This is a 2-approximate algorithm.

i.e., the size of returned vertex cover set is at most twice of the size of optimal vertex-cover.

Proof:

Let A be the set of edges picked in line 4 and C\* be the optimal vertex-cover.

* + Then C\* must include at least one end of each edge in A and no two edges in A share an end point so no two edges in A are covered by the same vertex in C\*, so |C\*|≥|A|.
  + Moreover, |C|=2|A|, so |C|≤2|C\*|.

= 2