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Discrete Mathematics

Let Us Count

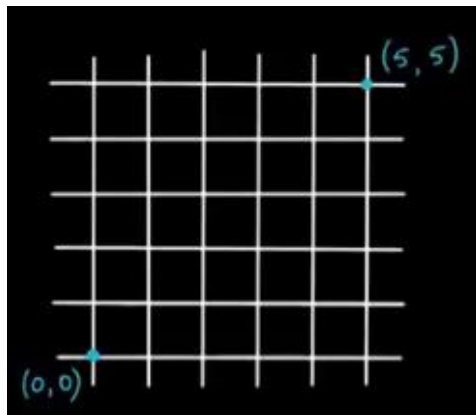
Catalan Numbers - Part 2

Prof. S.R.S Iyengar

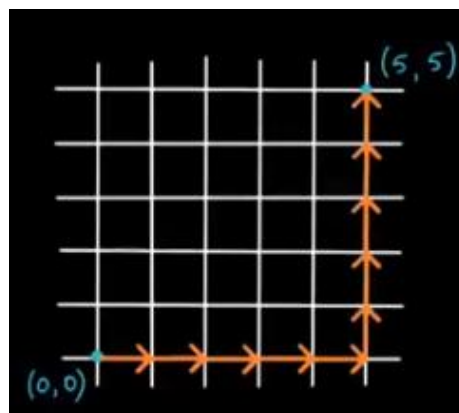
Department of Computer Science

IIT Ropar

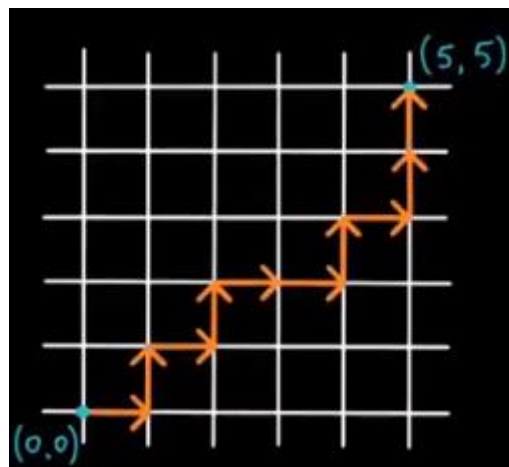
Let us take up this problem that we discussed just now of going from $(0,0)$ to $(5,5)$.



As you can see there are 5 rights and 5 ups for you to reach $(5,5)$.

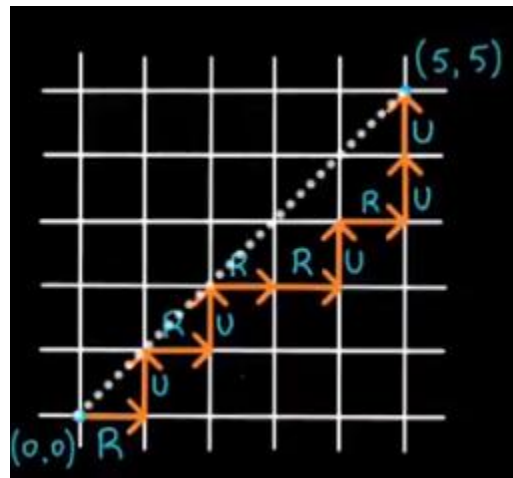


Let me take an example,



It is: right→up→right→up→ right→ right→up→ right→up→up.

You see what exactly happens here? You observed something very important here that you never crossed the diagonal. Although you touched the diagonal you never crossed it.



So here goes my question. In how many ways can we start from $(0,0)$ and go towards $(5,5)$ and end our journey in $(5,5)$ without trespassing the diagonal. By trespassing I mean you cannot cross this fence. The fence is a diagonal. You can however touch the diagonal. What is the question? The question is in how many ways can you reach your destination $(5,5)$ from your starting point $(0,0)$ without trespassing the fence which happens to be our diagonal.

So let me count the total number of ways for this now.

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