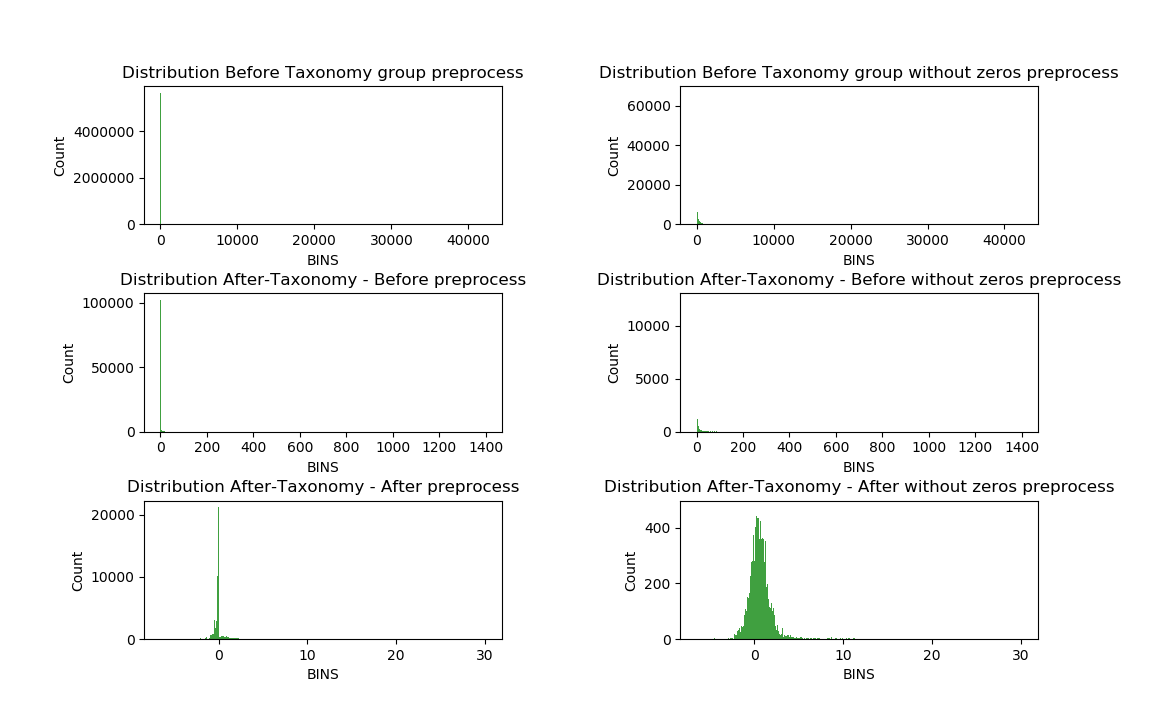
Allergy data set

# Pre-processing:

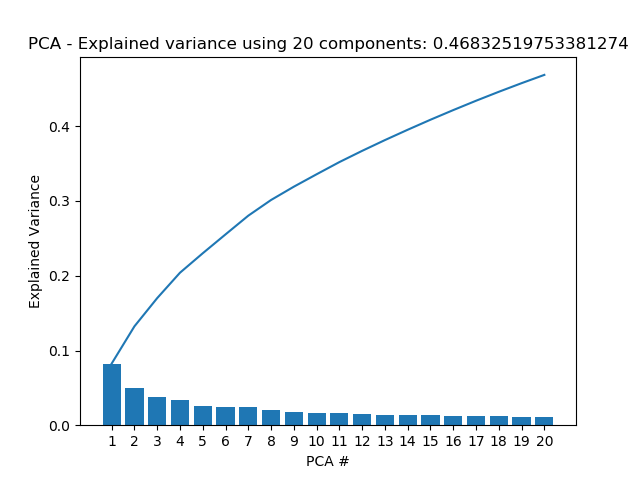
In the first stage, we restricted the information for each type of microbiome given in the data set by only the first five levels to minimize the number of features - from several thousand to several hundred.

In the second stage, we performed normalization using Z score, and log base 10 to obtain normalized values with an average of 0 and standard deviation 1.

In the third stage, we performed PCA to lower the features dimensions to twenty.

We chose a value of 20 according to the accumulation of the eigenvalues variance.

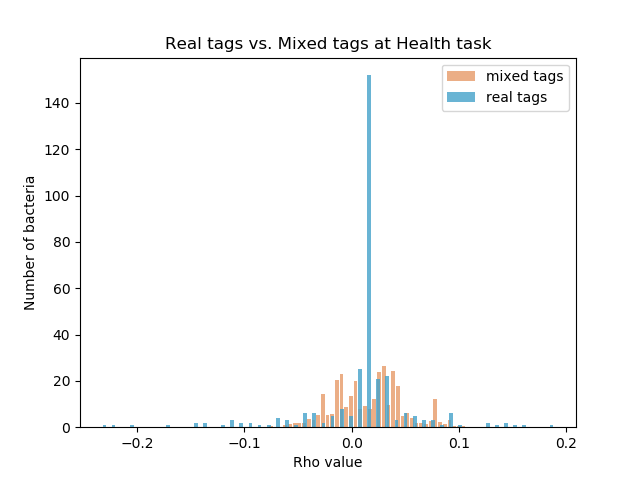
Towards component number 20, we have seen that the cumulative variance does not increase much as we proceed - so we stopped.



Component 20: 0.0111306300797054, Accumulative variance: 0.4691601802897902

## Distinction between allergic and healthy patients (the control group)

Is patient healthy or allergic?



|  |  |
| --- | --- |
| -0.23028 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Mogibacteriaceae]; g\_\_ |
| -0.21686 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_Adlercreutzia |
| -0.19847 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Actinomycetaceae; g\_\_Actinomyces |
| -0.1677 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae; g\_\_Bifidobacterium |
| -0.13957 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Turicibacterales; f\_\_Turicibacteraceae; g\_\_Turicibacter |
| -0.13955 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptostreptococcaceae; g\_\_ |
| -0.13193 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_Collinsella |
| -0.13188 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_ |
| -0.11379 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Blautia |
| -0.10584 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_ |
| -0.1058 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Streptococcaceae; g\_\_Streptococcus |
| -0.104 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Corynebacteriaceae; g\_\_Corynebacterium |
| -0.10203 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Clostridiaceae; g\_\_ |
| -0.09584 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Dehalobacteriaceae; g\_\_Dehalobacterium |
| -0.08952 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Dorea |
| -0.08613 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales |
| -0.08232 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_; g\_\_ |
| -0.07451 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_[Ruminococcus] |
| -0.06773 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Coprococcus |
| -0.06591 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Ruminococcus |
| -0.06586 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Clostridiaceae; g\_\_Clostridium |
| -0.06465 | k\_\_Bacteria; p\_\_Firmicutes |
| -0.05738 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Christensenellaceae; g\_\_Christensenella |
| -0.05486 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_ |
| 0.094571 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Lactobacillaceae; g\_\_Lactobacillus |
| 0.096126 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_ |
| 0.097112 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Fusobacteriaceae; g\_\_Cetobacterium |
| 0.097413 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Odoribacteraceae]; g\_\_Butyricimonas |
| 0.098265 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_; g\_\_ |
| 0.103697 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Megasphaera |
| 0.129471 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Desulfovibrionales; f\_\_Desulfovibrionaceae; g\_\_Bilophila |
| 0.133132 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Alcaligenaceae; g\_\_Sutterella |
| 0.138062 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Enterococcaceae; g\_\_Enterococcus |
| 0.145918 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Bacteroidaceae; g\_\_Bacteroides |
| 0.148944 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_Alistipes |
| 0.153005 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Lachnospira |
| 0.167948 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae; g\_\_Parabacteroides |
| 0.194758 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Prevotellaceae; g\_\_Prevotella |

Significant bacteria –

Too many to plot.

SVM

The best parameters found by grid search are:

{'C': 0.01, 'gamma': 'scale', 'kernel': 'sigmoid'}

AUC

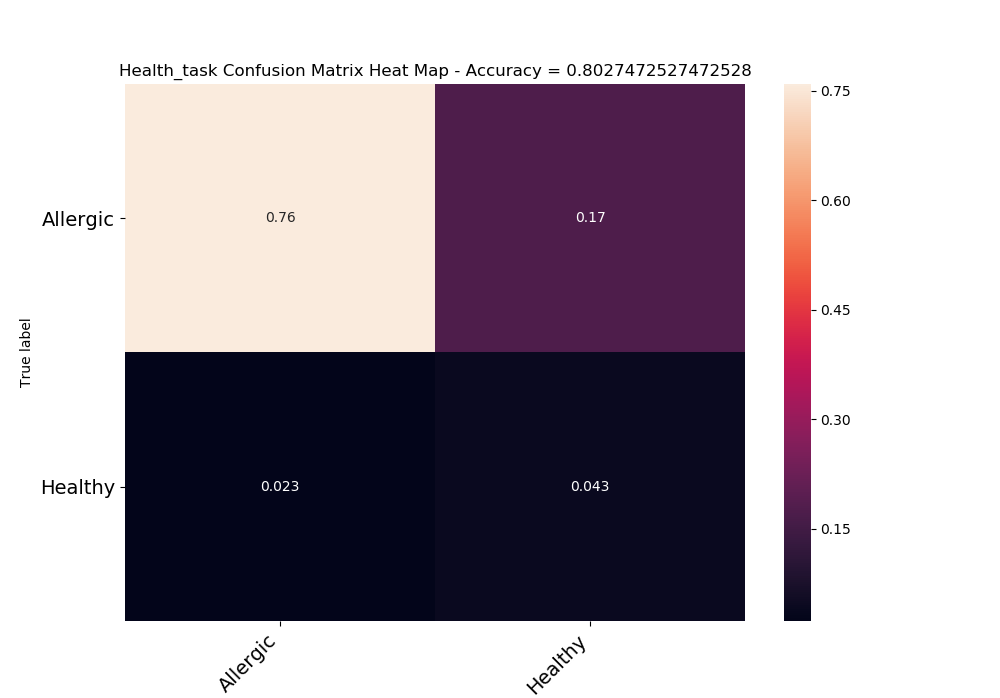
**train\_auc: 0.8126557863501482**

**test\_auc: 0.7341666666666667**

**train\_rho: 0.3624355900432167**

**test\_rho: 0.2615238085198263**

|  |  |  |
| --- | --- | --- |
|  | train accuracy | test accuracy |
| 0 | 0.792818 | 0.747253 |
| 1 | 0.788674 | 0.692308 |
| 2 | 0.796961 | 0.752747 |
| 3 | 0.780387 | 0.697802 |
| 4 | 0.774862 | 0.653846 |
| 5 | 0.801105 | 0.725275 |
| 6 | 0.767956 | 0.675824 |
| 7 | 0.766575 | 0.692308 |
| 8 | 0.783149 | 0.686813 |
| 9 | 0.770718 | 0.791209 |
| average | 0.78232 | 0.711538 |
| AUC | **0.81265** | **0.734166** |



XGBOOST

The best parameters found by grid search are:

{'gamma': 9, 'learning\_rate': 0.2, 'max\_depth': 3, 'min\_child\_weight': 7, 'n\_estimators': 1000, 'objective': 'binary:logistic'}

Using Anna preprocess-

|  |  |  |
| --- | --- | --- |
|  | train accuracy | test accuracy |
| 0 | 0.776243 | 0.736264 |
| 1 | 0.777624 | 0.769231 |
| 2 | 0.752762 | 0.752747 |
| 3 | 0.766575 | 0.763736 |
| 4 | 0.763812 | 0.714286 |
| average | 0.767403 | 0.747253 |
| AUC | **0.776937** | **0.740784** |

AUC

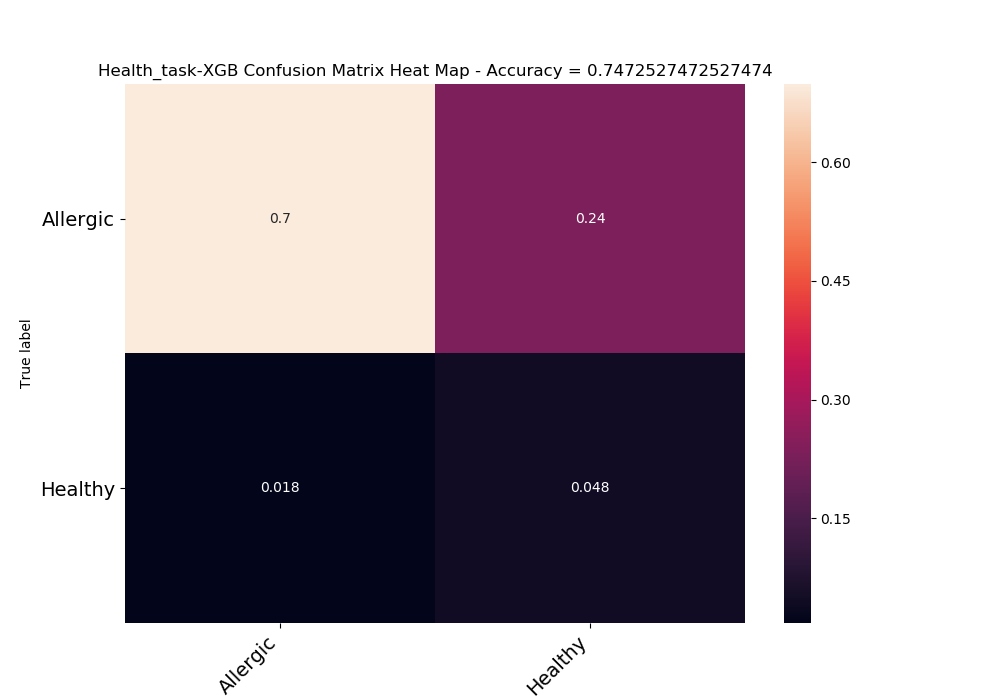
**train\_auc: 0.7769376854599407**

**test\_auc: 0.7407843137254903**

**train\_rho: 0.3154646247699522**

**test\_rho: 0.2651609849632187**

Confusion matrix



previous AUC

**train\_auc: 0.7213560830860534**

**test\_auc: 0.6094117647058824**

**train\_rho: 0.23536761866139078**

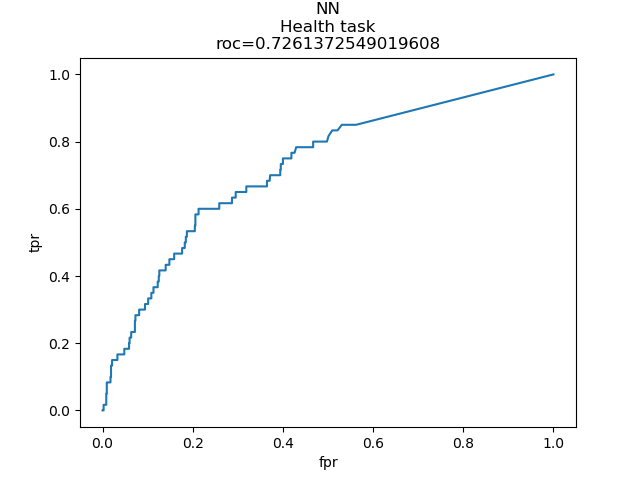
**test\_rho: 0.11418995419642765**

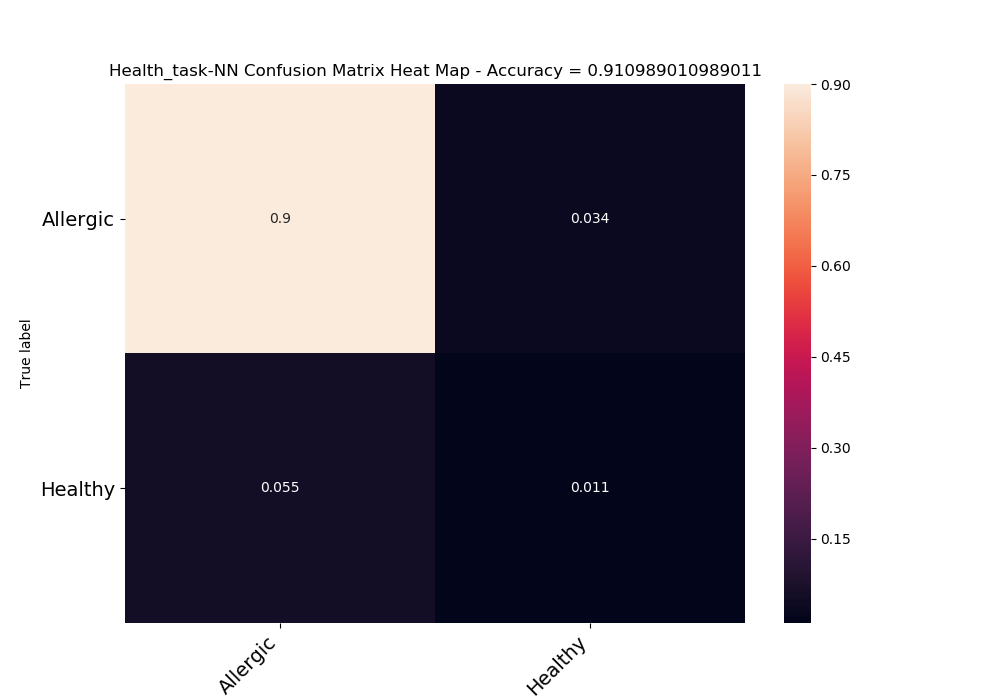
|  |  |  |
| --- | --- | --- |
|  | train accuracy | test accuracy |
| average | 0.686326 | 0.660989 |
| AUC | **0.7213560** | **0.6094117** |

|  |  |  |
| --- | --- | --- |
|  | Allergic | Healthy |
| Allergic | 0.624725 | 0.309341 |
| Healthy | 0.02967 | 0.036264 |
| acc | 0.660989 |  |

NN

Using Anna preprocess-



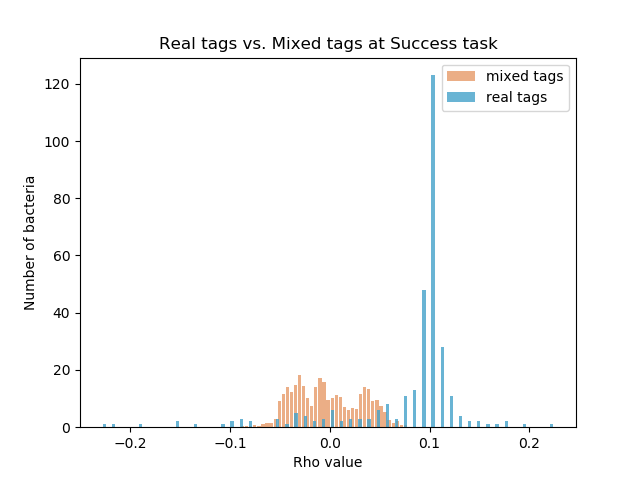


## Response to treatment in real time (i.e. the difference between after response and before response). All allergies.

Is patient in day X of treatment is seem to react to the treatment?

We wanted to check whether there was a difference in microbiome between the patients who responded to the treatment and were labeled A1 and the patients who did not respond to the treatment who were labeled otherwise.

We calculated the Rho values for the bacteria given their real tags and given random tags by mixing those tags but maintaining their distribution.



We were pleased to see that the dispersion was wider for the real tags, indicating a link between microbiome and the tags, this is in contrast to the narrower dispersion for mixed labels.

Significant bacteria –

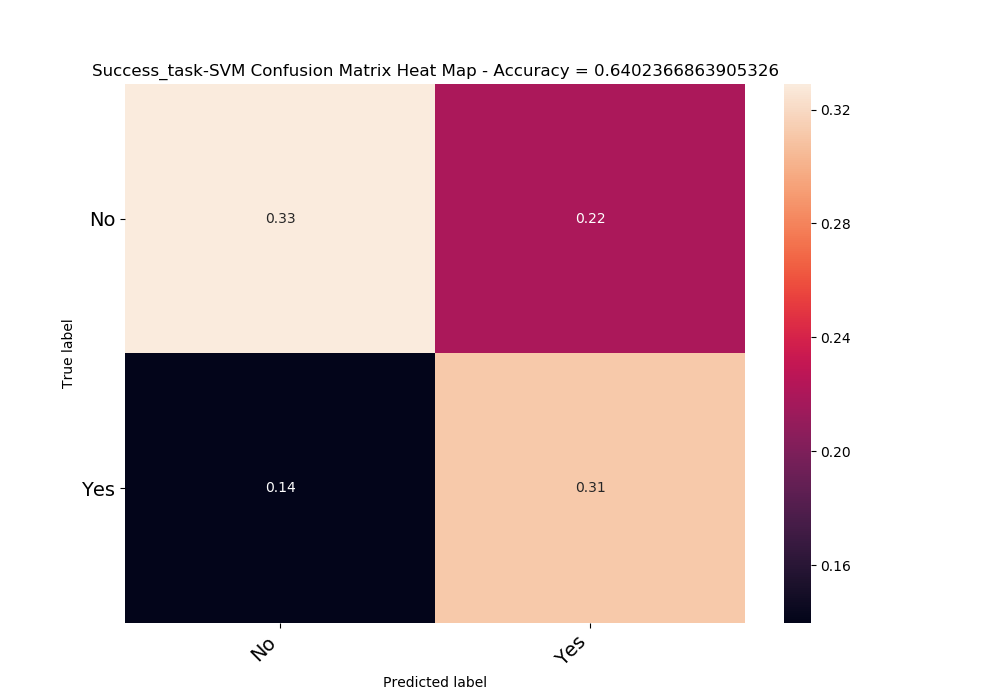
|  |  |
| --- | --- |
| -0.22612 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_ |
| -0.21206 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Bacteroidaceae; g\_\_Bacteroides |
| -0.18207 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Barnesiellaceae]; g\_\_ |
| -0.14591 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Odoribacteraceae]; g\_\_Odoribacter |
| -0.14564 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae; g\_\_Parabacteroides |
| -0.13353 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Christensenellaceae; g\_\_ |
| -0.10544 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Dialister |
| -0.09071 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Odoribacteraceae]; g\_\_Butyricimonas |
| -0.08958 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae; g\_\_Oxalobacter |
| -0.08674 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Lachnobacterium |
| -0.08424 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Alcaligenaceae; g\_\_Sutterella |
| -0.08005 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Desulfovibrionales; f\_\_Desulfovibrionaceae; g\_\_Bilophila |
| -0.07485 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Veillonella |
| -0.07322 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pasteurellales; f\_\_Pasteurellaceae; g\_\_Haemophilus |
| 0.069634 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pasteurellales; f\_\_Pasteurellaceae; g\_\_Actinobacillus |
| 0.072231 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Dehalobacteriaceae; g\_\_ |
| 0.07228 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pasteurellales; f\_\_Pasteurellaceae; g\_\_Aggregatibacter |
| 0.076995 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Mitsuokella |
| 0.077308 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Shuttleworthia |
| 0.077602 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Clostridium |
| 0.077779 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae |
| 0.079082 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Desulfovibrionales; f\_\_Desulfovibrionaceae; g\_\_ |
| 0.079945 | k\_\_Bacteria; p\_\_Bacteroidetes |
| 0.081444 | k\_\_Archaea; p\_\_Euryarchaeota; c\_\_Methanobacteria; o\_\_Methanobacteriales; f\_\_Methanobacteriaceae; g\_\_Methanosphaera |
| 0.082757 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Catenibacterium |
| 0.083551 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Campylobacteraceae; g\_\_Campylobacter |
| 0.083679 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Prevotellaceae; g\_\_ |
| 0.084129 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_EtOH8; g\_\_ |
| 0.085903 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Mogibacteriaceae]; g\_\_Mogibacterium |
| 0.085903 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_RFN20 |
| 0.08605 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Aeromonadales; f\_\_Succinivibrionaceae; g\_\_Succinivibrio |
| 0.086521 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Corynebacteriaceae; g\_\_Corynebacterium |
| 0.08704 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae |
| 0.089735 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Eubacteriaceae; g\_\_Anaerofustis |
| 0.09003 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Lactobacillaceae; g\_\_Lactobacillus |
| 0.090196 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Aerococcaceae; g\_\_Abiotrophia |
| 0.090882 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Selenomonas |
| 0.091372 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Actinomycetaceae; g\_\_Varibaculum |
| 0.09393 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_Shinella |
| 0.094058 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_WAL\_1855D |
| 0.094214 | k\_\_Bacteria; p\_\_Verrucomicrobia; c\_\_Opitutae; o\_\_HA64; f\_\_; g\_\_ |
| 0.094744 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Actinomycetaceae; g\_\_Mobiluncus |
| 0.095841 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae; g\_\_Comamonas |
| 0.09589 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_ |
| 0.096018 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae; g\_\_Dysgonomonas |
| 0.096351 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Clostridiaceae; g\_\_ |
| 0.096439 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_Mollicutes; o\_\_Anaeroplasmatales; f\_\_Anaeroplasmataceae; g\_\_ |
| 0.096812 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Methylobacteriaceae; g\_\_ |
| 0.096861 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_ |
| 0.097253 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae |
| 0.097547 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_ph2 |
| 0.098674 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae |
| 0.098713 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales |
| 0.099203 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Clostridiaceae |
| 0.099487 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptostreptococcaceae |
| 0.099899 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_[Weeksellaceae]; g\_\_Wautersiella |
| 0.099928 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_[Weeksellaceae]; g\_\_ |
| 0.100046 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_ |
| 0.100203 | k\_\_Bacteria; p\_\_Firmicutes |
| 0.100359 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Xanthomonadales; f\_\_Xanthomonadaceae; g\_\_Stenotrophomonas |
| 0.100428 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales |
| 0.100918 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Synergistaceae; g\_\_ |
| 0.101046 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Providencia |
| 0.101222 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Alcaligenaceae; g\_\_Alcaligenes |
| 0.10132 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_Rikenella |
| 0.101643 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Aeromonadales; f\_\_Succinivibrionaceae; g\_\_ |
| 0.101722 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Butyrivibrio |
| 0.101986 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Turicibacterales; f\_\_Turicibacteraceae; g\_\_Turicibacter |
| 0.102016 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptostreptococcaceae; g\_\_[Clostridium] |
| 0.102153 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Oribacterium |
| 0.102212 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Shigella |
| 0.102339 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_1-68 |
| 0.10277 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Alcaligenaceae; g\_\_Achromobacter |
| 0.103094 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rickettsiales; f\_\_Rickettsiaceae; g\_\_Wolbachia |
| 0.103133 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Carnobacteriaceae; g\_\_Trichococcus |
| 0.103133 | k\_\_Bacteria; p\_\_SR1; c\_\_; o\_\_; f\_\_; g\_\_ |
| 0.103162 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli |
| 0.103162 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Amaricoccus |
| 0.103162 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_Sphingopyxis |
| 0.103162 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Helicobacteraceae; g\_\_Flexispira |
| 0.103162 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Sodalis |
| 0.103162 | k\_\_Bacteria; p\_\_Verrucomicrobia; c\_\_Verrucomicrobiae; o\_\_Verrucomicrobiales; f\_\_Verrucomicrobiaceae; g\_\_Prosthecobacter |
| 0.103221 | k\_\_Bacteria; p\_\_Lentisphaerae; c\_\_[Lentisphaeria]; o\_\_Victivallales; f\_\_Victivallaceae; g\_\_ |
| 0.10326 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae; g\_\_Paludibacter |
| 0.10327 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodospirillales; f\_\_Acetobacteraceae; g\_\_Acetobacter |
| 0.103359 | k\_\_Archaea |
| 0.103378 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Rhodocyclales; f\_\_Rhodocyclaceae; g\_\_Dok59 |
| 0.103408 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Mogibacteriaceae]; g\_\_Anaerovorax |
| 0.103427 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptococcaceae; g\_\_rc4-4 |
| 0.103496 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae |
| 0.103515 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_[Weeksellaceae]; g\_\_Chryseobacterium |
| 0.103515 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae; g\_\_ |
| 0.103515 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_Rhizobium |
| 0.103515 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodospirillales; f\_\_Acetobacteraceae; g\_\_ |
| 0.103515 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_; g\_\_ |
| 0.103515 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_Sphingobium |
| 0.103535 | k\_\_Bacteria; p\_\_Chloroflexi; c\_\_Anaerolineae; o\_\_GCA004; f\_\_; g\_\_ |
| 0.103623 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Bacillaceae; g\_\_Bacillus |
| 0.103662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae |
| 0.103966 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Pseudobutyrivibrio |
| 0.104005 | k\_\_Bacteria; p\_\_Spirochaetes; c\_\_Spirochaetes; o\_\_Spirochaetales; f\_\_Spirochaetaceae; g\_\_Treponema |
| 0.104054 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Clostridiaceae; g\_\_02d06 |
| 0.104074 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Cytophagia; o\_\_Cytophagales; f\_\_Cytophagaceae; g\_\_Leadbetterella |
| 0.104074 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Gemellales; f\_\_Gemellaceae; g\_\_ |
| 0.104074 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Aerococcaceae; g\_\_Facklamia |
| 0.104113 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales |
| 0.104201 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Sphingobacteriia; o\_\_Sphingobacteriales; f\_\_Sphingobacteriaceae; g\_\_Sphingobacterium |
| 0.10427 | k\_\_Bacteria; p\_\_Verrucomicrobia; c\_\_Opitutae; o\_\_[Cerasicoccales]; f\_\_[Cerasicoccaceae]; g\_\_ |
| 0.104309 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Gallicola |
| 0.104368 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Actinomycetaceae; g\_\_Actinomyces |
| 0.104437 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae; g\_\_Kingella |
| 0.104456 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Xanthomonadales; f\_\_Xanthomonadaceae; g\_\_Pseudoxanthomonas |
| 0.104486 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Butyricicoccus |
| 0.104495 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Leuconostocaceae; g\_\_Weissella |
| 0.104505 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Sporobacter |
| 0.104642 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Microbacteriaceae; g\_\_Leucobacter |
| 0.104731 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Brucellaceae; g\_\_Ochrobactrum |
| 0.104731 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae; g\_\_Delftia |
| 0.10476 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Gemmiger |
| 0.10476 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_Agrobacterium |
| 0.104809 | k\_\_Bacteria; p\_\_[Thermi]; c\_\_Deinococci; o\_\_Thermales; f\_\_Thermaceae; g\_\_Thermus |
| 0.104838 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_Flavobacteriaceae; g\_\_Capnocytophaga |
| 0.104838 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Synergistaceae; g\_\_Synergistes |
| 0.105034 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_Eggerthella |
| 0.105054 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Leptotrichiaceae; g\_\_ |
| 0.105074 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Staphylococcaceae; g\_\_Jeotgalicoccus |
| 0.105113 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae; g\_\_Eikenella |
| 0.105132 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Leptotrichiaceae; g\_\_Leptotrichia |
| 0.105162 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Bacillaceae |
| 0.105191 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Enterobacter |
| 0.105221 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_S24-7; g\_\_ |
| 0.10527 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Hyphomicrobiaceae; g\_\_ |
| 0.105397 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales |
| 0.105485 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Burkholderiaceae; g\_\_Lautropia |
| 0.105515 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae; g\_\_ |
| 0.105573 | k\_\_Bacteria; p\_\_Proteobacteria |
| 0.105642 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae |
| 0.105789 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Moraxellaceae; g\_\_Enhydrobacter |
| 0.105907 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Catonella |
| 0.106044 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pasteurellales; f\_\_Pasteurellaceae |
| 0.106289 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Anaerococcus |
| 0.106309 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_Mollicutes; o\_\_Mycoplasmatales; f\_\_Mycoplasmataceae; g\_\_Mycoplasma |
| 0.106387 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Pseudomonadaceae |
| 0.106416 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Christensenellaceae |
| 0.106495 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Ethanoligenens |
| 0.106603 | k\_\_Bacteria; p\_\_Actinobacteria |
| 0.10672 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Dermabacteraceae; g\_\_Dermabacter |
| 0.10672 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Micrococcaceae |
| 0.10672 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_CF231 |
| 0.10672 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Bacillaceae; g\_\_Geobacillus |
| 0.10672 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Acidaminobacteraceae]; g\_\_ |
| 0.10672 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Leptotrichiaceae; g\_\_Sneathia |
| 0.10672 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Bradyrhizobiaceae; g\_\_Balneimonas |
| 0.10672 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Aeromonadales; f\_\_Succinivibrionaceae |
| 0.106818 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_[Saprospirae]; o\_\_[Saprospirales]; f\_\_Chitinophagaceae; g\_\_ |
| 0.107004 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_ |
| 0.107083 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae |
| 0.107093 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_YRC22 |
| 0.107269 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Plesiomonas |
| 0.107347 | k\_\_Bacteria; p\_\_Cyanobacteria; c\_\_ML635J-21; o\_\_; f\_\_; g\_\_ |
| 0.107357 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Bdellovibrionales; f\_\_Bdellovibrionaceae; g\_\_Bdellovibrio |
| 0.107367 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Proteus |
| 0.107475 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Clostridiaceae; g\_\_SMB53 |
| 0.107641 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Intrasporangiaceae |
| 0.107651 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Burkholderiaceae; g\_\_Burkholderia |
| 0.107661 | k\_\_Bacteria; p\_\_Acidobacteria; c\_\_Acidobacteria-6; o\_\_iii1-15; f\_\_mb2424; g\_\_ |
| 0.107681 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_ |
| 0.10773 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Erwinia |
| 0.107779 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Paenibacillaceae; g\_\_Paenibacillus |
| 0.107779 | k\_\_Bacteria; p\_\_TM7; c\_\_TM7-3; o\_\_CW040; f\_\_F16; g\_\_ |
| 0.107877 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Lactobacillaceae |
| 0.108053 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_Flavobacteriaceae; g\_\_Flavobacterium |
| 0.108053 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_Novosphingobium |
| 0.108063 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_BD7-3; f\_\_; g\_\_ |
| 0.108416 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Prevotellaceae |
| 0.108416 | k\_\_Bacteria; p\_\_[Thermi]; c\_\_Deinococci; o\_\_Deinococcales; f\_\_Deinococcaceae; g\_\_R18-435 |
| 0.109014 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodospirillales; f\_\_Acetobacteraceae; g\_\_Gluconobacter |
| 0.10919 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Serratia |
| 0.109357 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Hyphomicrobiaceae; g\_\_Devosia |
| 0.109366 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Fusobacteriaceae; g\_\_Cetobacterium |
| 0.109406 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Pseudonocardiaceae |
| 0.109464 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae; g\_\_Janthinobacterium |
| 0.109474 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Nocardiaceae; g\_\_Rhodococcus |
| 0.1097 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_ |
| 0.1097 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae; g\_\_Cupriavidus |
| 0.109749 | k\_\_Bacteria; p\_\_Cyanobacteria; c\_\_Oscillatoriophycideae; o\_\_Oscillatoriales; f\_\_Phormidiaceae; g\_\_Phormidium |
| 0.110111 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Burkholderiaceae |
| 0.11018 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_; g\_\_ |
| 0.110248 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae |
| 0.110248 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Paracoccus |
| 0.110248 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Alcaligenaceae; g\_\_ |
| 0.110513 | k\_\_Bacteria; p\_\_Chloroflexi; c\_\_Thermomicrobia; o\_\_AKYG1722; f\_\_; g\_\_ |
| 0.110513 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Clostridium |
| 0.110582 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Brucellaceae |
| 0.11066 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae |
| 0.110807 | k\_\_Bacteria; p\_\_Chloroflexi; c\_\_Anaerolineae; o\_\_SBR1031; f\_\_A4b; g\_\_ |
| 0.110807 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Phyllobacteriaceae; g\_\_ |
| 0.110807 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae; g\_\_Methylibium |
| 0.110807 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Myxococcales; f\_\_; g\_\_ |
| 0.110895 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales |
| 0.110895 | k\_\_Bacteria; p\_\_WPS-2; c\_\_; o\_\_; f\_\_; g\_\_ |
| 0.111013 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Clostridium |
| 0.111209 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Thermoleophilia; o\_\_Solirubrobacterales; f\_\_Conexibacteraceae; g\_\_ |
| 0.111219 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae; g\_\_Mycoplana |
| 0.111268 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Sphingobacteriia; o\_\_Sphingobacteriales; f\_\_Sphingobacteriaceae; g\_\_Pedobacter |
| 0.111268 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae |
| 0.111356 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Microbacteriaceae |
| 0.111356 | k\_\_Bacteria; p\_\_Lentisphaerae; c\_\_[Lentisphaeria]; o\_\_Victivallales; f\_\_Victivallaceae; g\_\_Victivallis |
| 0.111503 | k\_\_Bacteria; p\_\_TM7; c\_\_TM7-3; o\_\_; f\_\_; g\_\_ |
| 0.111758 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Staphylococcaceae; g\_\_Staphylococcus |
| 0.112052 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae |
| 0.112316 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Helicobacteraceae |
| 0.11263 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptococcaceae; g\_\_Peptococcus |
| 0.112659 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_[Saprospirae]; o\_\_[Saprospirales]; f\_\_Chitinophagaceae; g\_\_Sediminibacterium |
| 0.113022 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Helicobacteraceae; g\_\_Helicobacter |
| 0.113257 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Citrobacter |
| 0.113287 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Schwartzia |
| 0.113345 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Gemellales; f\_\_Gemellaceae; g\_\_Gemella |
| 0.113434 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_AF12 |
| 0.113443 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Trabulsiella |
| 0.113483 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Coprobacillus |
| 0.113884 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Epulopiscium |
| 0.11412 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae |
| 0.114159 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae |
| 0.114286 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Moraxellaceae; g\_\_Acinetobacter |
| 0.114453 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Rhodocyclales; f\_\_Rhodocyclaceae; g\_\_Thauera |
| 0.114727 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Peptoniphilus |
| 0.114767 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Yersinia |
| 0.115247 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae; g\_\_Alloscardovia |
| 0.115443 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae; g\_\_Brevundimonas |
| 0.115443 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Rhodobacter |
| 0.115943 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Cardiobacteriales; f\_\_Cardiobacteriaceae; g\_\_Cardiobacterium |
| 0.115992 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Allobaculum |
| 0.116256 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Aerococcaceae; g\_\_Alloiococcus |
| 0.117913 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_; g\_\_ |
| 0.118471 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Finegoldia |
| 0.11855 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Moryella |
| 0.119794 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae; g\_\_Bifidobacterium |
| 0.119922 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Leuconostocaceae; g\_\_ |
| 0.12097 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Parvimonas |
| 0.122156 | k\_\_Bacteria; p\_\_Deferribacteres; c\_\_Deferribacteres; o\_\_Deferribacterales; f\_\_Deferribacteraceae; g\_\_Mucispirillum |
| 0.123264 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_Mollicutes; o\_\_Anaeroplasmatales; f\_\_Anaeroplasmataceae; g\_\_Anaeroplasma |
| 0.123538 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_Collinsella |
| 0.124156 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Streptococcaceae; g\_\_Streptococcus |
| 0.124979 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_Atopobium |
| 0.126341 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Dethiosulfovibrionaceae; g\_\_TG5 |
| 0.126508 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Pseudomonadaceae; g\_\_Pseudomonas |
| 0.127115 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_[Prevotella] |
| 0.127919 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Leuconostocaceae; g\_\_Leuconostoc |
| 0.130585 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptostreptococcaceae; g\_\_Peptostreptococcus |
| 0.130673 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae; g\_\_Scardovia |
| 0.133466 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Bulleidia |
| 0.134887 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Dethiosulfovibrionaceae; g\_\_Pyramidobacter |
| 0.137818 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Succiniclasticum |
| 0.139229 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Mogibacteriaceae]; g\_\_ |
| 0.140778 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Enterococcaceae; g\_\_Enterococcus |
| 0.148618 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Bradyrhizobiaceae; g\_\_Bradyrhizobium |
| 0.149941 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_[Eubacterium] |
| 0.158321 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_ |
| 0.160164 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Blautia |
| 0.173542 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_[Ruminococcus] |
| 0.179951 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptostreptococcaceae; g\_\_ |
| 0.18493 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_ |
| 0.196377 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Coprococcus |
| 0.23163 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Dorea |

Significant bacteria –

Too many to plot.

We then performed machine learning using SVM and XGBOOST methods.

~~SVM~~



XGBOOST

The best parameters found by grid search are:

{'gamma': 6, 'learning\_rate': 0.2, 'max\_depth': 3, 'min\_child\_weight': 5, 'n\_estimators': 1000, 'objective': 'binary:logistic'}  
AUC = 0.656803999870332

AUC

train\_auc: 0.6478909648434714

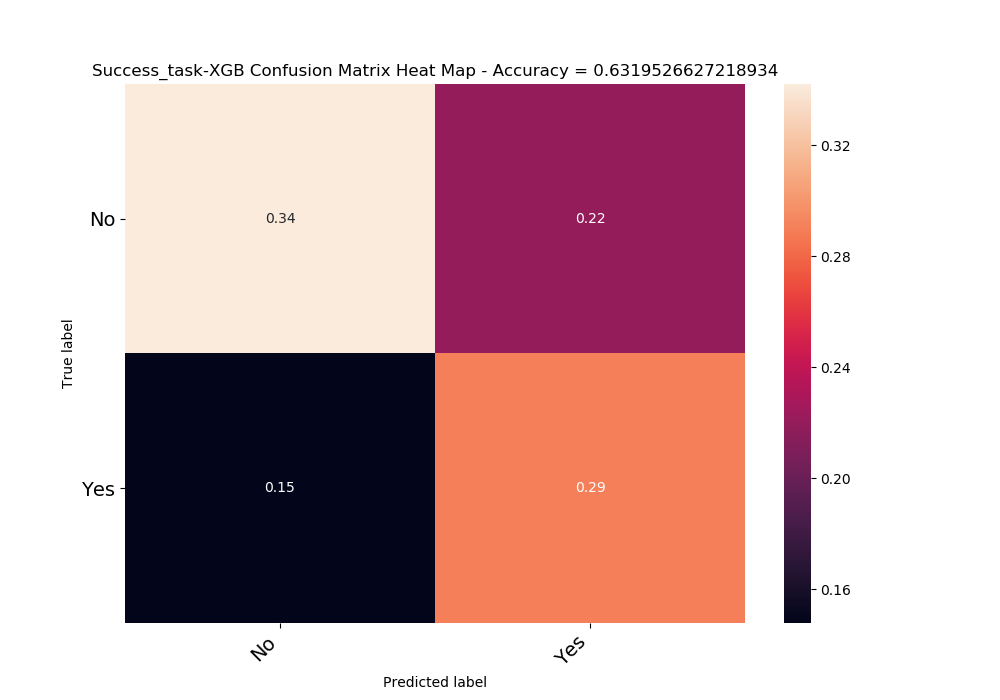
test\_auc: 0.6352916073968706

train\_rho: 0.2938086012184547

test\_rho: 0.26854045073216676

|  |  |  |
| --- | --- | --- |
|  | train accuracy | test accuracy |
| 0 | 0.648889 | 0.639053 |
| 1 | 0.663704 | 0.573964 |
| 2 | 0.625185 | 0.692308 |
| 3 | 0.663704 | 0.573964 |
| 4 | 0.64 | 0.680473 |
| average | 0.648296 | 0.631953 |
| AUC | 0.6478909 | 0.6352916 |

Confusion matrix



Previous - AUC

**train\_auc: 0.6634364080439279**

**test\_auc: 0.6171194879089615**

**train\_rho: 0.3297514382495453**

**test\_rho: 0.2371579927759326**

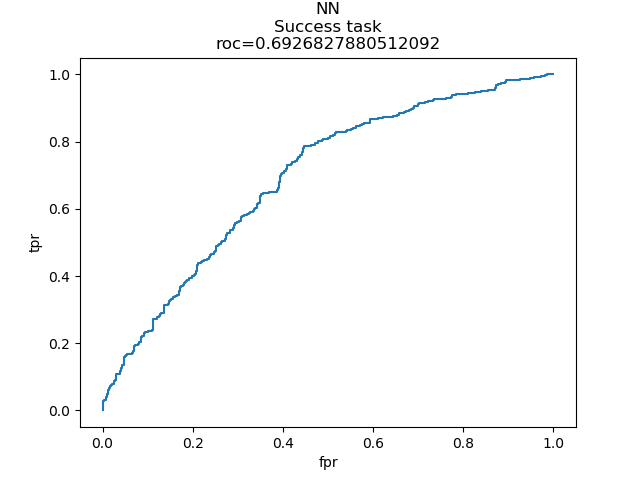
|  |  |  |
| --- | --- | --- |
|  | train accuracy | test accuracy |
| average | 0.649926 | 0.602959 |
| AUC | **0.6634364** | **0.6171194** |

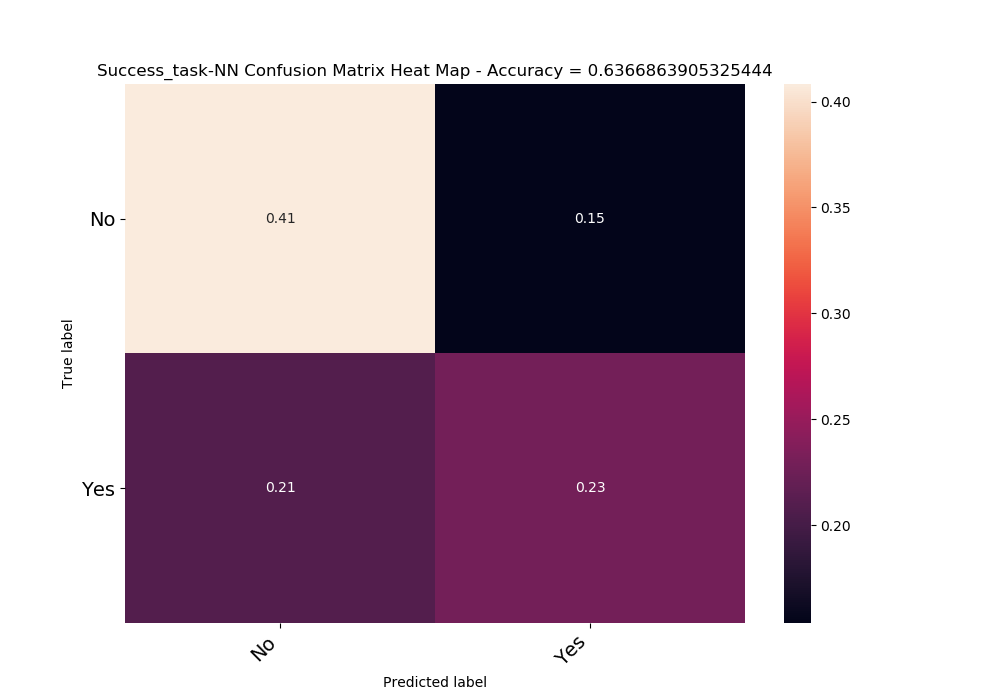
Confusion matrix

|  |  |  |
| --- | --- | --- |
|  | No | Yes |
| No | 0.28284 | 0.27929 |
| Yes | 0.117751 | 0.320118 |
| acc | 0.602959 |  |

NN

Using Anna preprocess-



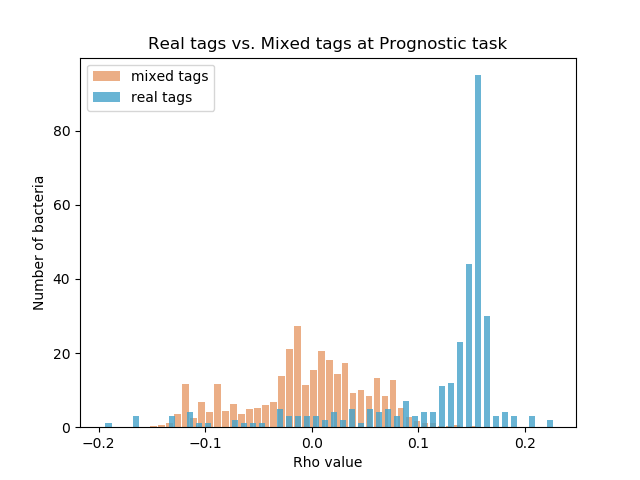


Prognostic distinction in allergic patients at day 0

Is patient in day 0 of treatment is seem to react to the treatment?

We wanted to check whether there was a difference in microbiome between the patients who responded to the treatment and were labeled A1 and the patients who did not respond to the treatment who were labeled otherwise.

We calculated the Rho values for the bacteria given their real tags and given random tags by mixing those tags but maintaining their distribution.



We were pleased to see that the dispersion was wider for the real tags, indicating a link between microbiome and the tags, this is in contrast to the narrower dispersion for mixed labels.

Significant bacteria –

|  |  |
| --- | --- |
| -0.19057 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_ |
| -0.1649 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Bacteroidaceae; g\_\_Bacteroides |
| -0.16261 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Barnesiellaceae]; g\_\_ |
| -0.15949 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae; g\_\_Parabacteroides |
| -0.12833 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Christensenellaceae; g\_\_ |
| -0.12558 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Desulfovibrionales; f\_\_Desulfovibrionaceae; g\_\_Bilophila |
| -0.12384 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae; g\_\_Oxalobacter |
| 0.113663 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Anaerococcus |
| 0.113755 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Desulfovibrionales; f\_\_Desulfovibrionaceae; g\_\_ |
| 0.116505 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_EtOH8; g\_\_ |
| 0.119163 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Mogibacteriaceae]; g\_\_ |
| 0.121821 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_S24-7; g\_\_ |
| 0.122096 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Coprobacillus |
| 0.123746 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Aeromonadales; f\_\_Succinivibrionaceae; g\_\_Succinivibrio |
| 0.123929 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Synergistaceae; g\_\_Cloacibacillus |
| 0.124846 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Megamonas |
| 0.125854 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Streptococcaceae; g\_\_Lactococcus |
| 0.126129 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Streptococcaceae; g\_\_Streptococcus |
| 0.126129 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Dehalobacteriaceae; g\_\_ |
| 0.127963 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_; g\_\_ |
| 0.128329 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_ph2 |
| 0.129521 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Mogibacteriaceae]; g\_\_Mogibacterium |
| 0.130346 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Dethiosulfovibrionaceae; g\_\_Pyramidobacter |
| 0.130529 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Prevotellaceae; g\_\_ |
| 0.131629 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_[Prevotella] |
| 0.132546 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_1-68 |
| 0.133371 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae; g\_\_Bifidobacterium |
| 0.133737 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Aerococcaceae; g\_\_Abiotrophia |
| 0.134104 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Staphylococcaceae; g\_\_Staphylococcus |
| 0.136304 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae |
| 0.136854 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Bacillaceae; g\_\_Bacillus |
| 0.137679 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae; g\_\_Comamonas |
| 0.138046 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Moraxellaceae; g\_\_Acinetobacter |
| 0.138137 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_Collinsella |
| 0.138412 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Actinomycetaceae; g\_\_Mobiluncus |
| 0.138962 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales |
| 0.140612 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Synergistaceae; g\_\_ |
| 0.140979 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Mitsuokella |
| 0.141254 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_[Weeksellaceae]; g\_\_ |
| 0.142079 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Actinomycetaceae; g\_\_Varibaculum |
| 0.142079 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Parvimonas |
| 0.142262 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_RF3; o\_\_ML615J-28; f\_\_; g\_\_ |
| 0.145104 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Bulleidia |
| 0.146845 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Campylobacteraceae; g\_\_Campylobacter |
| 0.14767 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Intrasporangiaceae |
| 0.14767 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae; g\_\_Dysgonomonas |
| 0.14767 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Cytophagia; o\_\_Cytophagales; f\_\_Cytophagaceae; g\_\_Leadbetterella |
| 0.14767 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Sphingobacteriia; o\_\_Sphingobacteriales; f\_\_Sphingobacteriaceae; g\_\_Sphingobacterium |
| 0.14767 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Aerococcaceae; g\_\_Facklamia |
| 0.14767 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Carnobacteriaceae; g\_\_Trichococcus |
| 0.14767 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_Shinella |
| 0.14767 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Paracoccus |
| 0.14767 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Pseudomonadaceae |
| 0.14767 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Xanthomonadales; f\_\_Xanthomonadaceae; g\_\_Stenotrophomonas |
| 0.14767 | k\_\_Bacteria; p\_\_SR1; c\_\_; o\_\_; f\_\_; g\_\_ |
| 0.147762 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae; g\_\_Paludibacter |
| 0.147762 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales |
| 0.147762 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Methylobacteriaceae; g\_\_ |
| 0.147762 | k\_\_Bacteria; p\_\_Spirochaetes; c\_\_Spirochaetes; o\_\_Spirochaetales; f\_\_Spirochaetaceae; g\_\_Treponema |
| 0.147945 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Aerococcaceae; g\_\_Alloiococcus |
| 0.147945 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Leptotrichiaceae; g\_\_Leptotrichia |
| 0.147945 | k\_\_Bacteria; p\_\_Verrucomicrobia; c\_\_Opitutae; o\_\_[Cerasicoccales]; f\_\_[Cerasicoccaceae]; g\_\_ |
| 0.148037 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Clostridium |
| 0.148129 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptococcaceae; g\_\_rc4-4 |
| 0.14822 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae |
| 0.148587 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae |
| 0.149412 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Pseudobutyrivibrio |
| 0.149412 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptostreptococcaceae; g\_\_[Clostridium] |
| 0.149504 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Bacillaceae |
| 0.149687 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae |
| 0.14987 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_Rikenella |
| 0.150054 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Gemellales; f\_\_Gemellaceae; g\_\_ |
| 0.150512 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae; g\_\_Kingella |
| 0.150604 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Leuconostocaceae; g\_\_Weissella |
| 0.150604 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Butyricicoccus |
| 0.150604 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Yersinia |
| 0.150695 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Pseudomonadaceae; g\_\_Pseudomonas |
| 0.150879 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae; g\_\_Scardovia |
| 0.151245 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Burkholderiaceae; g\_\_Lautropia |
| 0.151429 | k\_\_Bacteria; p\_\_Actinobacteria |
| 0.151429 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Brucellaceae; g\_\_Ochrobactrum |
| 0.151429 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Alcaligenaceae; g\_\_Achromobacter |
| 0.151429 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae; g\_\_Delftia |
| 0.15152 | k\_\_Bacteria; p\_\_Bacteroidetes |
| 0.15152 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Synergistaceae; g\_\_Synergistes |
| 0.151612 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Selenomonas |
| 0.151704 | k\_\_Bacteria; p\_\_[Thermi]; c\_\_Deinococci; o\_\_Thermales; f\_\_Thermaceae; g\_\_Thermus |
| 0.151795 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Hyphomicrobiaceae; g\_\_Devosia |
| 0.15207 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_Mollicutes; o\_\_Anaeroplasmatales; f\_\_Anaeroplasmataceae; g\_\_ |
| 0.152254 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Staphylococcaceae; g\_\_Jeotgalicoccus |
| 0.152345 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_ |
| 0.152437 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Enterobacter |
| 0.152895 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae |
| 0.153262 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Butyrivibrio |
| 0.153262 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Schwartzia |
| 0.153353 | k\_\_Archaea; p\_\_Euryarchaeota; c\_\_Methanobacteria; o\_\_Methanobacteriales; f\_\_Methanobacteriaceae; g\_\_Methanosphaera |
| 0.153537 | k\_\_Bacteria; p\_\_Lentisphaerae; c\_\_[Lentisphaeria]; o\_\_Victivallales; f\_\_Victivallaceae; g\_\_ |
| 0.153812 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Catonella |
| 0.153812 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Moryella |
| 0.154362 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Leptotrichiaceae; g\_\_ |
| 0.154453 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Clostridiaceae |
| 0.15482 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_[Saprospirae]; o\_\_[Saprospirales]; f\_\_Chitinophagaceae; g\_\_Sediminibacterium |
| 0.156103 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Proteus |
| 0.156837 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Ethanoligenens |
| 0.157295 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptococcaceae; g\_\_Peptococcus |
| 0.157478 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Shigella |
| 0.157662 | k\_\_Archaea |
| 0.157662 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Dermabacteraceae; g\_\_Dermabacter |
| 0.157662 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Microbacteriaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Microbacteriaceae; g\_\_Leucobacter |
| 0.157662 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Micrococcaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Pseudonocardiaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_CF231 |
| 0.157662 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_Flavobacteriaceae; g\_\_Flavobacterium |
| 0.157662 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_[Weeksellaceae]; g\_\_Chryseobacterium |
| 0.157662 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_[Weeksellaceae]; g\_\_Wautersiella |
| 0.157662 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Sphingobacteriia; o\_\_Sphingobacteriales; f\_\_Sphingobacteriaceae; g\_\_Pedobacter |
| 0.157662 | k\_\_Bacteria; p\_\_Chloroflexi; c\_\_Anaerolineae; o\_\_GCA004; f\_\_; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Chloroflexi; c\_\_Thermomicrobia; o\_\_AKYG1722; f\_\_; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Cyanobacteria; c\_\_Oscillatoriophycideae; o\_\_Oscillatoriales; f\_\_Phormidiaceae; g\_\_Phormidium |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Bacillaceae; g\_\_Geobacillus |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Paenibacillaceae; g\_\_Paenibacillus |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Lactobacillaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Christensenellaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Clostridiaceae; g\_\_02d06 |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Oribacterium |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Gemmiger |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Sporobacter |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Acidaminobacteraceae]; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Mogibacteriaceae]; g\_\_Anaerovorax |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Clostridium |
| 0.157662 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Leptotrichiaceae; g\_\_Sneathia |
| 0.157662 | k\_\_Bacteria; p\_\_Lentisphaerae; c\_\_[Lentisphaeria]; o\_\_Victivallales; f\_\_Victivallaceae; g\_\_Victivallis |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_BD7-3; f\_\_; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae; g\_\_Mycoplana |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Bradyrhizobiaceae; g\_\_Balneimonas |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Brucellaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Hyphomicrobiaceae; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_Agrobacterium |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_Rhizobium |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Amaricoccus |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodospirillales; f\_\_Acetobacteraceae; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodospirillales; f\_\_Acetobacteraceae; g\_\_Gluconobacter |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rickettsiales; f\_\_Rickettsiaceae; g\_\_Wolbachia |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_Novosphingobium |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_Sphingobium |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_Sphingopyxis |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Alcaligenaceae; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Alcaligenaceae; g\_\_Alcaligenes |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Burkholderiaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae; g\_\_Cupriavidus |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae; g\_\_Janthinobacterium |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae; g\_\_Eikenella |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Rhodocyclales; f\_\_Rhodocyclaceae; g\_\_Dok59 |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Rhodocyclales; f\_\_Rhodocyclaceae; g\_\_Thauera |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Helicobacteraceae; g\_\_Flexispira |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Aeromonadales; f\_\_Succinivibrionaceae |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Aeromonadales; f\_\_Succinivibrionaceae; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Erwinia |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Plesiomonas |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Providencia |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Sodalis |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Trabulsiella |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Moraxellaceae; g\_\_Enhydrobacter |
| 0.157662 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Xanthomonadales; f\_\_Xanthomonadaceae; g\_\_Pseudoxanthomonas |
| 0.157662 | k\_\_Bacteria; p\_\_TM7; c\_\_TM7-3; o\_\_CW040; f\_\_F16; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_Mollicutes; o\_\_Mycoplasmatales; f\_\_Mycoplasmataceae; g\_\_Mycoplasma |
| 0.157662 | k\_\_Bacteria; p\_\_Verrucomicrobia; c\_\_Opitutae; o\_\_HA64; f\_\_; g\_\_ |
| 0.157662 | k\_\_Bacteria; p\_\_Verrucomicrobia; c\_\_Verrucomicrobiae; o\_\_Verrucomicrobiales; f\_\_Verrucomicrobiaceae; g\_\_Prosthecobacter |
| 0.157753 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Peptoniphilus |
| 0.158762 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Fusobacteriaceae; g\_\_Fusobacterium |
| 0.159037 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales |
| 0.159128 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptostreptococcaceae |
| 0.159128 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Burkholderiaceae; g\_\_Burkholderia |
| 0.159128 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Serratia |
| 0.159678 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pasteurellales; f\_\_Pasteurellaceae |
| 0.159862 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Gemellales; f\_\_Gemellaceae; g\_\_Gemella |
| 0.160687 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_RFN20 |
| 0.160778 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Epulopiscium |
| 0.160962 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_YRC22 |
| 0.161145 | k\_\_Bacteria; p\_\_Acidobacteria; c\_\_Acidobacteria-6; o\_\_iii1-15; f\_\_mb2424; g\_\_ |
| 0.161512 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae |
| 0.162245 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Succiniclasticum |
| 0.162612 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Cardiobacteriales; f\_\_Cardiobacteriaceae; g\_\_Cardiobacterium |
| 0.163161 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Finegoldia |
| 0.163711 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Prevotellaceae |
| 0.163711 | k\_\_Bacteria; p\_\_[Thermi]; c\_\_Deinococci; o\_\_Deinococcales; f\_\_Deinococcaceae; g\_\_R18-435 |
| 0.164995 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae |
| 0.16637 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodospirillales; f\_\_Acetobacteraceae; g\_\_Acetobacter |
| 0.16747 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_AF12 |
| 0.167745 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Nocardiaceae; g\_\_Rhodococcus |
| 0.16857 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_[Saprospirae]; o\_\_[Saprospirales]; f\_\_Chitinophagaceae; g\_\_ |
| 0.169578 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Fusobacteriaceae; g\_\_Cetobacterium |
| 0.16967 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Dethiosulfovibrionaceae; g\_\_TG5 |
| 0.170128 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae; g\_\_Alloscardovia |
| 0.170311 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae; g\_\_ |
| 0.17077 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Bdellovibrionales; f\_\_Bdellovibrionaceae; g\_\_Bdellovibrio |
| 0.171228 | k\_\_Bacteria; p\_\_Chloroflexi; c\_\_Anaerolineae; o\_\_SBR1031; f\_\_A4b; g\_\_ |
| 0.171228 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Phyllobacteriaceae; g\_\_ |
| 0.171228 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae; g\_\_Methylibium |
| 0.171228 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Myxococcales; f\_\_; g\_\_ |
| 0.171503 | k\_\_Bacteria; p\_\_Cyanobacteria; c\_\_ML635J-21; o\_\_; f\_\_; g\_\_ |
| 0.171503 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae; g\_\_Brevundimonas |
| 0.171503 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales |
| 0.171503 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_; g\_\_ |
| 0.171503 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Rhodobacter |
| 0.171503 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_ |
| 0.171503 | k\_\_Bacteria; p\_\_WPS-2; c\_\_; o\_\_; f\_\_; g\_\_ |
| 0.172053 | k\_\_Bacteria; p\_\_TM7; c\_\_TM7-3; o\_\_; f\_\_; g\_\_ |
| 0.172236 | k\_\_Bacteria; p\_\_Deferribacteres; c\_\_Deferribacteres; o\_\_Deferribacterales; f\_\_Deferribacteraceae; g\_\_Mucispirillum |
| 0.172695 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Thermoleophilia; o\_\_Solirubrobacterales; f\_\_Conexibacteraceae; g\_\_ |
| 0.172695 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_Flavobacteriaceae; g\_\_Capnocytophaga |
| 0.173061 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Gallicola |
| 0.173061 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Allobaculum |
| 0.173061 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Helicobacteraceae |
| 0.173061 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Helicobacteraceae; g\_\_Helicobacter |
| 0.173153 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_[Eubacterium] |
| 0.174894 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Citrobacter |
| 0.176544 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Leuconostocaceae; g\_\_ |
| 0.179111 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_Mollicutes; o\_\_Anaeroplasmatales; f\_\_Anaeroplasmataceae; g\_\_Anaeroplasma |
| 0.182869 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales |
| 0.185711 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Leuconostocaceae; g\_\_Leuconostoc |
| 0.186169 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Blautia |
| 0.186719 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptostreptococcaceae; g\_\_Peptostreptococcus |
| 0.190752 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_ |
| 0.191944 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Enterococcaceae; g\_\_Enterococcus |
| 0.19781 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_[Ruminococcus] |
| 0.210277 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_ |
| 0.215227 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_Atopobium |
| 0.215593 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Coprococcus |
| 0.227051 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Dorea |
| 0.232551 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Bradyrhizobiaceae; g\_\_Bradyrhizobium |

Significant bacteria –

~~SVM~~

XGBOOST

Using anna preprocess didn’t improve the results.

The best parameters found by grid search are:

{'gamma': 3, 'learning\_rate': 0.2, 'max\_depth': 3, 'min\_child\_weight': 7, 'n\_estimators': 1000, 'objective': 'binary:logistic'}

AUC

**train\_auc: 0.6529426729986432**

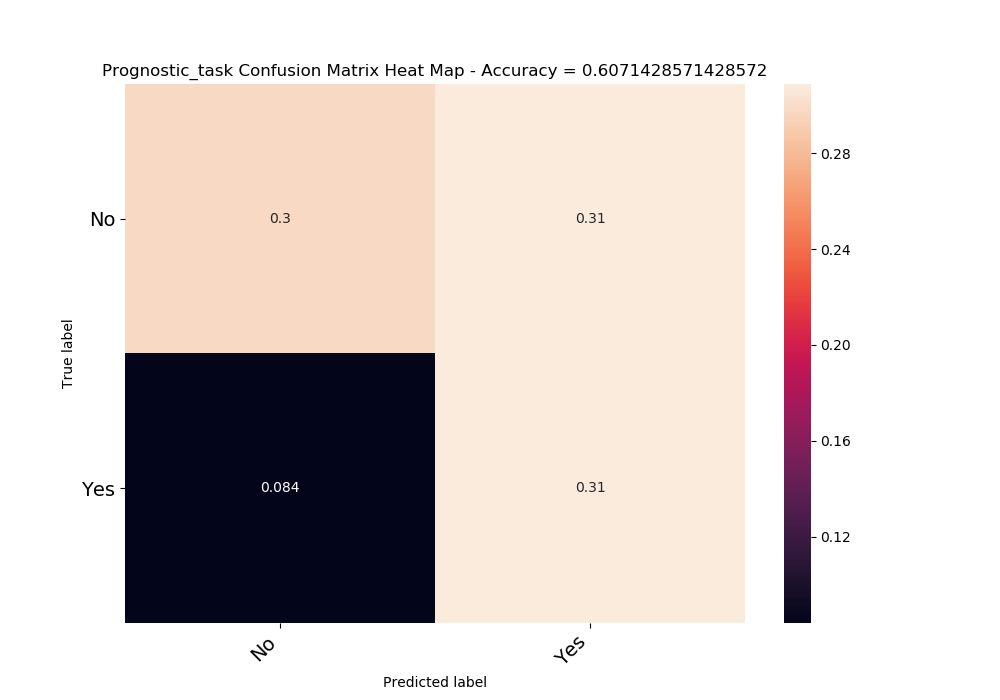
**test\_auc: 0.6387700534759359**

**train\_rho: 0.3107323599277604**

**test\_rho: 0.2789533711169917**

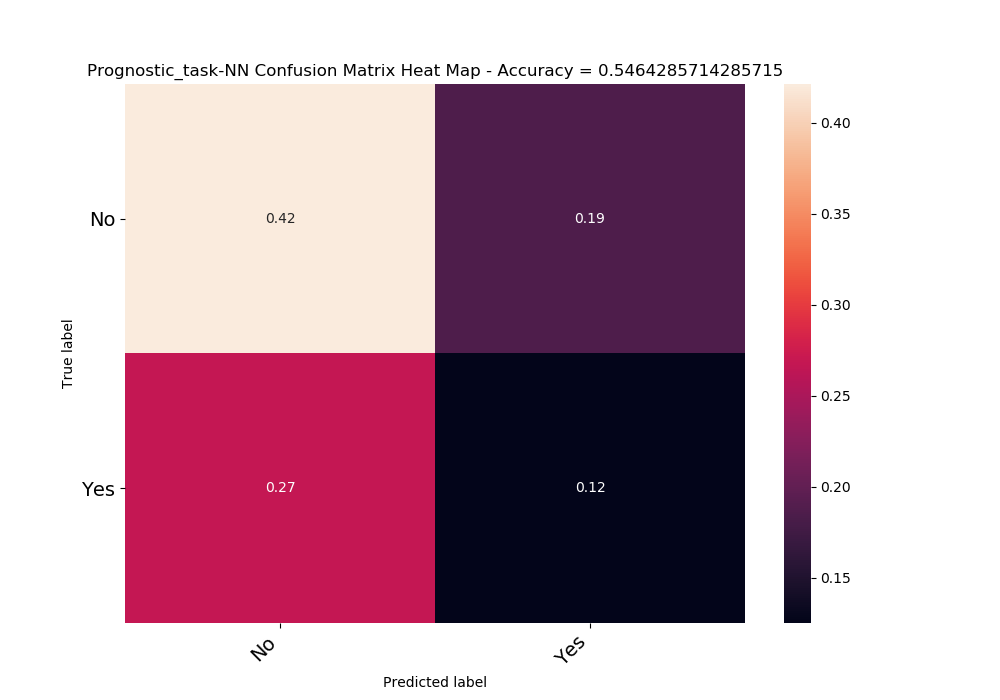
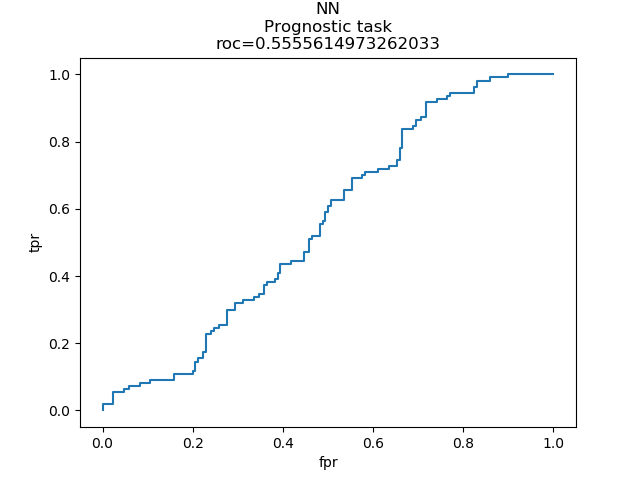
|  |  |  |
| --- | --- | --- |
|  | train accuracy | test accuracy |
| 0 | 0.662162 | 0.589286 |
| 1 | 0.68018 | 0.535714 |
| 2 | 0.612613 | 0.678571 |
| 3 | 0.608108 | 0.535714 |
| 4 | 0.585586 | 0.625 |
| 5 | 0.59009 | 0.607143 |
| 6 | 0.603604 | 0.553571 |
| 7 | 0.684685 | 0.642857 |
| 8 | 0.558559 | 0.732143 |
| 9 | 0.599099 | 0.571429 |
| average | 0.618468 | 0.607143 |
| AUC | **0.6529426** | **0.6387700** |

Confusion matrix



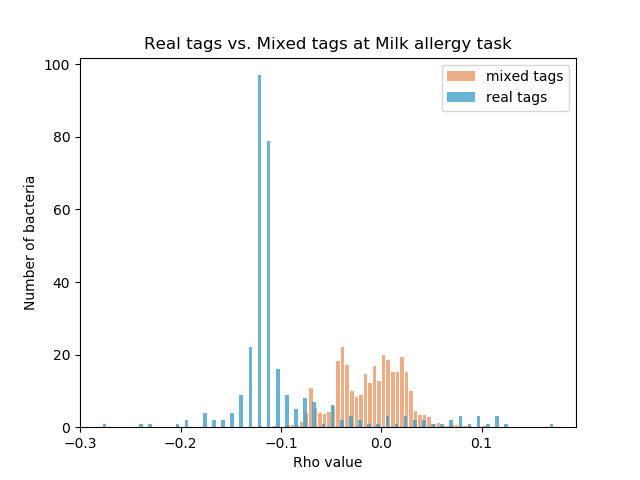
|  |  |  |
| --- | --- | --- |
|  | No | Yes |
| No | 0.298214 | 0.308929 |
| Yes | 0.083929 | 0.308929 |
| acc | 0.607143 |  |

NN

Using Anna preprocess-

## Distinction between milk allergy to other allergies

Is patient allergic to milk or not?



Significant bacteria –

|  |  |
| --- | --- |
| -0.27603 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_ |
| -0.23358 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Streptococcaceae; g\_\_Lactococcus |
| -0.22279 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Coprococcus |
| -0.19757 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_Eggerthella |
| -0.19364 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Streptococcaceae; g\_\_Streptococcus |
| -0.18721 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Blautia |
| -0.17483 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_[Ruminococcus] |
| -0.17365 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_; g\_\_ |
| -0.17227 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Dorea |
| -0.16849 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_[Prevotella] |
| -0.16512 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Bradyrhizobiaceae; g\_\_Bradyrhizobium |
| -0.16298 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Enterococcaceae; g\_\_Enterococcus |
| -0.15755 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Coprobacillus |
| -0.15675 | k\_\_Bacteria; p\_\_Cyanobacteria; c\_\_4C0d-2; o\_\_YS2; f\_\_; g\_\_ |
| -0.14504 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Dethiosulfovibrionaceae; g\_\_Pyramidobacter |
| -0.1445 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Parvimonas |
| -0.14355 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Megamonas |
| -0.14153 | k\_\_Bacteria; p\_\_Bacteroidetes |
| -0.13899 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Leuconostocaceae; g\_\_Leuconostoc |
| -0.13565 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_WAL\_1855D |
| -0.13529 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_[Eubacterium] |
| -0.13475 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_RF32; f\_\_; g\_\_ |
| -0.13256 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Pseudomonadaceae; g\_\_Pseudomonas |
| -0.13224 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Succiniclasticum |
| -0.1309 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Actinomycetaceae; g\_\_Varibaculum |
| -0.13081 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_ph2 |
| -0.13062 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pasteurellales; f\_\_Pasteurellaceae; g\_\_Aggregatibacter |
| -0.12865 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Leuconostocaceae; g\_\_ |
| -0.12865 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_1-68 |
| -0.12757 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodospirillales; f\_\_Acetobacteraceae; g\_\_Acetobacter |
| -0.12745 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_Atopobium |
| -0.12676 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Phascolarctobacterium |
| -0.12664 | k\_\_Bacteria; p\_\_TM7; c\_\_TM7-3; o\_\_; f\_\_; g\_\_ |
| -0.12652 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_Mollicutes; o\_\_Anaeroplasmatales; f\_\_Anaeroplasmataceae; g\_\_Anaeroplasma |
| -0.12645 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Anaerotruncus |
| -0.12632 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Leptotrichiaceae; g\_\_Leptotrichia |
| -0.12617 | k\_\_Bacteria; p\_\_Deferribacteres; c\_\_Deferribacteres; o\_\_Deferribacterales; f\_\_Deferribacteraceae; g\_\_Mucispirillum |
| -0.12608 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_ |
| -0.12542 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptococcaceae; g\_\_Peptococcus |
| -0.12419 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Yersinia |
| -0.12377 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Dehalobacteriaceae; g\_\_ |
| -0.1234 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Cardiobacteriales; f\_\_Cardiobacteriaceae; g\_\_Cardiobacterium |
| -0.12302 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Eubacteriaceae; g\_\_Anaerofustis |
| -0.12226 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Turicibacterales; f\_\_Turicibacteraceae; g\_\_Turicibacter |
| -0.12224 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Moryella |
| -0.12195 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae; g\_\_Comamonas |
| -0.12173 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Dethiosulfovibrionaceae; g\_\_TG5 |
| -0.12166 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Epulopiscium |
| -0.12138 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_RFN20 |
| -0.12134 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptostreptococcaceae |
| -0.12066 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_EtOH8; g\_\_ |
| -0.11999 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_Alistipes |
| -0.11995 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Helicobacteraceae |
| -0.11994 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Gallicola |
| -0.11965 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Xanthomonadales; f\_\_Xanthomonadaceae; g\_\_Pseudoxanthomonas |
| -0.11959 | k\_\_Bacteria; p\_\_Verrucomicrobia; c\_\_Opitutae; o\_\_HA64; f\_\_; g\_\_ |
| -0.11943 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Methylobacteriaceae; g\_\_ |
| -0.11941 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Helicobacteraceae; g\_\_Helicobacter |
| -0.11888 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_[Saprospirae]; o\_\_[Saprospirales]; f\_\_Chitinophagaceae; g\_\_ |
| -0.11854 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Fusobacteriaceae; g\_\_Fusobacterium |
| -0.11822 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Burkholderiaceae; g\_\_Lautropia |
| -0.11807 | k\_\_Bacteria; p\_\_Lentisphaerae; c\_\_[Lentisphaeria]; o\_\_Victivallales; f\_\_Victivallaceae; g\_\_ |
| -0.11782 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_; g\_\_ |
| -0.11774 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Actinomycetaceae; g\_\_Mobiluncus |
| -0.11765 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Finegoldia |
| -0.1175 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Aeromonadales; f\_\_Succinivibrionaceae; g\_\_ |
| -0.11711 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Allobaculum |
| -0.11711 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Erwinia |
| -0.11708 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Paenibacillaceae; g\_\_Paenibacillus |
| -0.11708 | k\_\_Bacteria; p\_\_TM7; c\_\_TM7-3; o\_\_CW040; f\_\_F16; g\_\_ |
| -0.11705 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Clostridiaceae; g\_\_02d06 |
| -0.11674 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_YRC22 |
| -0.11666 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Schwartzia |
| -0.11664 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_[Weeksellaceae]; g\_\_ |
| -0.11652 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Bdellovibrionales; f\_\_Bdellovibrionaceae; g\_\_Bdellovibrio |
| -0.11607 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Hyphomicrobiaceae; g\_\_ |
| -0.11599 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Selenomonas |
| -0.11552 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae |
| -0.11545 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Campylobacteraceae; g\_\_Campylobacter |
| -0.11543 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Providencia |
| -0.11534 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Alcaligenaceae; g\_\_Alcaligenes |
| -0.11523 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Gemellales; f\_\_Gemellaceae; g\_\_Gemella |
| -0.11518 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Moraxellaceae; g\_\_Enhydrobacter |
| -0.11479 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Shigella |
| -0.11458 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae; g\_\_Alloscardovia |
| -0.11453 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Oribacterium |
| -0.1145 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae; g\_\_Porphyromonas |
| -0.11442 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptostreptococcaceae; g\_\_[Clostridium] |
| -0.1143 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_Collinsella |
| -0.11423 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Microbacteriaceae |
| -0.11423 | k\_\_Bacteria; p\_\_Lentisphaerae; c\_\_[Lentisphaeria]; o\_\_Victivallales; f\_\_Victivallaceae; g\_\_Victivallis |
| -0.11423 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rickettsiales; f\_\_Rickettsiaceae; g\_\_Wolbachia |
| -0.11422 | k\_\_Bacteria; p\_\_Cyanobacteria; c\_\_ML635J-21; o\_\_; f\_\_; g\_\_ |
| -0.11422 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli |
| -0.11422 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Amaricoccus |
| -0.11422 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_Sphingopyxis |
| -0.11422 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Epsilonproteobacteria; o\_\_Campylobacterales; f\_\_Helicobacteraceae; g\_\_Flexispira |
| -0.11422 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Sodalis |
| -0.11422 | k\_\_Bacteria; p\_\_Verrucomicrobia; c\_\_Verrucomicrobiae; o\_\_Verrucomicrobiales; f\_\_Verrucomicrobiaceae; g\_\_Prosthecobacter |
| -0.11419 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Thermoleophilia; o\_\_Solirubrobacterales; f\_\_Conexibacteraceae; g\_\_ |
| -0.11419 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae; g\_\_Mycoplana |
| -0.11411 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_[Saprospirae]; o\_\_[Saprospirales]; f\_\_Chitinophagaceae; g\_\_Sediminibacterium |
| -0.11411 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pasteurellales; f\_\_Pasteurellaceae |
| -0.11409 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Rhodocyclales; f\_\_Rhodocyclaceae; g\_\_Dok59 |
| -0.11405 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Mogibacteriaceae]; g\_\_Anaerovorax |
| -0.114 | k\_\_Bacteria; p\_\_Chloroflexi; c\_\_Anaerolineae; o\_\_SBR1031; f\_\_A4b; g\_\_ |
| -0.114 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Phyllobacteriaceae; g\_\_ |
| -0.114 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae; g\_\_Methylibium |
| -0.114 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Myxococcales; f\_\_; g\_\_ |
| -0.11397 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae |
| -0.11395 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_Flavobacteriaceae; g\_\_Flavobacterium |
| -0.11395 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_[Weeksellaceae]; g\_\_Chryseobacterium |
| -0.11395 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_BD7-3; f\_\_; g\_\_ |
| -0.11395 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae; g\_\_ |
| -0.11395 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_Rhizobium |
| -0.11395 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodospirillales; f\_\_Acetobacteraceae; g\_\_ |
| -0.11395 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_; g\_\_ |
| -0.11395 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_ |
| -0.11395 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_Novosphingobium |
| -0.11395 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae; g\_\_Sphingobium |
| -0.11392 | k\_\_Bacteria; p\_\_Chloroflexi; c\_\_Anaerolineae; o\_\_GCA004; f\_\_; g\_\_ |
| -0.1139 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Brucellaceae |
| -0.11383 | k\_\_Bacteria; p\_\_Chloroflexi; c\_\_Thermomicrobia; o\_\_AKYG1722; f\_\_; g\_\_ |
| -0.11383 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Clostridium |
| -0.11343 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Alcaligenaceae; g\_\_Achromobacter |
| -0.11335 | k\_\_Bacteria; p\_\_Actinobacteria |
| -0.11329 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Trabulsiella |
| -0.11322 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Serratia |
| -0.11309 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae |
| -0.11307 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_Peptoniphilus |
| -0.11296 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Nocardiaceae; g\_\_Rhodococcus |
| -0.11296 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae; g\_\_Janthinobacterium |
| -0.11292 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Pseudonocardiaceae |
| -0.11291 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Clostridiaceae |
| -0.11281 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae; g\_\_ |
| -0.11269 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Leuconostocaceae; g\_\_Weissella |
| -0.11269 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Leptotrichiaceae; g\_\_ |
| -0.11257 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodospirillales; f\_\_Acetobacteraceae; g\_\_Gluconobacter |
| -0.11251 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Fusobacteriaceae; g\_\_Cetobacterium |
| -0.1125 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae |
| -0.11248 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Microbacteriaceae; g\_\_Leucobacter |
| -0.11242 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Brucellaceae; g\_\_Ochrobactrum |
| -0.11242 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Comamonadaceae; g\_\_Delftia |
| -0.11236 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_Agrobacterium |
| -0.1123 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Hyphomicrobiaceae; g\_\_Devosia |
| -0.1123 | k\_\_Bacteria; p\_\_[Thermi]; c\_\_Deinococci; o\_\_Thermales; f\_\_Thermaceae; g\_\_Thermus |
| -0.11223 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_Shinella |
| -0.11218 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Prevotellaceae |
| -0.11218 | k\_\_Bacteria; p\_\_[Thermi]; c\_\_Deinococci; o\_\_Deinococcales; f\_\_Deinococcaceae; g\_\_R18-435 |
| -0.11213 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Staphylococcaceae; g\_\_Jeotgalicoccus |
| -0.11213 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae |
| -0.11208 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae; g\_\_Eikenella |
| -0.11204 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Burkholderiaceae; g\_\_Burkholderia |
| -0.11186 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Butyrivibrio |
| -0.11183 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Proteus |
| -0.11173 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Plesiomonas |
| -0.11172 | k\_\_Bacteria; p\_\_Proteobacteria |
| -0.11167 | k\_\_Bacteria; p\_\_Acidobacteria; c\_\_Acidobacteria-6; o\_\_iii1-15; f\_\_mb2424; g\_\_ |
| -0.11166 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Paracoccus |
| -0.11147 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae |
| -0.11146 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_AF12 |
| -0.11146 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Tissierellaceae]; g\_\_ |
| -0.11135 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Dermabacteraceae; g\_\_Dermabacter |
| -0.11135 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Micrococcaceae |
| -0.11135 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_CF231 |
| -0.11135 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Sphingobacteriia; o\_\_Sphingobacteriales; f\_\_Sphingobacteriaceae; g\_\_Pedobacter |
| -0.11135 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Bacillaceae; g\_\_Geobacillus |
| -0.11135 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Ethanoligenens |
| -0.11135 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Acidaminobacteraceae]; g\_\_ |
| -0.11135 | k\_\_Bacteria; p\_\_Fusobacteria; c\_\_Fusobacteriia; o\_\_Fusobacteriales; f\_\_Leptotrichiaceae; g\_\_Sneathia |
| -0.11135 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae; g\_\_Brevundimonas |
| -0.11135 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales |
| -0.11135 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Bradyrhizobiaceae; g\_\_Balneimonas |
| -0.11135 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Rhodobacter |
| -0.11135 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Sphingomonadales; f\_\_Sphingomonadaceae |
| -0.11135 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Aeromonadales; f\_\_Succinivibrionaceae |
| -0.11135 | k\_\_Bacteria; p\_\_WPS-2; c\_\_; o\_\_; f\_\_; g\_\_ |
| -0.11114 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Bacillaceae |
| -0.11107 | k\_\_Bacteria; p\_\_Verrucomicrobia; c\_\_Opitutae; o\_\_[Cerasicoccales]; f\_\_[Cerasicoccaceae]; g\_\_ |
| -0.11071 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_Mollicutes; o\_\_Mycoplasmatales; f\_\_Mycoplasmataceae; g\_\_Mycoplasma |
| -0.11062 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae; g\_\_Dysgonomonas |
| -0.11061 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Cytophagia; o\_\_Cytophagales; f\_\_Cytophagaceae; g\_\_Leadbetterella |
| -0.1106 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Aerococcaceae; g\_\_Facklamia |
| -0.11059 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Bulleidia |
| -0.11042 | k\_\_Bacteria; p\_\_Firmicutes |
| -0.11029 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Clostridium |
| -0.1102 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae; g\_\_Scardovia |
| -0.11 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_Mollicutes; o\_\_Anaeroplasmatales; f\_\_Anaeroplasmataceae; g\_\_ |
| -0.10985 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales |
| -0.10978 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Moraxellaceae; g\_\_Acinetobacter |
| -0.10959 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Christensenellaceae |
| -0.10933 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Catonella |
| -0.10873 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_[Weeksellaceae]; g\_\_Wautersiella |
| -0.10872 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Enterobacter |
| -0.10795 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Lactobacillaceae |
| -0.10793 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Gemmiger |
| -0.10775 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Intrasporangiaceae |
| -0.10751 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Sporobacter |
| -0.10746 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Butyricicoccus |
| -0.10744 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales |
| -0.10741 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Neisseriales; f\_\_Neisseriaceae; g\_\_Kingella |
| -0.10731 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Gemellales; f\_\_Gemellaceae; g\_\_ |
| -0.10701 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Xanthomonadales; f\_\_Xanthomonadaceae; g\_\_Stenotrophomonas |
| -0.10692 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Rhizobiaceae; g\_\_ |
| -0.10692 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae; g\_\_Cupriavidus |
| -0.10687 | k\_\_Bacteria; p\_\_Cyanobacteria; c\_\_Oscillatoriophycideae; o\_\_Oscillatoriales; f\_\_Phormidiaceae; g\_\_Phormidium |
| -0.10672 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Rhodocyclales; f\_\_Rhodocyclaceae; g\_\_Thauera |
| -0.10665 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Pseudobutyrivibrio |
| -0.10662 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae |
| -0.10651 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Burkholderiaceae |
| -0.10638 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Bifidobacteriales; f\_\_Bifidobacteriaceae |
| -0.10638 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Alcaligenaceae; g\_\_ |
| -0.10638 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Enterobacteriales; f\_\_Enterobacteriaceae; g\_\_Citrobacter |
| -0.1061 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Caulobacterales; f\_\_Caulobacteraceae |
| -0.10562 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptococcaceae; g\_\_rc4-4 |
| -0.1055 | k\_\_Archaea |
| -0.10539 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pseudomonadales; f\_\_Pseudomonadaceae |
| -0.10535 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Flavobacteriia; o\_\_Flavobacteriales; f\_\_Flavobacteriaceae; g\_\_Capnocytophaga |
| -0.10526 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae; g\_\_Paludibacter |
| -0.10521 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae; g\_\_Adlercreutzia |
| -0.10512 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Aerococcaceae; g\_\_Alloiococcus |
| -0.10489 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Carnobacteriaceae; g\_\_Trichococcus |
| -0.10489 | k\_\_Bacteria; p\_\_SR1; c\_\_; o\_\_; f\_\_; g\_\_ |
| -0.10466 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae |
| -0.1034 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Staphylococcaceae; g\_\_Staphylococcus |
| -0.10305 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Coriobacteriia; o\_\_Coriobacteriales; f\_\_Coriobacteriaceae |
| -0.10291 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Peptostreptococcaceae; g\_\_Peptostreptococcus |
| -0.10211 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_Rikenella |
| -0.1015 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Sphingobacteriia; o\_\_Sphingobacteriales; f\_\_Sphingobacteriaceae; g\_\_Sphingobacterium |
| -0.10144 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Synergistaceae; g\_\_ |
| -0.09982 | k\_\_Bacteria; p\_\_Spirochaetes; c\_\_Spirochaetes; o\_\_Spirochaetales; f\_\_Spirochaetaceae; g\_\_Treponema |
| -0.09963 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Synergistaceae; g\_\_Synergistes |
| -0.09867 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Mogibacteriaceae]; g\_\_Mogibacterium |
| -0.09798 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_cc\_115 |
| -0.09715 | k\_\_Bacteria; p\_\_Verrucomicrobia; c\_\_Verrucomicrobiae; o\_\_Verrucomicrobiales; f\_\_Verrucomicrobiaceae; g\_\_Akkermansia |
| -0.09651 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Aerococcaceae; g\_\_Abiotrophia |
| -0.0963 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Bacillales; f\_\_Bacillaceae; g\_\_Bacillus |
| -0.09604 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Erysipelotrichi; o\_\_Erysipelotrichales; f\_\_Erysipelotrichaceae; g\_\_Holdemania |
| -0.09585 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Pasteurellales; f\_\_Pasteurellaceae; g\_\_Actinobacillus |
| -0.0957 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Eubacteriaceae; g\_\_Pseudoramibacter\_Eubacterium |
| -0.09479 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales |
| -0.0939 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Desulfovibrionales; f\_\_Desulfovibrionaceae; g\_\_Desulfovibrio |
| -0.09299 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Clostridium |
| -0.09261 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_S24-7; g\_\_ |
| -0.09152 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales |
| -0.0897 | k\_\_Archaea; p\_\_Euryarchaeota; c\_\_Methanobacteria; o\_\_Methanobacteriales; f\_\_Methanobacteriaceae; g\_\_Methanosphaera |
| -0.08967 | k\_\_Bacteria; p\_\_Actinobacteria; c\_\_Actinobacteria; o\_\_Actinomycetales; f\_\_Corynebacteriaceae; g\_\_Corynebacterium |
| -0.08835 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia |
| -0.08729 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Clostridiaceae; g\_\_SMB53 |
| -0.08655 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_SHA-98; f\_\_; g\_\_ |
| -0.08314 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Gammaproteobacteria; o\_\_Aeromonadales; f\_\_Succinivibrionaceae; g\_\_Succinivibrio |
| -0.08128 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Paraprevotellaceae]; g\_\_ |
| -0.08016 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Bacilli; o\_\_Lactobacillales; f\_\_Carnobacteriaceae; g\_\_Granulicatella |
| -0.07757 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_ |
| -0.07685 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_[Mogibacteriaceae]; g\_\_ |
| 0.062278 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Bacteroidaceae; g\_\_Bacteroides |
| 0.072036 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Deltaproteobacteria; o\_\_Desulfovibrionales; f\_\_Desulfovibrionaceae; g\_\_Bilophila |
| 0.078518 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_; g\_\_ |
| 0.081113 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae |
| 0.084636 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Lachnospiraceae; g\_\_Lachnospira |
| 0.086315 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_Mollicutes; o\_\_RF39; f\_\_; g\_\_ |
| 0.093666 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_Faecalibacterium |
| 0.101487 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Prevotellaceae; g\_\_Prevotella |
| 0.103119 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_[Barnesiellaceae]; g\_\_ |
| 0.104904 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales |
| 0.110764 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Ruminococcaceae; g\_\_ |
| 0.11963 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Rikenellaceae; g\_\_ |
| 0.122272 | k\_\_Bacteria; p\_\_Bacteroidetes; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Porphyromonadaceae; g\_\_Parabacteroides |
| 0.123857 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Christensenellaceae; g\_\_ |
| 0.133392 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae; g\_\_Oxalobacter |
| 0.178884 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae; g\_\_Dialister |

Significant bacteria –

Too many to plot.

~~SVM~~

XGBOOST

Using anna preprocess didn’t improve the results.

The best parameters found by grid search are:

AUC

**train\_auc: 0.9470720720720721**

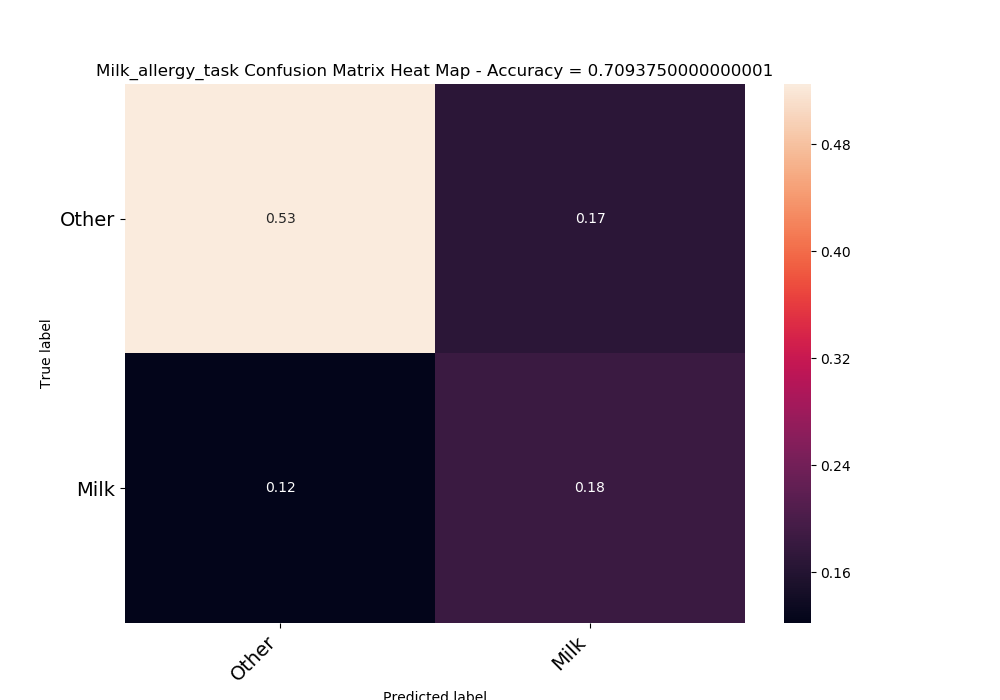
**test\_auc: 0.6793987865416437**

**train\_rho: 0.8614679070342778**

**test\_rho: 0.3460306968916471**

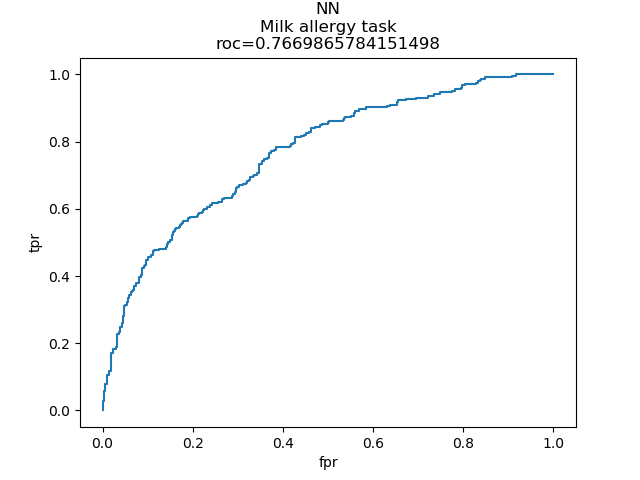
|  |  |  |
| --- | --- | --- |
|  | train accuracy | test accuracy |
| 0 | 0.935938 | 0.68125 |
| 1 | 0.923438 | 0.6875 |
| 2 | 0.923438 | 0.6875 |
| 3 | 0.948438 | 0.7625 |
| 4 | 0.942188 | 0.71875 |
| 5 | 0.934375 | 0.75 |
| 6 | 0.9375 | 0.7 |
| 7 | 0.935938 | 0.7 |
| 8 | 0.945313 | 0.68125 |
| 9 | 0.935938 | 0.725 |
| average | 0.93625 | 0.709375 |
| AUC | **0.947072** | **0.6793987** |

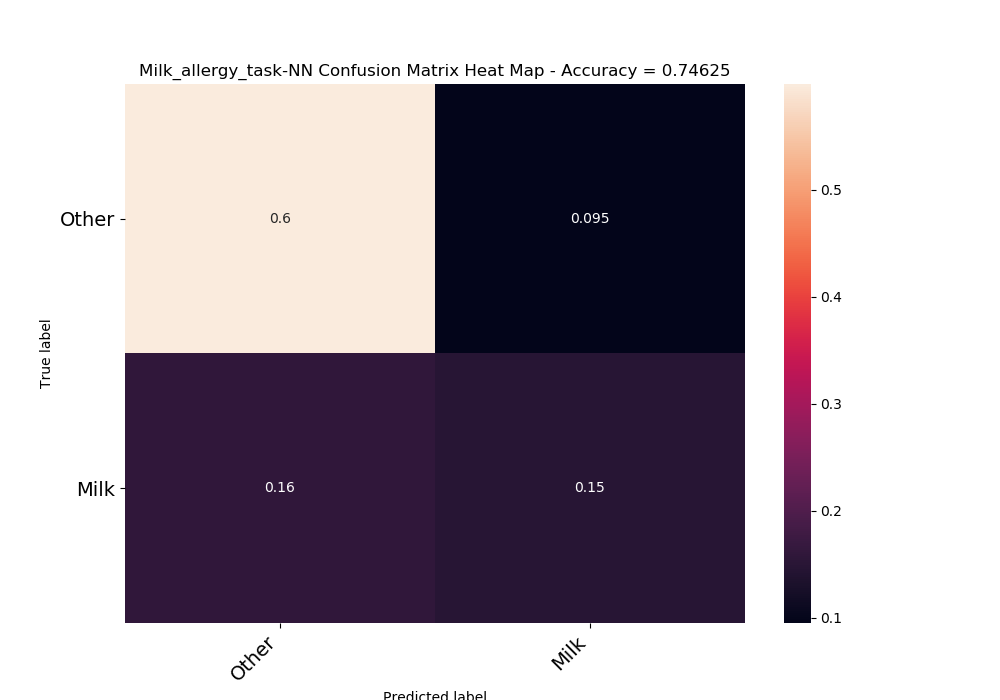
Confusion matrix



|  |  |  |
| --- | --- | --- |
|  | No | Yes |
| No | 0.525 | 0.16875 |
| Yes | 0.121875 | 0.184375 |
| acc | 0.709375 |  |

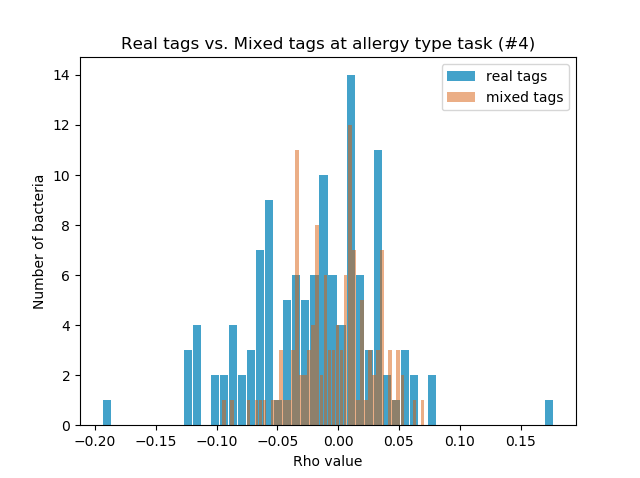
NN

Using Anna preprocess- 

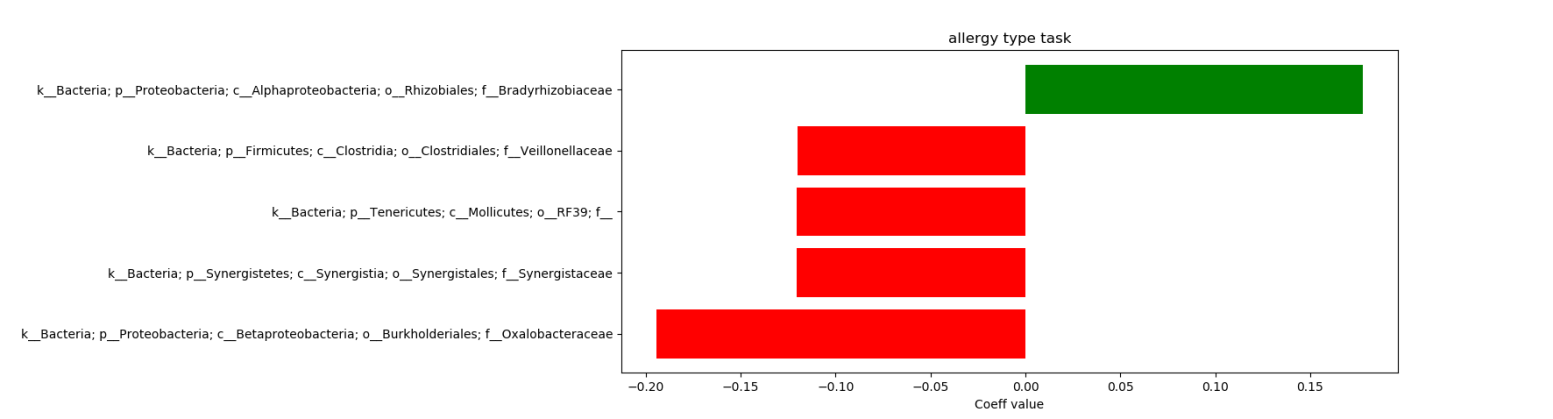


## Distinction between all types of allergies

Is patient allergic to milk or not?

 Significant bacteria -

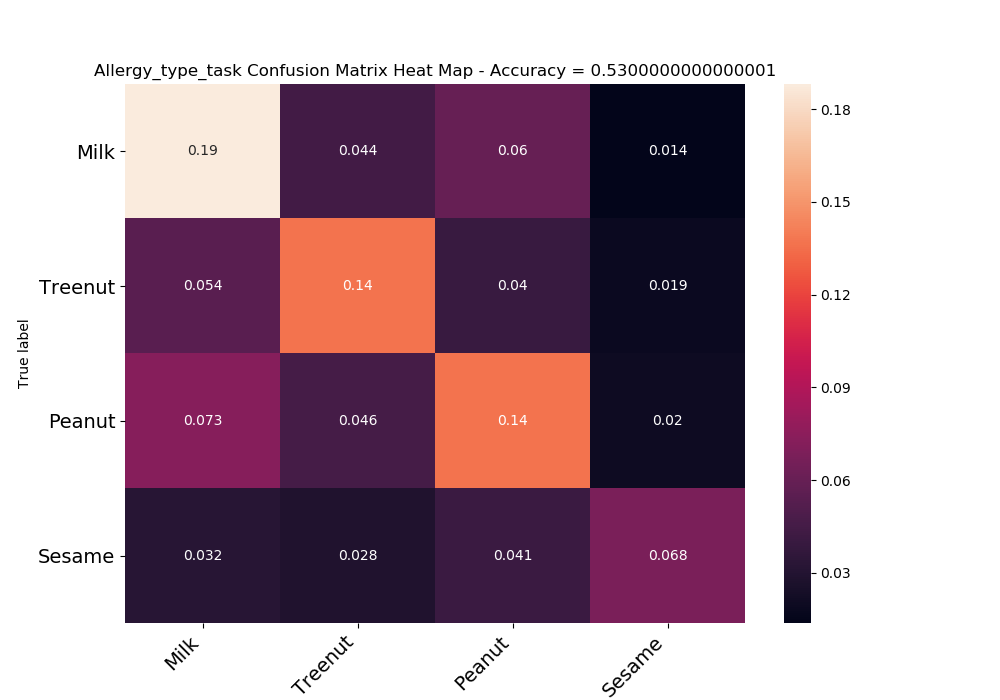
|  |  |
| --- | --- |
| -0.12018 | k\_\_Bacteria; p\_\_Firmicutes; c\_\_Clostridia; o\_\_Clostridiales; f\_\_Veillonellaceae |
| 0.17747 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhizobiales; f\_\_Bradyrhizobiaceae |
| -0.19425 | k\_\_Bacteria; p\_\_Proteobacteria; c\_\_Betaproteobacteria; o\_\_Burkholderiales; f\_\_Oxalobacteraceae |
| -0.12046 | k\_\_Bacteria; p\_\_Synergistetes; c\_\_Synergistia; o\_\_Synergistales; f\_\_Synergistaceae |
| -0.12038 | k\_\_Bacteria; p\_\_Tenericutes; c\_\_Mollicutes; o\_\_RF39; f\_\_ |



Can't calculate AUC for multi-class, there for accuracy score:

|  |  |  |
| --- | --- | --- |
|  | train accuracy | test accuracy |
| 0 | 0.94375 | 0.48125 |
| 1 | 0.926563 | 0.51875 |
| 2 | 0.921875 | 0.5125 |
| 3 | 0.917188 | 0.55625 |
| 4 | 0.928125 | 0.53125 |
| 5 | 0.926563 | 0.575 |
| 6 | 0.926563 | 0.50625 |
| 7 | 0.942188 | 0.5375 |
| 8 | 0.921875 | 0.525 |
| 9 | 0.929688 | 0.55625 |
| average | 0.928438 | 0.53 |

Confusion matrix



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Milk | Treenut | Peanut | Sesame |
| Milk | 0.188125 | 0.044375 | 0.06 | 0.01375 |
| Treenut | 0.054375 | 0.136875 | 0.04 | 0.01875 |
| Peanut | 0.0725 | 0.045625 | 0.136875 | 0.02 |
| Sesame | 0.031875 | 0.028125 | 0.040625 | 0.068125 |
| acc | 0.53 |  |  |  |

Roc-

This is a commonly used graph that summarizes the performance of a classifier across all possible thresholds. It is generated by plotting the True Positive Rate (y-axis) against the False Positive Rate (x-axis) as you vary the threshold for assigning observations to a given class.

confusion matrix

is a performance measurement for machine learning classification problem where output can be two or more classes. It is a table with 4 different combinations of predicted and actual values.

It is extremely useful for measuring Recall, Precision, Specificity, Accuracy and most importantly AUC-ROC Curve.

Let's understand TP, FP, FN, TN in terms of pregnancy analogy.