limits the information branching, but also in reality – mis-diagnosing is extremely common and while a diagnosis might appear to be one of the most significant pieces of information, patients are commonly mis-diagnosed.

An example of a patient who died, but was classified as lived :

negTestEx13

I found this example interesting because the leaf node actually has painbefore surgery = T with a “lived” classification. Having pain immediately before surgery does not seem like a very useful feature. Particularly with the vast amount of pain this could be, does it mean there knee hurt before elective surgery? Or did they have excruciating gastrointestinal pain before a major surgery. This seems like a weakness in the tree or training set.