A* Algorithm

Aim

To implement A* algorithm.

Code

```
from heapq import*
g=[[1,1,1,1],[1,0,1,0],[1,1,1,1],[0,1,0,1]]
n=len(g)
h=lambda a,b:abs(a[0]-b[0])+abs(a[1]-b[1])
def A(s,e):
 q=[(h(s,e),0,s)];v=set()
 while q:
  f,c,p=heappop(q)
  if p==e:return c
  if p in v:continue
  v.add(p)
  for dx,dy in[(1,0),(-1,0),(0,1),(0,-1)]:
   x,y=p[0]+dx,p[1]+dy
   if 0<=x<n and 0<=y<n and g[x][y] and (x,y) not in v:
    heappush(q,(c+1+h((x,y),e),c+1,(x,y)))
 return-1
print(A((0,0),(n-1,n-1)))
```

Output

6

The A* algorithm finds the shortest path from (0, 0) to (3, 3) in the given 4x4 grid. The path length (number of steps) is 6.

Result

The A* algorithm is solved using python successfully.