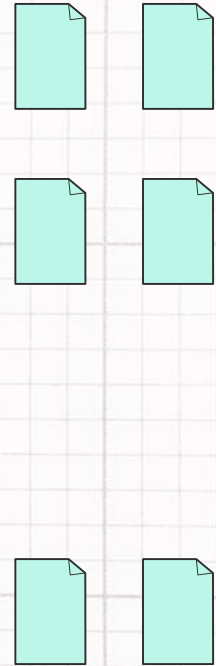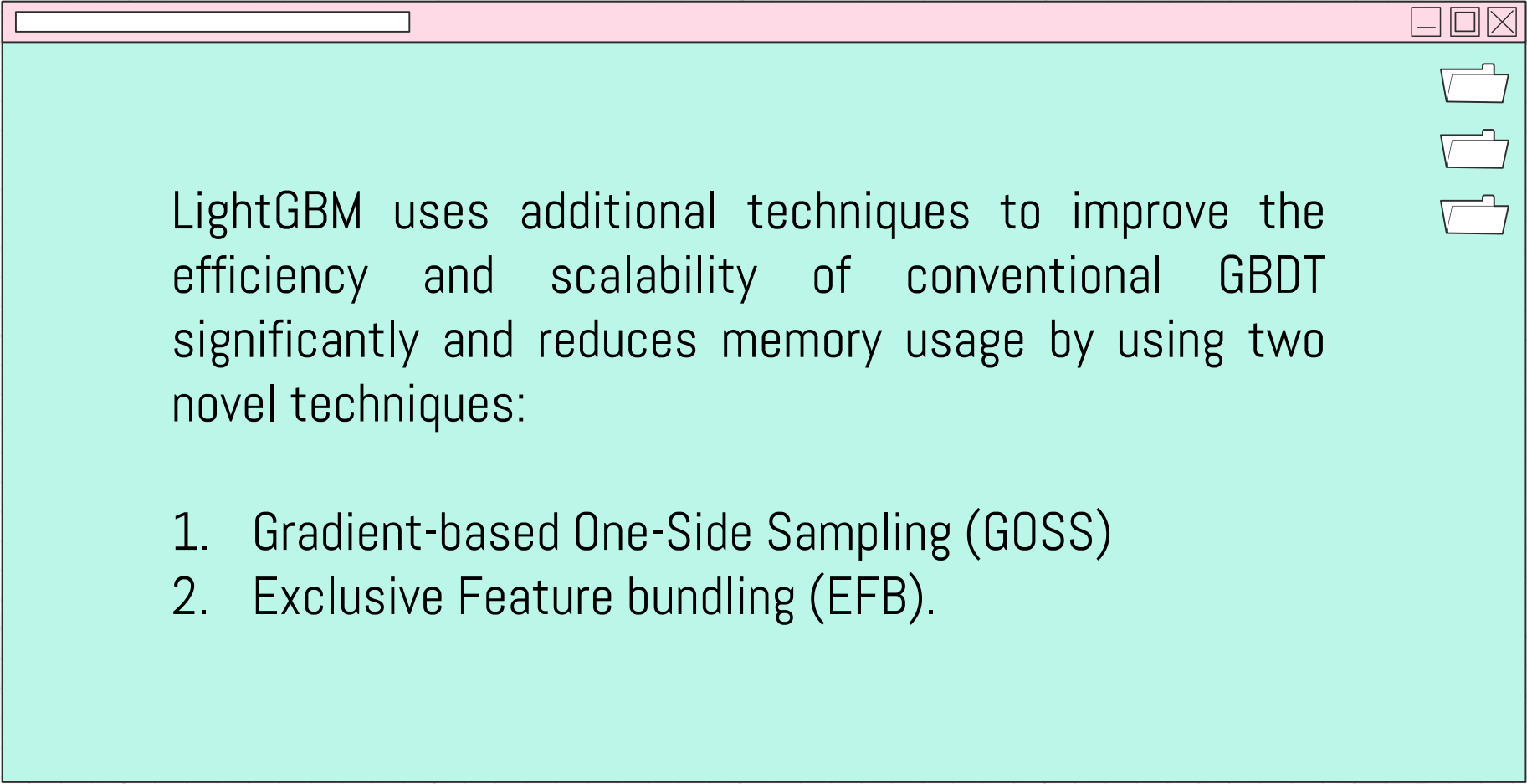# LightGBM

-- an overview

LightGBM (by Microsoft), a **Gradient Boosted-based** supervised learning algorithm, is a distributed high-performance framework that uses decision trees for **ranking**, **classification**, and **regression** tasks.
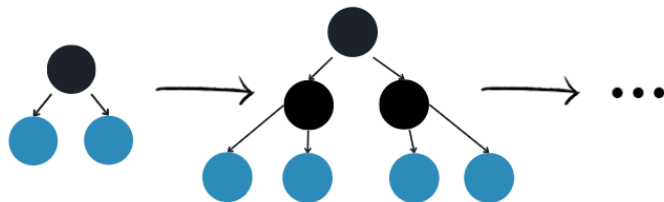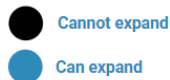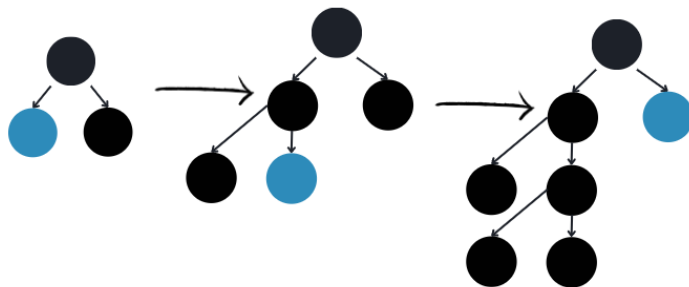
LightGBM uses additional techniques to improve the efficiency and scalability of conventional GBDT significantly and reduces memory usage by using two novel techniques:

1. Gradient-based One-Side Sampling (GOSS)
2. Exclusive Feature bundling (EFB).

LEVEL-WISE TREE GROWTH

LEAF-WISE TREE GROWTH

● Cannot expand
● Can expand

LightGBM splits the tree **leaf-wise**, meanwhile, XGBoost splits the tree level-wise or tree-wise. This means that XGBoost grows trees horizontally, adding one level of nodes at a time, while **LightGBM grows trees vertically**, adding new nodes to the deepest leaf.

Splitting the tree leaf-wise can produce more complex trees, resulting in higher accuracy, but has a higher chance of overfitting, but it can be minimized by setting the depth for splitting.

References

LightGBM in Python | Complete guide on how to Use LightGBM in Python (analyticsvidhya.com)
XGBoost vs LightGBM: How Are They Different (neptune.ai)
LightGBM (Light Gradient Boosting Machine) - GeeksforGeeks