

Supplemental Material

Figure S1. The screenshot of MiTree after quality controls.



Figure S2. The underlying CV process for cost-complexity pruning in decision tree to search for an optimal tuning parameter (the number of leaves or complexity parameter) value.

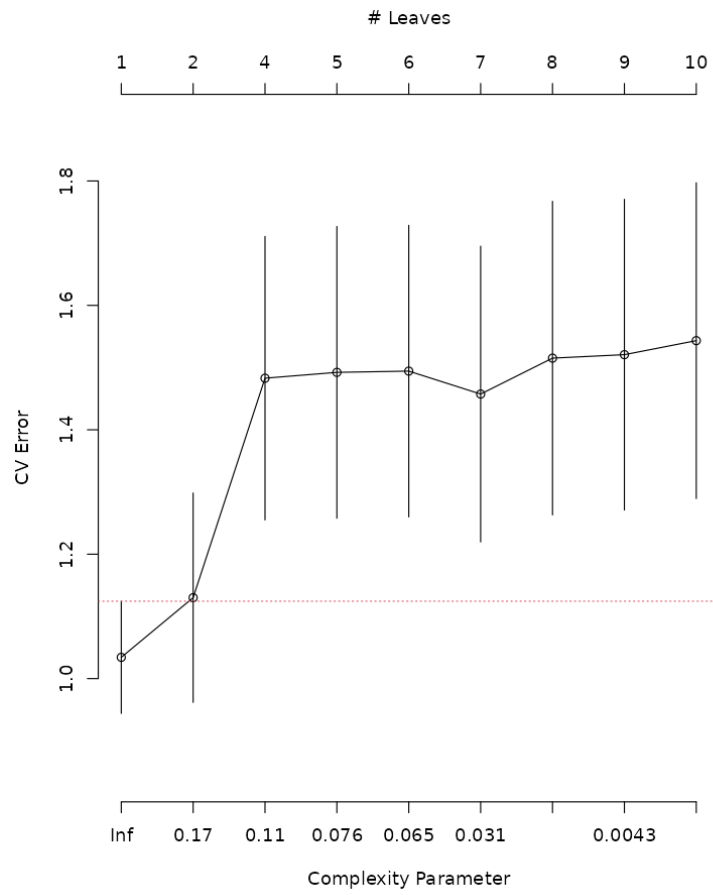


Figure S3. The underlying CV process for random forest to search for an optimal tuning (the number of randomly selected taxa to create a tree) parameter value.

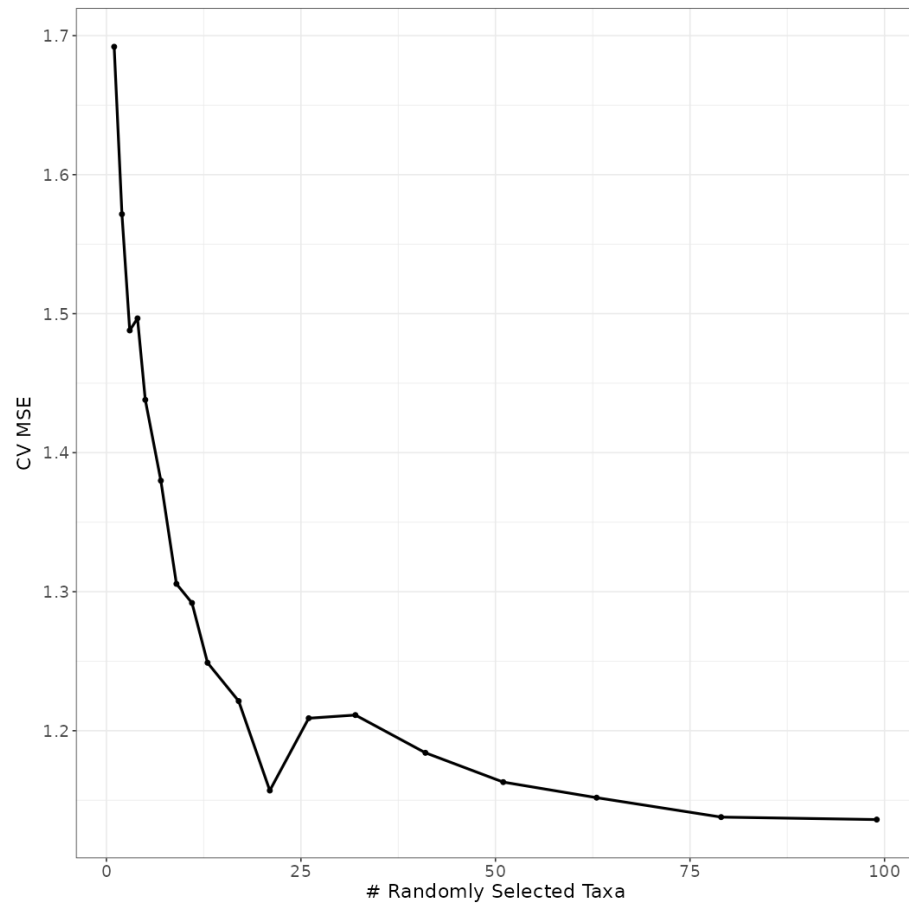


Figure S4. The OOB error plot from random forest to show a sufficient convergence of the OOB error for the number of bagged trees to be aggregated (5,000).

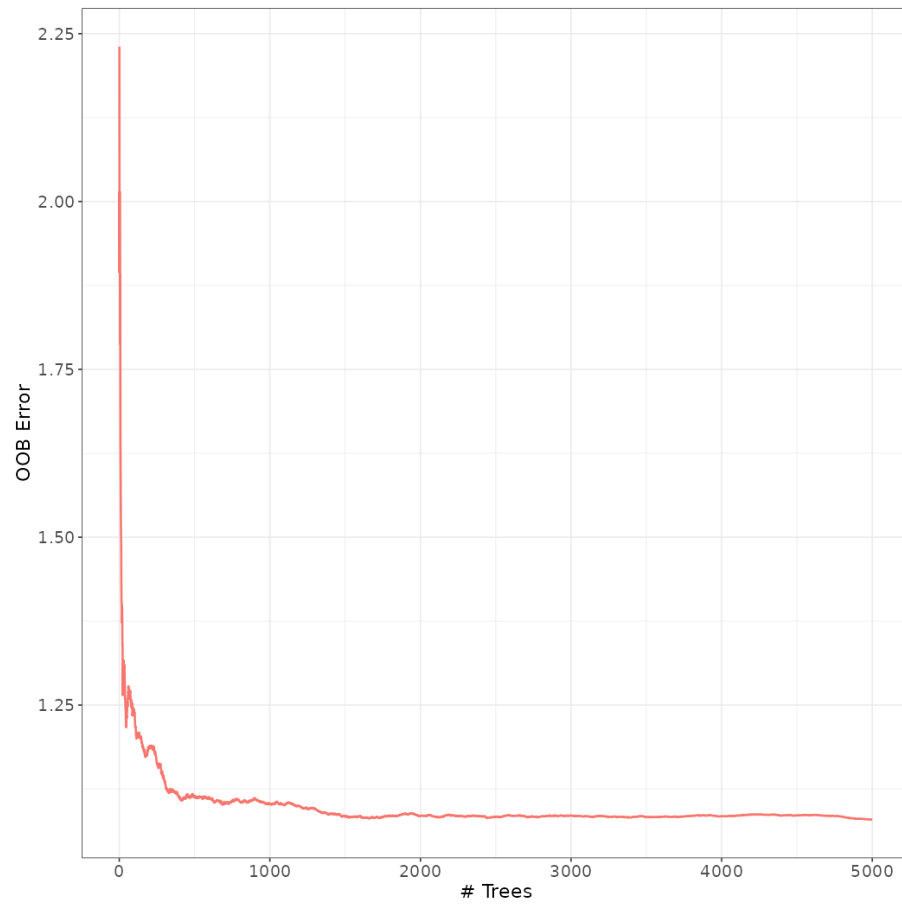


Figure S5. The underlying CV process for gradient boosting to search for an optimal tuning (the number of iterations (updates) in the boosting process) parameter value.

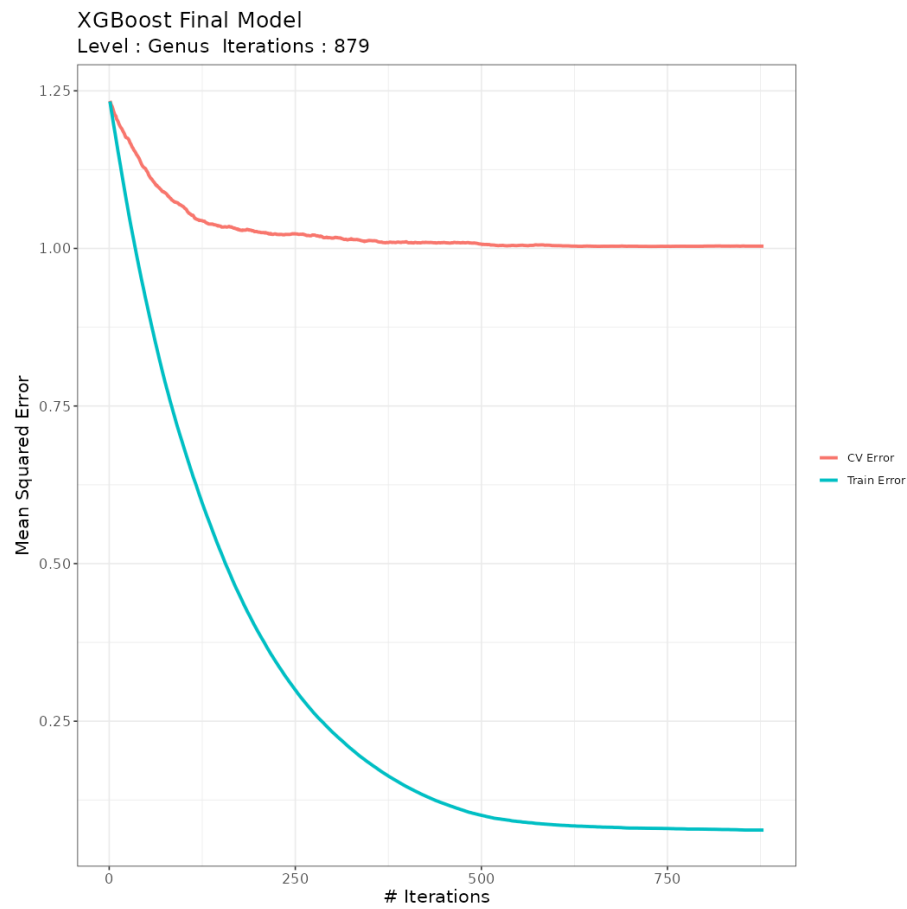


Figure S6. The screenshot of the Ask ChatGPT plugin.

Ask ChatGPT. Tell me about the roles of (a microbial taxon) on (a human disease).

API Key

You need to create your own secret API key to run ChatGPT. Here is the link to create an API key. (https://platform.openai.com/account/api-keys)

sk-yKFFrPvnt718bcb5LSHqT3BibkFJxo5EXy6UHRobCa0wRyoO

Select a taxonomic rank

Genus

Select an important taxon (e.g., disease-predictor in the importance plot).

Arachnia

Rename the taxon

You can rename it using a human language, for instance, deleting possible codes, special symbols or numbers (e.g., from 'Saccharibacteria_(TM7)_[O-1]' to 'Saccharibacteria').

Arachnia

Rename the output variable

You can rename it using a human language (e.g., from 'gingival_inflammation' to 'gingival inflammation').

gingival inflammation

Ask!

Tell me about the roles of a Arachnia on a gingival inflammation

Arachnia, also known as Aggregatibacter actinomycetemcomitans, is a bacterium that has been identified as a potential pathogen involved in gingival inflammation. It is commonly found in the oral cavity and is commonly associated with periodontal diseases, especially aggressive periodontitis. The role of Arachnia in gingival inflammation starts with its ability to colonize and invade the gingival tissues. It does so by attaching itself to the epithelial cells lining the gums and infiltrating into the deeper layers of the gingival tissues. Once established, Arachnia can lead to an immune response in the surrounding tissues, leading to inflammation. One way Arachnia contributes to gingival inflammation is through the production of various virulence factors. These factors include leukotoxin, which has been shown to be toxic to immune cells known as neutrophils. By inhibiting neutrophils' ability to function properly, Arachnia impairs the body's defense mechanisms against bacterial infection, resulting in increased inflammation. Additionally, Arachnia can induce the production of pro-inflammatory cytokines by immune cells and gingival fibroblasts. These cytokines, such as interleukin-1 beta (IL-1β) and tumornecrosis factor-alpha (TNF-α), further promote the inflammatory response. The release of these inflammatory molecules leads to increased blood flow and recruitment of immune cells to the site of infection, resulting in redness, swelling, and tenderness of the gums. Arachnia can also directly damage the gingival tissues through its ability to produce enzymes that degrade the extracellular matrix, allowing it to penetrate deeper into the gingival tissues. This tissue destruction exacerbates the inflammation and can contribute to the progression of periodontal disease. Moreover, Arachnia has been found to modulate the host's immune response in a way that favors its survival. It can interfere with the function of immune cells, impairing their ability to recognize and eliminate the bacteria. This evasion strategy allows Arachnia to persist and continue causing inflammation in the gingival tissues. Overall, the presence of Arachnia in the oral cavity can contribute to gingival inflammation through various mechanisms, including colonization, production of virulence factors, immune modulation, and tissue destruction. Proper oral hygiene and regular dental check-ups are essential to prevent Arachnia overgrowth and the associated gingival inflammation.

Reference Search Results

Google Scholar

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Arachnia+gingival+inflammation&btnG=

PubMed

<https://pubmed.ncbi.nlm.nih.gov/?term=Arachnia+gingival+inflammation>

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