

Microbiome Premature

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Overview

1 Introduction

2 Materials

3 Methods

4 Results

5 Proceedings

References

Ribosomal RNA

Premature (Preterm Birth)

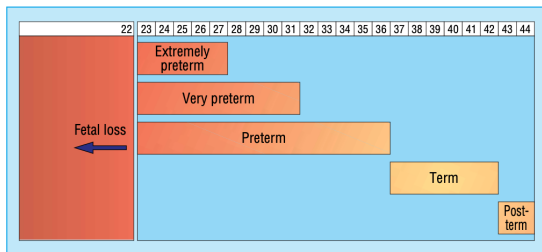


Figure: Definitions of Premature (Tucker & McGuire, 2004)

∴ Hence, in this study,

- Premature: < 37 weeks
- Normal: ≥ 37 weeks

16s rRNA Sequencing

Train Data vs. Validate Data

Train data

- Data collected by Helixco

Validate data

- Data collected by (Dominguez-Bello et al., 2016)

Qiime 2

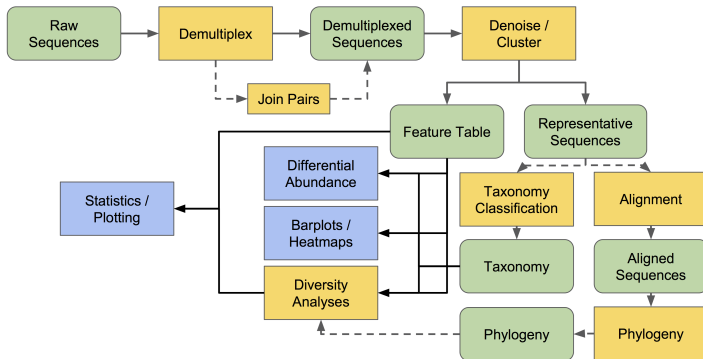


Figure: QIIME 2 workflow (Bolyen et al., 2019; Mandal et al., 2015; McDonald et al., 2012)

Denoising Techniques

- DADA2: Amplicon Sequence Variants (ASVs) (Callahan et al., 2016)
- Deblur: Operational Taxonomic Units (OTUs) (Amir et al., 2017)

Taxonomy Classification

- Greengenes (GG): Kingdom \leftrightarrow Species (DeSantis et al., 2006)
- SILVA: Domain \leftrightarrow Genus (Pruesse et al., 2007; Quast et al., 2012)

“A **higher** performance at taxonomic levels above *genus level*;
but performance appears to **drop** at *species level*” (Gihawi et al., 2019)



Figure: Mothur

Note: Still in progress

t-distributed Stochastic Neighbor Embedding (t-SNE)

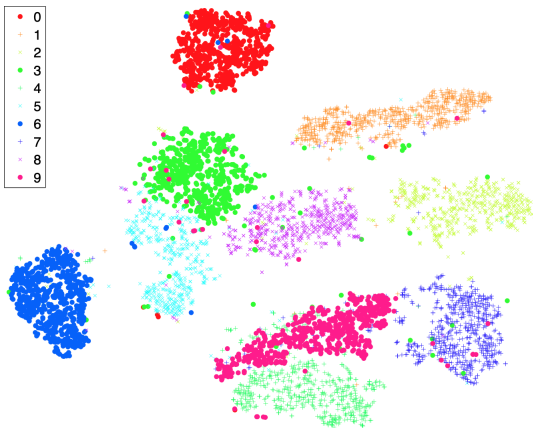
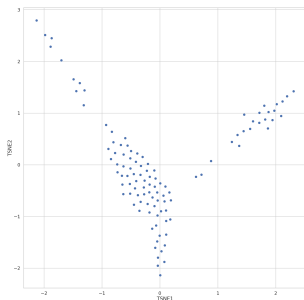


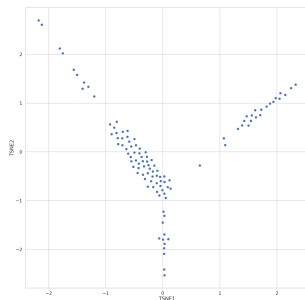
Figure: t-SNE with handwritten data (Maaten & Hinton, 2008)

- Pandas (McKinney et al., 2011)
- Scikit-Learn (Pedregosa et al., 2011)
- Matplotlib (Hunter, 2007)
- Seaborn (Waskom et al., 2020)

t-SNE for Brief Information



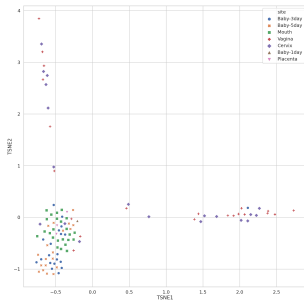
(a) DADA2



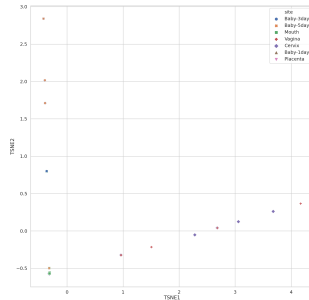
(b) Deblur

Figure: t-SNE for Brief Information

t-SNE with Site I

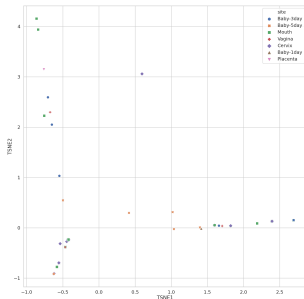


(a) DADA2 + GG

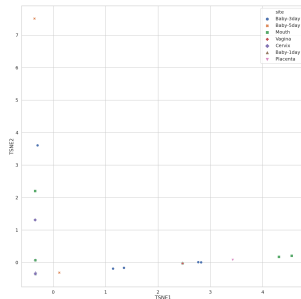


(b) DADA2 + SILVA

t-SNE with Site II



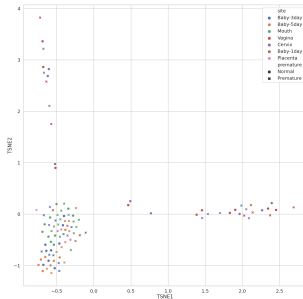
(c) Deblur + GG



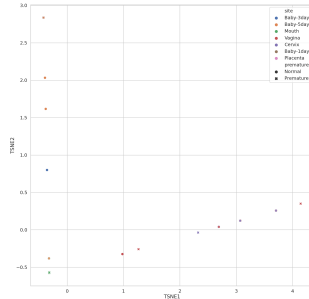
(d) Deblur + SILVA

Figure: t-SNE with Site

t-SNE with Site + Premature I



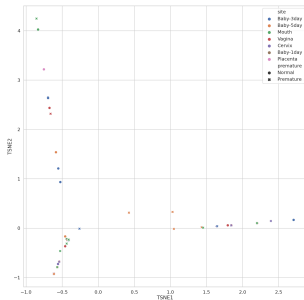
(a) DADA2 + GG



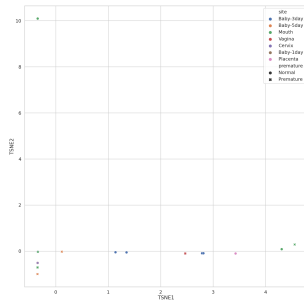
(b) DADA2 + SILVA

Figure: t-SNE with Site

t-SNE with Site + Premature II



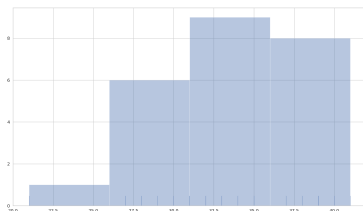
(c) Deblur + GG



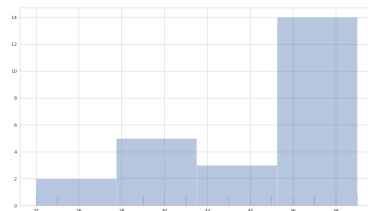
(d) Deblur + SILVA

Figure: t-SNE with Site

Histogram with Clinical Information



(a) Age



(b) Weeks

Figure: Histogram with Clinical Information

- t-SNE plots
 - in Brief
 - by Site
 - by Site + Premature
- Histogram
 - by Age
 - by Weeks
- Have tried (but in vain)
 - ANCOM with premature/normal
 - Classification with raw TSV

Requirements I

- More data
- Mothur pipeline
- Classification

- Classifier result (Statistical values)

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