No, that implementation doesn’t return at least ½ of the maximum flow.

See counterexample:

2

2

1

1

1

1

1

1

Those numbers are the edge capacities. The maximum flow would be 3, with the flow like this:

0/2

2/2

1/1

0/1

1/1

1/1

1/1

1/1

If we were to run my friends’ faulty Ford-Fulkerson algorithm, though, the flow might end up as 1, which is less than half of 3. First of all, the path from to of maximum value is 1, for which several paths have ties: ,,,,, , and . The algorithm could pick ;so the faulty residual graph would be:

1

2

0

0

0

1

0

1

No more paths from to exist now.