

## Pneumonia

### rule

$[G](\max(\text{mfcc2}) > 1.60) \wedge [G](\max(\text{mfcc3}) > -0.52) \wedge [G](\max(\text{mel12}=2383\text{Hz}) > 1.23\text{e-}8) \wedge [G](\text{std}^+(\text{mfcc6}) < 0.32)$   
 $\langle G \rangle(\max(\text{mel8}=1194\text{Hz}) \leq -4.91) \wedge [G](\max(\text{cntrd}) < 1084.33) \wedge [G](\text{std}^+(\text{mel10}=1687\text{Hz}) < 0.42) \wedge [G](\langle \max(\text{mel8}=1194\text{Hz})$   
 $(\text{std}(\text{skwns}) < 16.88) \wedge (\text{std}(\text{mel10}=1687\text{Hz}) < 0.54) \wedge (\min(\text{mel8}=1194\text{Hz}) < -4.20) \wedge (\text{std}(\text{mel8}=1194\text{Hz}) < 0.19)$   
 $\langle G \rangle(\langle \max(\text{mfcc2}) \leq 1.60 \rangle \wedge \langle \overline{\text{DBE}} \rangle(\min(\text{mfcc5}) \geq -0.01)) \wedge [G](\langle \max(\text{mfcc2}) \leq 1.60 \rangle \rightarrow [G](\max(\text{mfcc5}) < 0.91))$   
 $(\min(\text{mfcc2}) < 1.50) \wedge (\max(\text{mfcc4}) \geq 0.56) \wedge (\text{mean}(\text{mfcc5}) < 0.48) \wedge (\text{med}(\text{mel11}=2005\text{Hz}) < 9.76\text{e-}5)$   
 $\langle G \rangle(\langle \max(\text{cntrd}) \geq 1084.33 \rangle \wedge (\text{std}^-(\text{skwns}) \leq 0.08))$

## Bronchiecstasis

### rule

$\langle G \rangle(\max(\text{kurts}) \leq 5.06) \wedge [G](\langle \max(\text{kurts}) \leq 5.06 \rangle \rightarrow [\overline{\text{DBE}}](\text{median}(\text{mel8}=1194\text{Hz}) > 9.17\text{e-}5))$   
 $\langle G \rangle(\max(\text{mel7}=1005\text{Hz}) \geq -4.14) \wedge [G](\langle \max(\text{mel7}=1005\text{Hz}) \geq -4.14 \rangle \rightarrow [\text{AO}](\max(\text{kurts}) > 6.44))$   
 $\text{std}(\text{decrs}) < 2.77$   
 $\langle G \rangle(\langle \max(\text{kurts}) \leq 5.06 \rangle \wedge \langle \overline{\text{DBE}} \rangle(\text{median}(\text{mel8}=1194\text{Hz}) \leq 9.17\text{e-}5)) \wedge [G](\langle \max(\text{kurts}) \leq 5.06 \rangle \rightarrow [\overline{\text{DBE}}](\langle \text{median}(\text{mel8}=1194\text{Hz})$   
 $\langle G \rangle(\langle \max(\text{mel7}=1005\text{Hz}) \geq -4.14 \rangle \wedge \langle \text{AO} \rangle(\langle \max(\text{kurts}) \leq 6.44 \rangle \wedge \langle \overline{\text{DBE}} \rangle(\langle \text{mean}(\text{mel7}=1005\text{Hz}) \leq -4.18 \rangle \wedge \langle \overline{\text{DBE}} \rangle(\langle \text{median}(\text{decrs})$   
 $\text{mean}(\text{decrs}) < -1.49$   
 $\text{std}(\text{decrs}) \geq 2.77$

## COPD

### rule

$\langle G \rangle(\langle \max(\text{mfcc6}) \geq 0.05 \rangle \wedge (\max(\text{mfcc5}) \leq 0.24)) \wedge [G](\max(\text{mel5}=711\text{Hz}) > 5.15\text{e-}5)$   
 $(\text{med}(\text{entrp}) \geq 0.23) \wedge (\min(\text{mel14}=3366\text{Hz}) \geq -5.87)$   
 $\langle G \rangle(\langle \max(\text{mel1}=357\text{Hz}) \leq -3.83 \rangle \wedge \langle \overline{\text{L}} \rangle(\langle \max(\text{mel13}=2832\text{Hz}) \geq -8.07 \rangle \wedge (\max(\text{skwns}) \leq 1.57) \wedge \langle G \rangle(\text{std}^+(\text{entrp}) \geq 0.11)))$   
 $(\text{mean}(\text{crest}) \geq 120.66) \wedge (\min(\text{mfcc2}) < 1.55) \wedge (\text{med}(\text{mel13}=2832\text{Hz}) < 8.06\text{e-}5) \wedge (\text{mean}(\text{slope}) \geq -0.05)$

## URTI

### rule

$\langle G \rangle(\langle \max(\text{mel7}=1005\text{Hz}) \leq -4.79 \rangle \wedge \langle \text{AO} \rangle(\text{sumdiagcov}^-(\text{entrp}) \leq 0.04)) \wedge [G](\max(\text{flatn}) < 0.14) \wedge [G](\langle \max(\text{mel7}=1005\text{Hz})$   
 $(\text{mean}(\text{mfcc2}) \geq 3.53) \wedge (\text{mean}(\text{mel3}=504\text{Hz}) \geq 9.25\text{e-}5) \wedge (\max(\text{mel13}=2832\text{Hz}) < 1.44\text{e-}6)$   
 $\langle G \rangle(\max(\text{flatn}) \geq 0.14) \wedge [G](\langle \max(\text{flatn}) \geq 0.14 \rangle \rightarrow [\text{L}](\max(\text{flatn}) < 0.28)) \wedge [G](\langle \max(\text{flatn}) \geq 0.14 \rangle \rightarrow [\overline{\text{L}}](\text{sumdiagcov}^-(\text{flatn})$   
 $(\text{mean}(\text{skwns}) \geq 17.49) \wedge (\min(\text{mel1}=357\text{Hz}) < -3.17) \wedge (\text{mean}(\text{slope}) < -0.02) \wedge (\text{qnt}(\text{cntrd}) \geq 2.05) \wedge (\max(\text{mel10}=1687\text{Hz})$

## Bronchiolitis

### rule

$\langle G \rangle(\langle \max(\text{crest}) \geq 39.35 \rangle \wedge \langle \text{AO} \rangle(\langle \text{mean}(\text{mel1}=357\text{Hz}) \geq 0.00 \rangle \wedge (\text{mean}(\text{mfcc1}) \leq -19.99))) \wedge [G](\langle \max(\text{crest}) \geq 39.35 \rangle \rightarrow [\text{A}](\text{mean}(\text{kurts}) < 5761.28) \wedge (\text{med}(\text{mel6}=845\text{Hz}) < -3.25) \wedge (\text{mean}(\text{entrp}) \geq 0.21) \wedge (\min(\text{skwns}) < 3.35)$   
 $[G](\max(\text{crest}) < 39.35) \wedge [G](\text{std}^-(\text{mel11}=2005\text{Hz}) > 1.23\text{e-}9)$   
 $\text{mean}(\text{kurts}) \geq 5761.28$

# interesting\_rules\_Pneumonia

| consequent | coverage | confidence | lift | natoms | type          | condition | scale     |
|------------|----------|------------|------|--------|---------------|-----------|-----------|
| Pneumonia  | 0.25     | 0.96       | 2.15 | 4      | modal         | Pneumonia | semitones |
| Pneumonia  | 0.28     | 0.93       | 1.84 | 5      | modal         | Pneumonia | semitones |
| Pneumonia  | 0.17     | 1          | 2.2  | 4      | propositional | Pneumonia | semitones |
| Healthy    | 0.4      | 0.92       | 1.67 | 4      | modal         | Pneumonia | semitones |
| Healthy    | 0.37     | 0.86       | 1.75 | 4      | propositional | Pneumonia | semitones |
| Healthy    | 0.17     | 1          | 2.02 | 2      | modal         | Pneumonia | semitones |

| consequent     | coverage | confidence | lift | natoms | type          | condition      | scale     |
|----------------|----------|------------|------|--------|---------------|----------------|-----------|
| Bronchiectasis | 0.14     | 1          | 2.25 | 3      | modal         | Bronchiectasis | semitones |
| Bronchiectasis | 0.28     | 0.8        | 1.6  | 3      | modal         | Bronchiectasis | semitones |
| Bronchiectasis | 0.5      | 1          | 2    | 1      | propositional | Bronchiectasis | semitones |
| Healthy        | 0.44     | 0.94       | 1.69 | 5      | modal         | Bronchiectasis | semitones |
| Healthy        | 0.17     | 1          | 2    | 5      | modal         | Bronchiectasis | semitones |
| Healthy        | 0.61     | 1          | 1.64 | 1      | propositional | Bronchiectasis | semitones |
| Healthy        | 0.5      | 1          | 2    | 1      | propositional | Bronchiectasis | semitones |

| consequent | coverage | confidence | lift | natoms | type          | condition | scale     |
|------------|----------|------------|------|--------|---------------|-----------|-----------|
| COPD       | 0.25     | 0.96       | 2.04 | 3      | modal         | COPD      | semitones |
| COPD       | 0.27     | 0.97       | 2.01 | 2      | propositional | COPD      | semitones |
| Healthy    | 0.32     | 0.94       | 1.92 | 4      | modal         | COPD      | semitones |
| Healthy    | 0.32     | 0.97       | 2.27 | 4      | propositional | COPD      | semitones |

| consequent | coverage | confidence | lift | natoms | type          | condition | scale     |
|------------|----------|------------|------|--------|---------------|-----------|-----------|
| URTI       | 0.24     | 0.9        | 1.69 | 7      | modal         | URTI      | semitones |
| URTI       | 0.16     | 0.86       | 1.8  | 3      | propositional | URTI      | semitones |
| Healthy    | 0.14     | 0.5        | 1.08 | 7      | modal         | URTI      | semitones |
| Healthy    | 0.12     | 0.7        | 1.31 | 8      | propositional | URTI      | semitones |

| consequent    | coverage | confidence | lift | natoms | type          | condition     | scale     |
|---------------|----------|------------|------|--------|---------------|---------------|-----------|
| Bronchiolitis | 0.25     | 0.93       | 1.63 | 7      | modal         | Bronchiolitis | semitones |
| Bronchiolitis | 0.25     | 0.93       | 1.93 | 4      | propositional | Bronchiolitis | semitones |
| Healthy       | 0.21     | 0.83       | 1.94 | 2      | modal         | Bronchiolitis | semitones |
| Healthy       | 0.27     | 0.87       | 1.67 | 1      | propositional | Bronchiolitis | semitones |

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