ABSTRACT

HENDRA PRASETYA. Performance Comparison Between Kimura 2-Parameters and Jukes-Cantor Model in Constructing Phylogenetic Tree of Neighbour Joining (NJ). Advised by ASEF UDDIN and MULADNO.

Bioinformatics as a recent improvement of knowledge has made an interest for scientist to collect and analyze data to provide the best estimate of the true phylogeny. The objective of this research is to construct and compare the phylogenetic tree of Neighbour Joining (NJ) based on different models (Kimura 2-Parameters and Jukes-Cantor) and to find out which model is more able on constructing NJ’s tree. In order to build the tree, reliable set of data is conducted from loop mtDNA sequences that is available in Gen Bank. The nucleotide sequences come from *Bison bison* (American bison), *Bos taurus* (European cow such as Shorthorn), *Bos indicus* (zebu breeds), *Bos grumniens mutus* (one of subspecies of cow), and *Capra hircus* (species of goat). The ability of each models was measured using the Felsentein’s bootstrap method. The whole bootstrap process for each models was repeated 1,000, 5,000, and 10,000 times to detect its ability. The performance was measured on the basis of the consistency of the topology relationship, the stability of nodes, the consistency of bootstrap confidence level ($P_B$), standard error of distance, change of $P_B$ from (1.000-5.000) to (5.000-1.000), computational time, and BIC score. NJ’s phylogenetic tree with kimura 2-parameters and jukes cantor model have a good node stability and is also generally successful in representing topological relationships between taxa. The increasing of bootstrap replication number in common will increase the consistency of bootstrap confidence value ($P_B$). It means both models have a good reliability. But, when the number of sequences is large and the extent of sequence divergence is low, it is generally difficult to construct the tree by any models. In conclusion, Kimura 2-Parameters has a better performance than Jukes-Cantor.

Key words: phylogenetic tree, Neighbour Joining, Kimura 2-Parameters, Jukes-Cantor