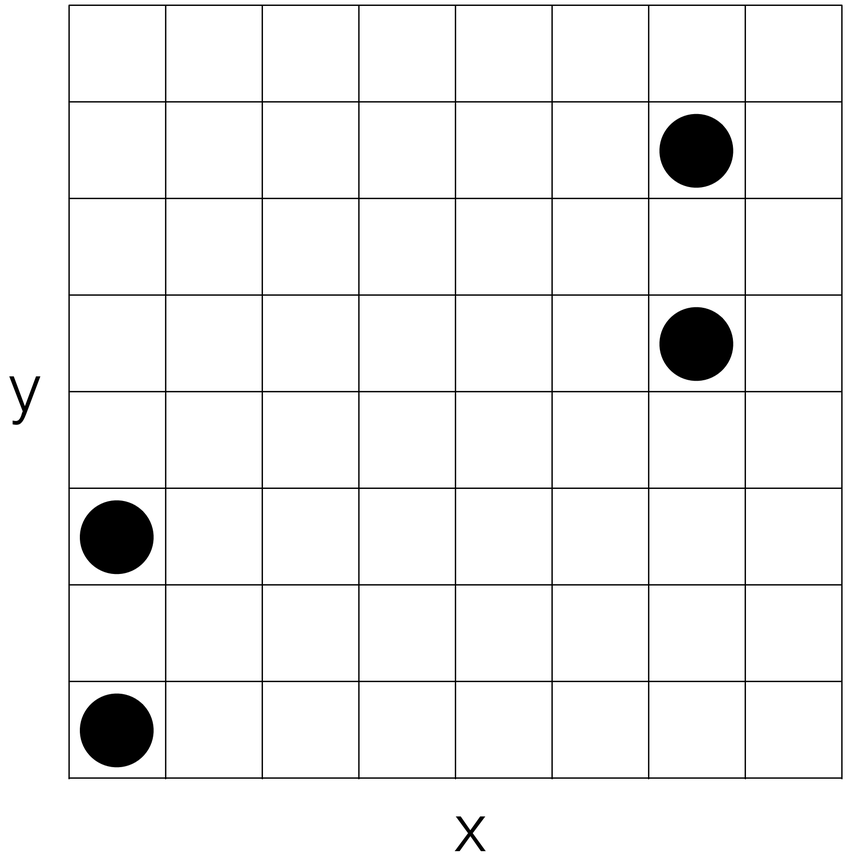
Hierarchical Data Cubes - a worked example
CSC544

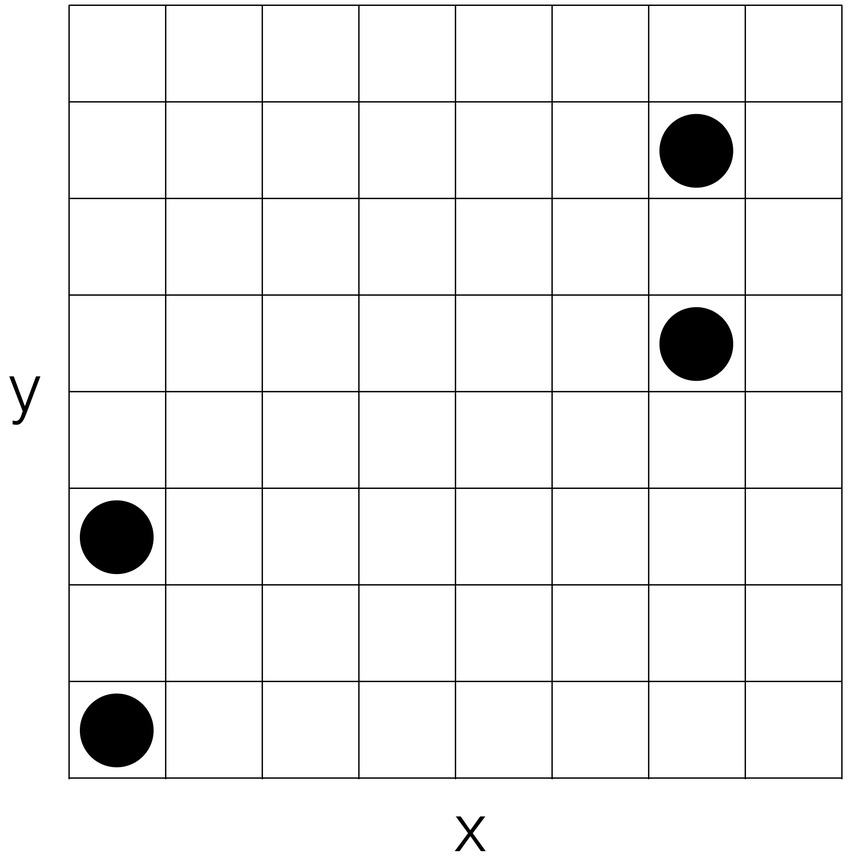
Let’s build a small 2D hierarchical cube

Two dimensions, 3 bits of resolution in each dimension

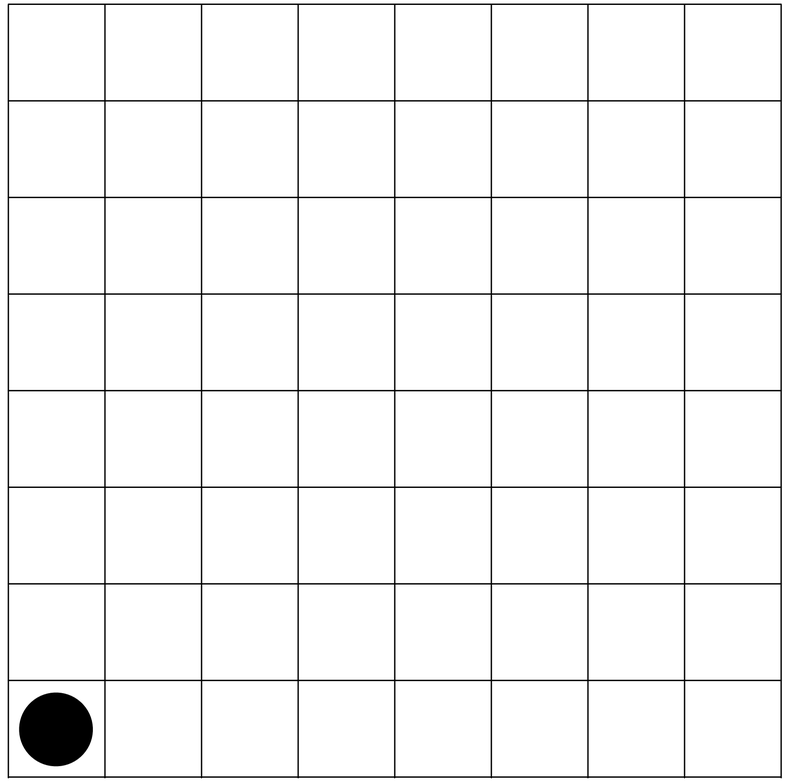


(0, 0)
(0, 2)
(6, 4)
(6, 6)

Two dimensions, 3 bits of resolution in each dimension



(0, 0)	**(000, 000)**
(0, 2)	**(000, 010)**
(6, 4)	**(110, 100)**
(6, 6)	**(110, 110)**



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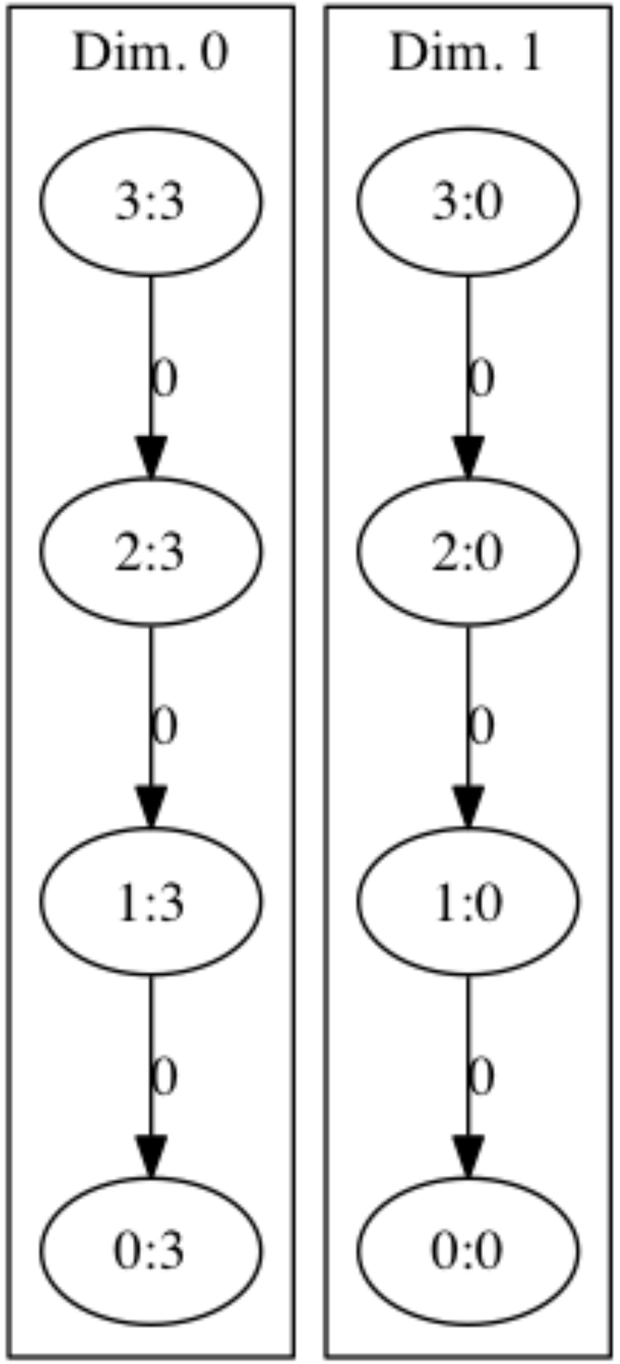

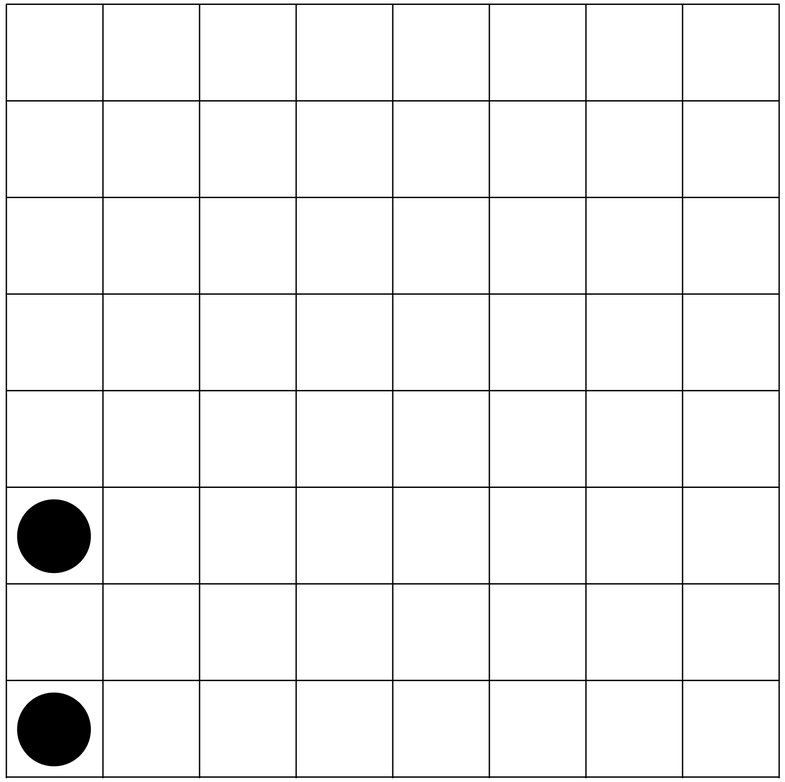

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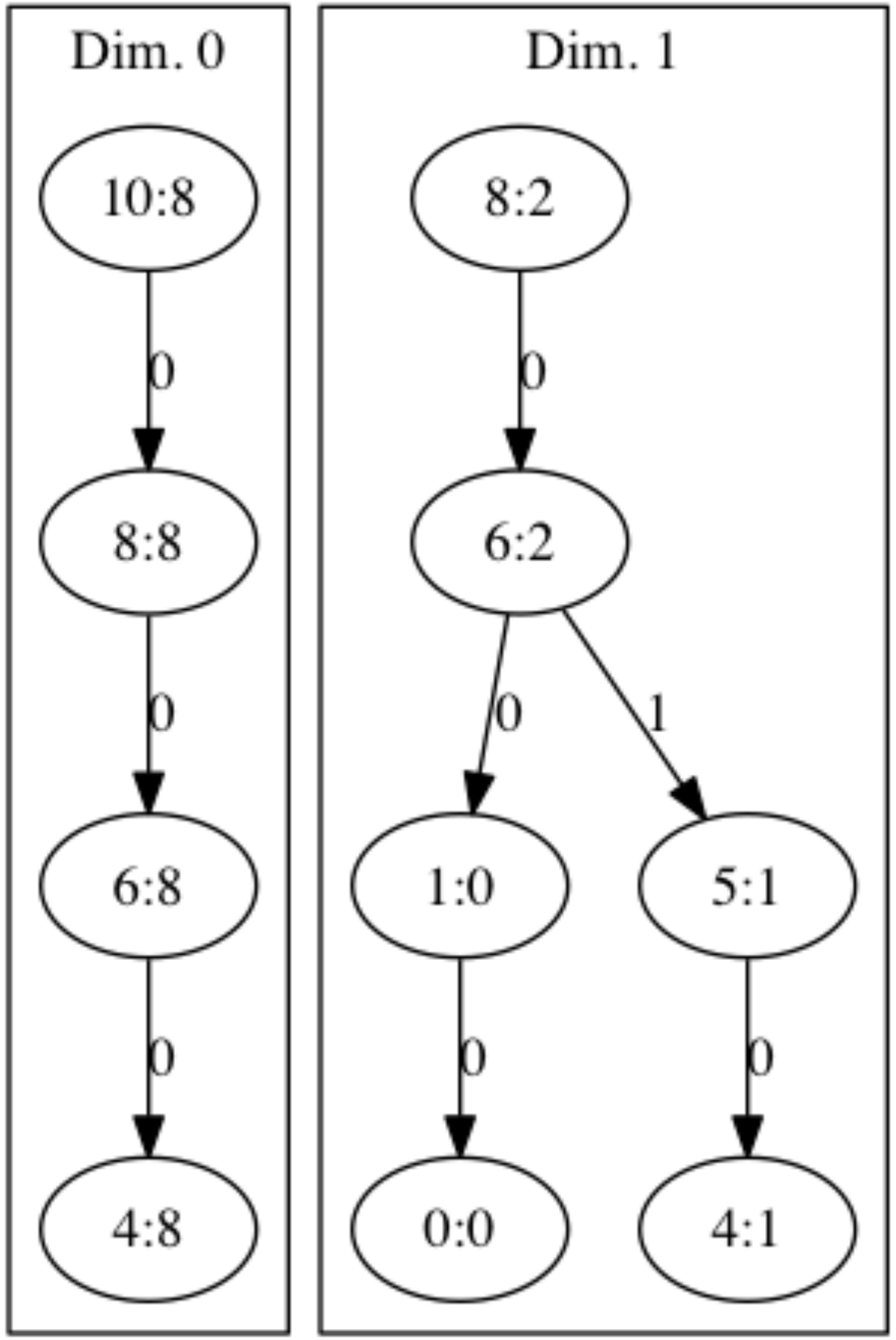

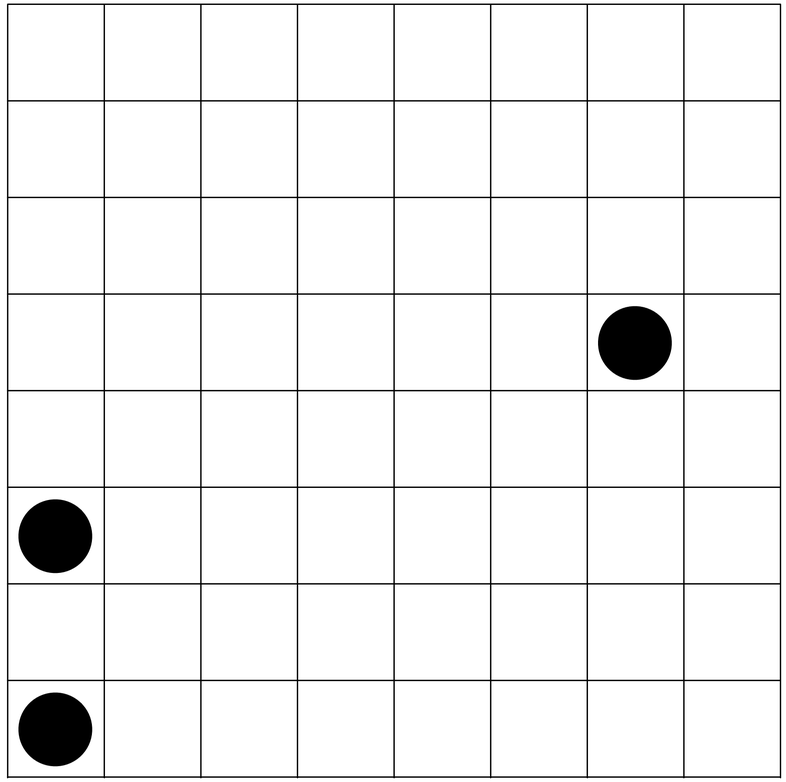

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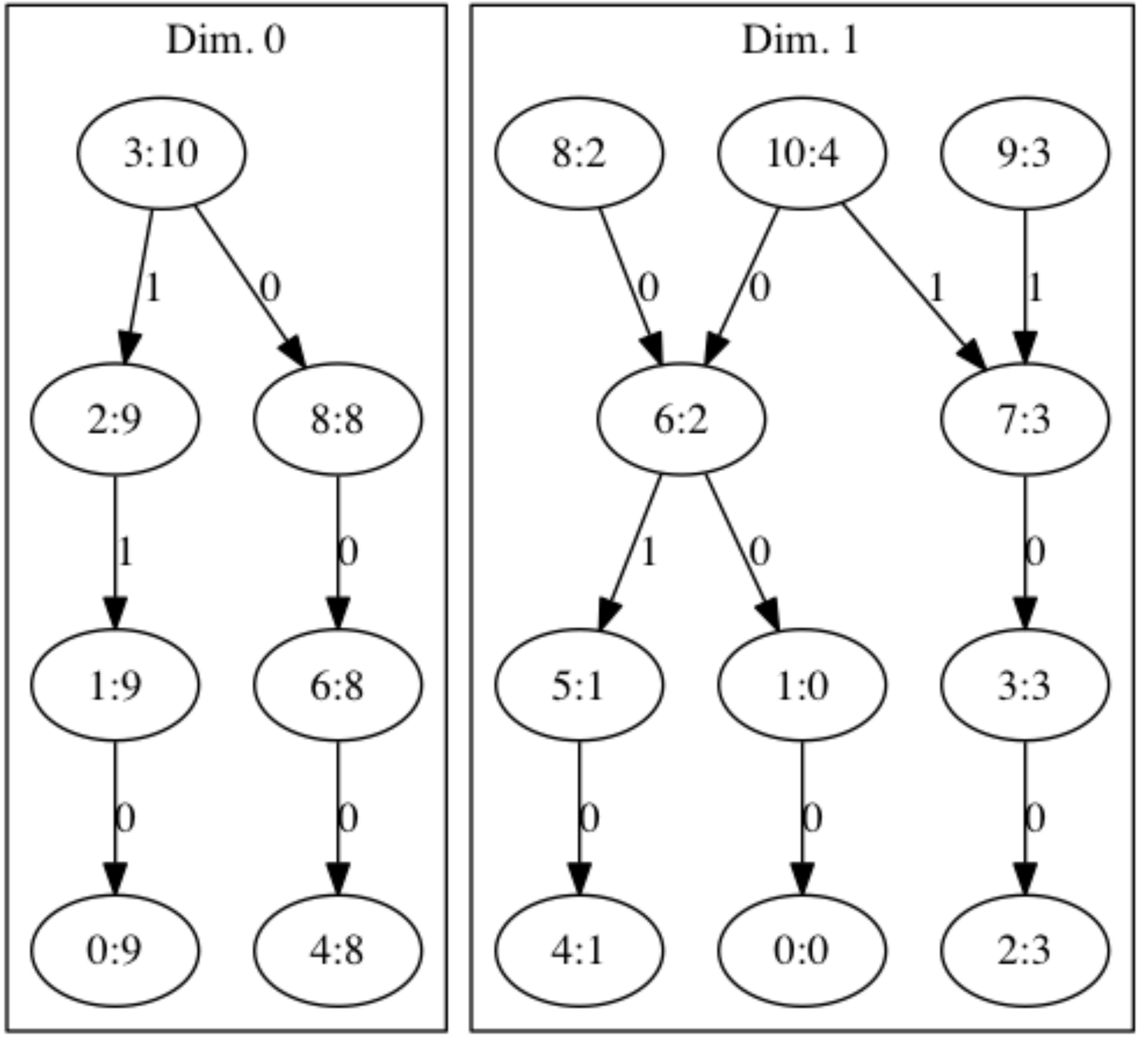

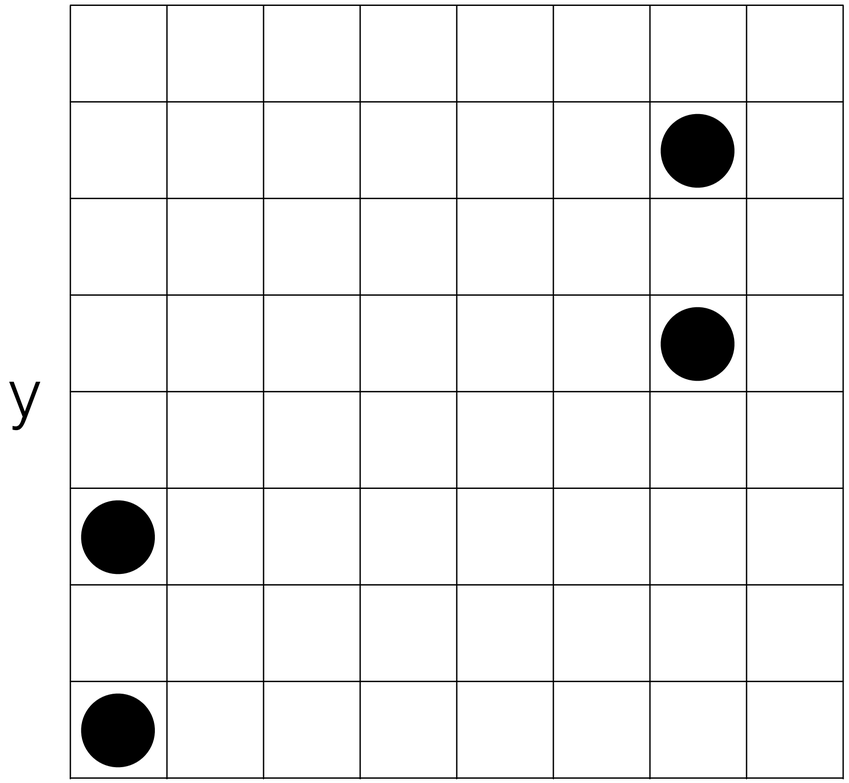

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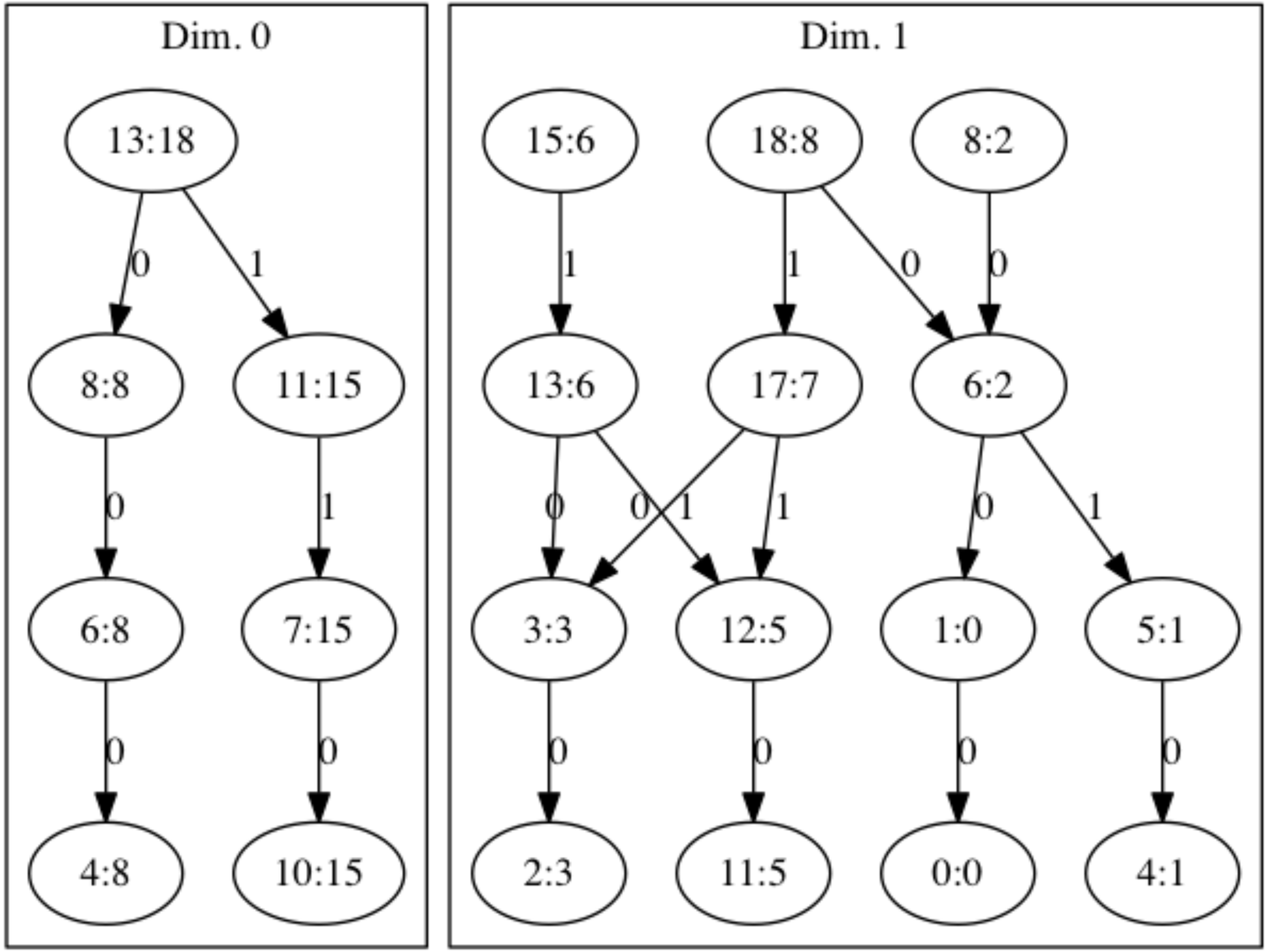

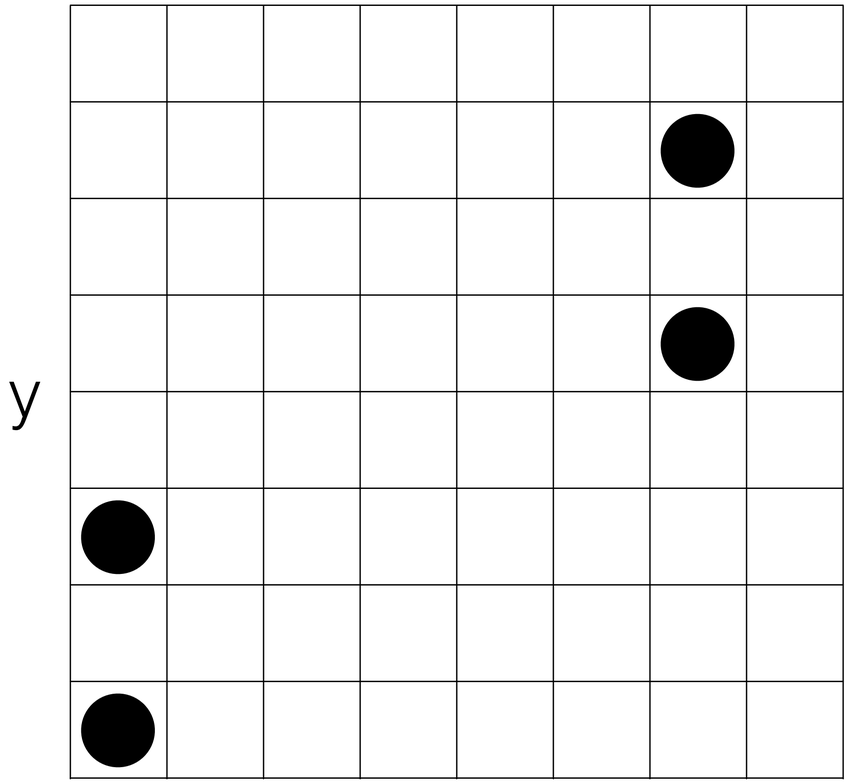

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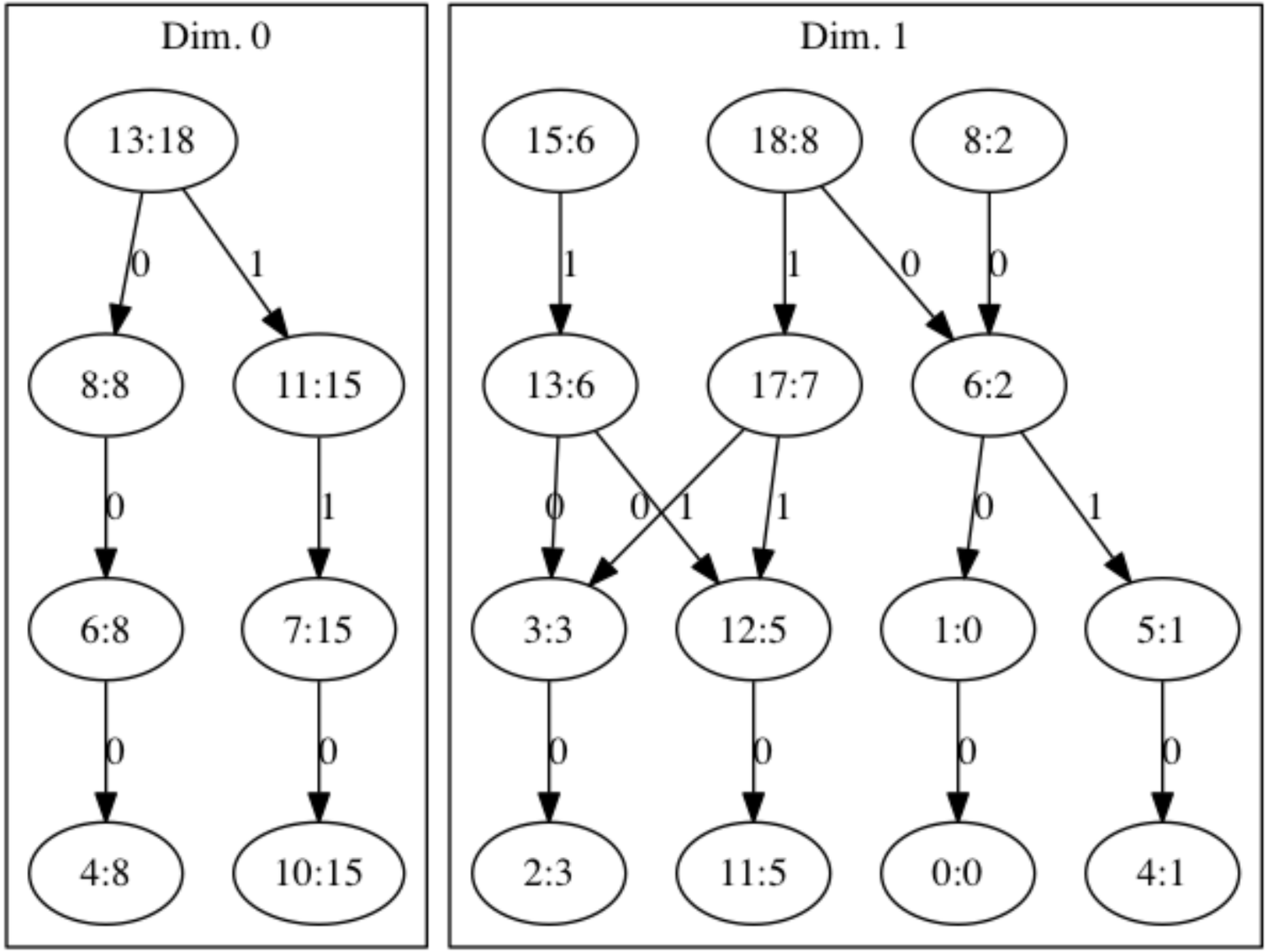
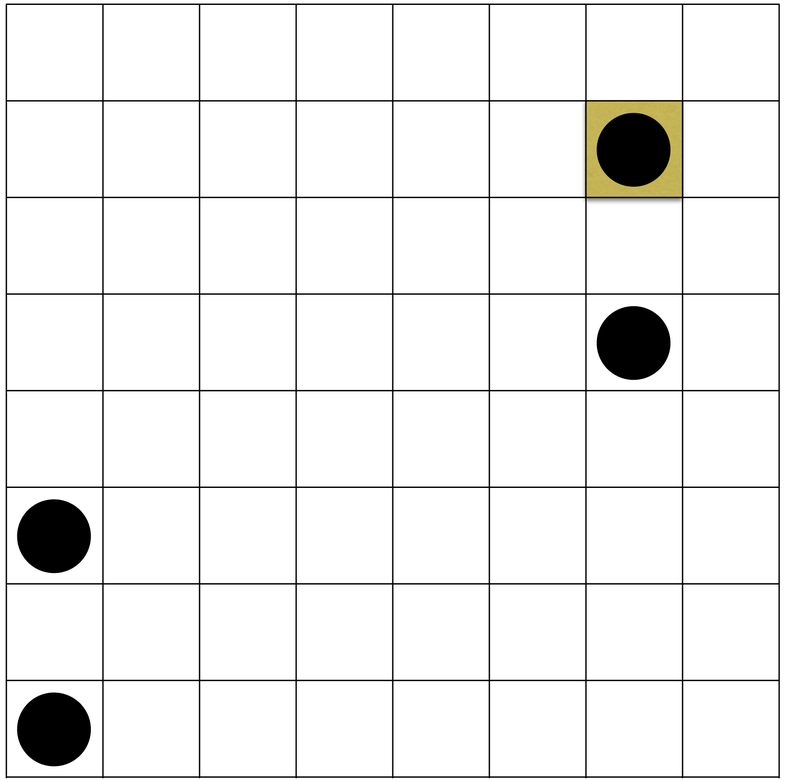


Let’s make some queries against it

Example 1



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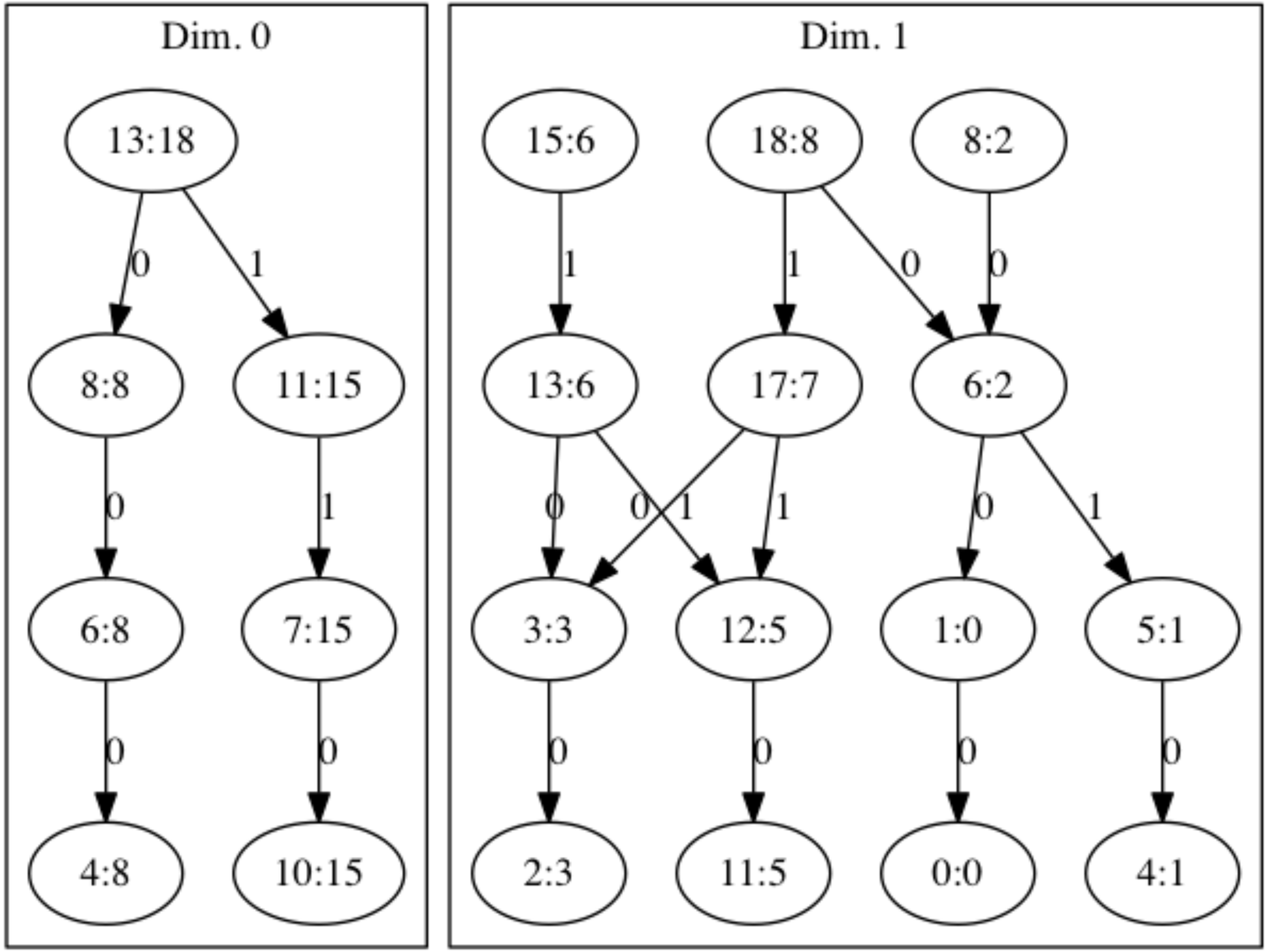
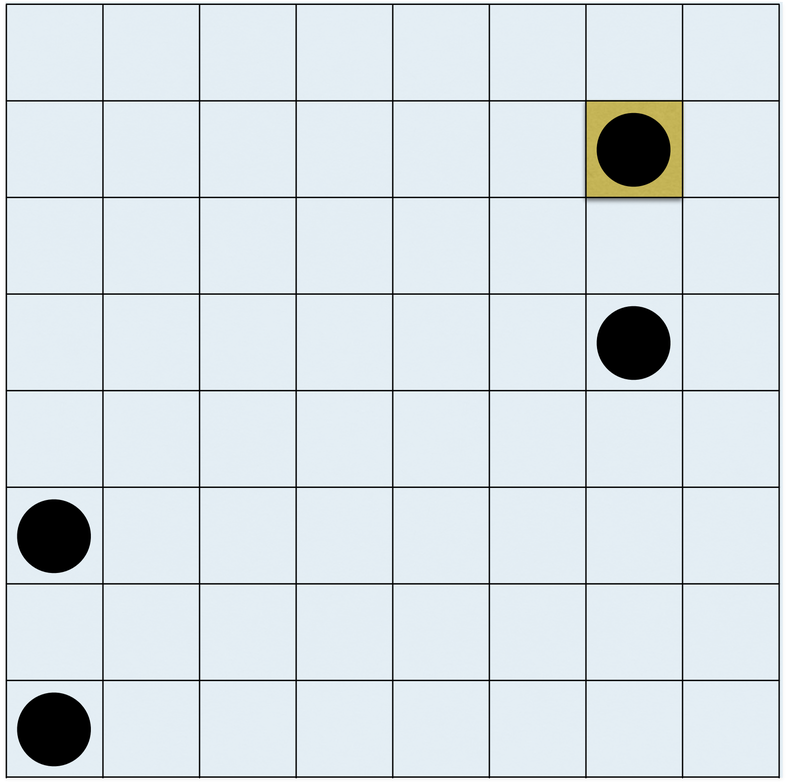


Example 1



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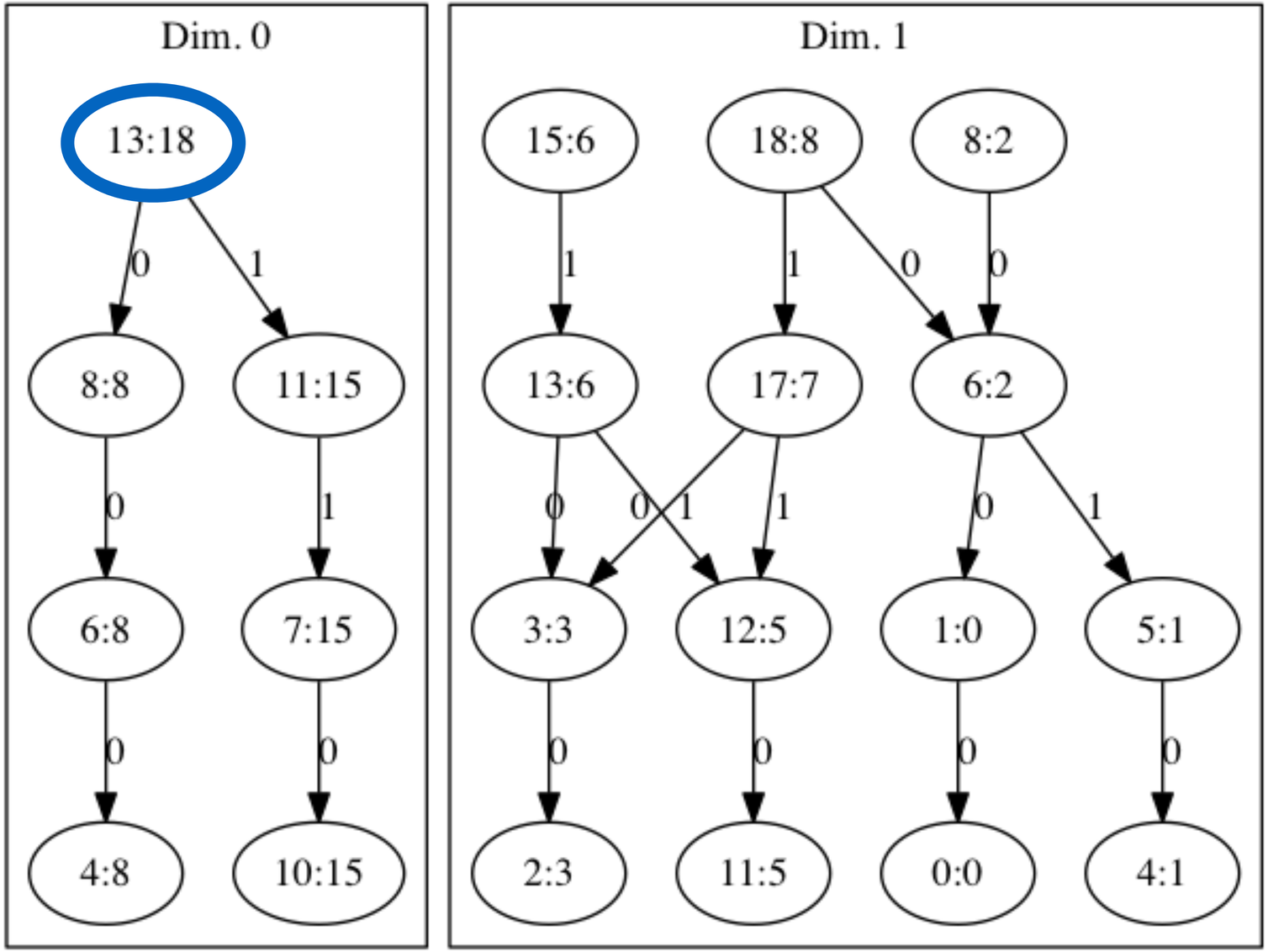
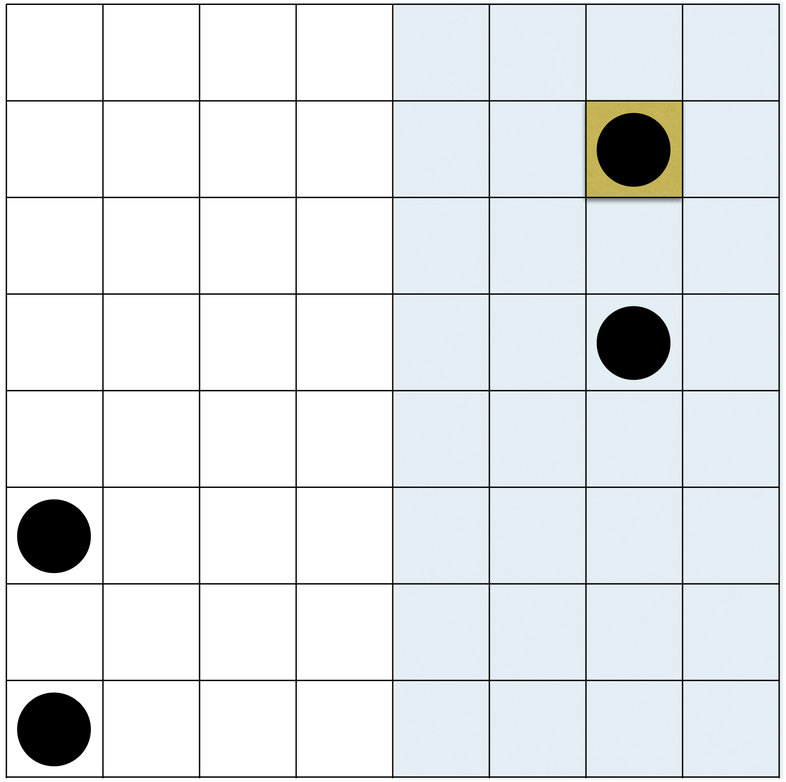


Example 1



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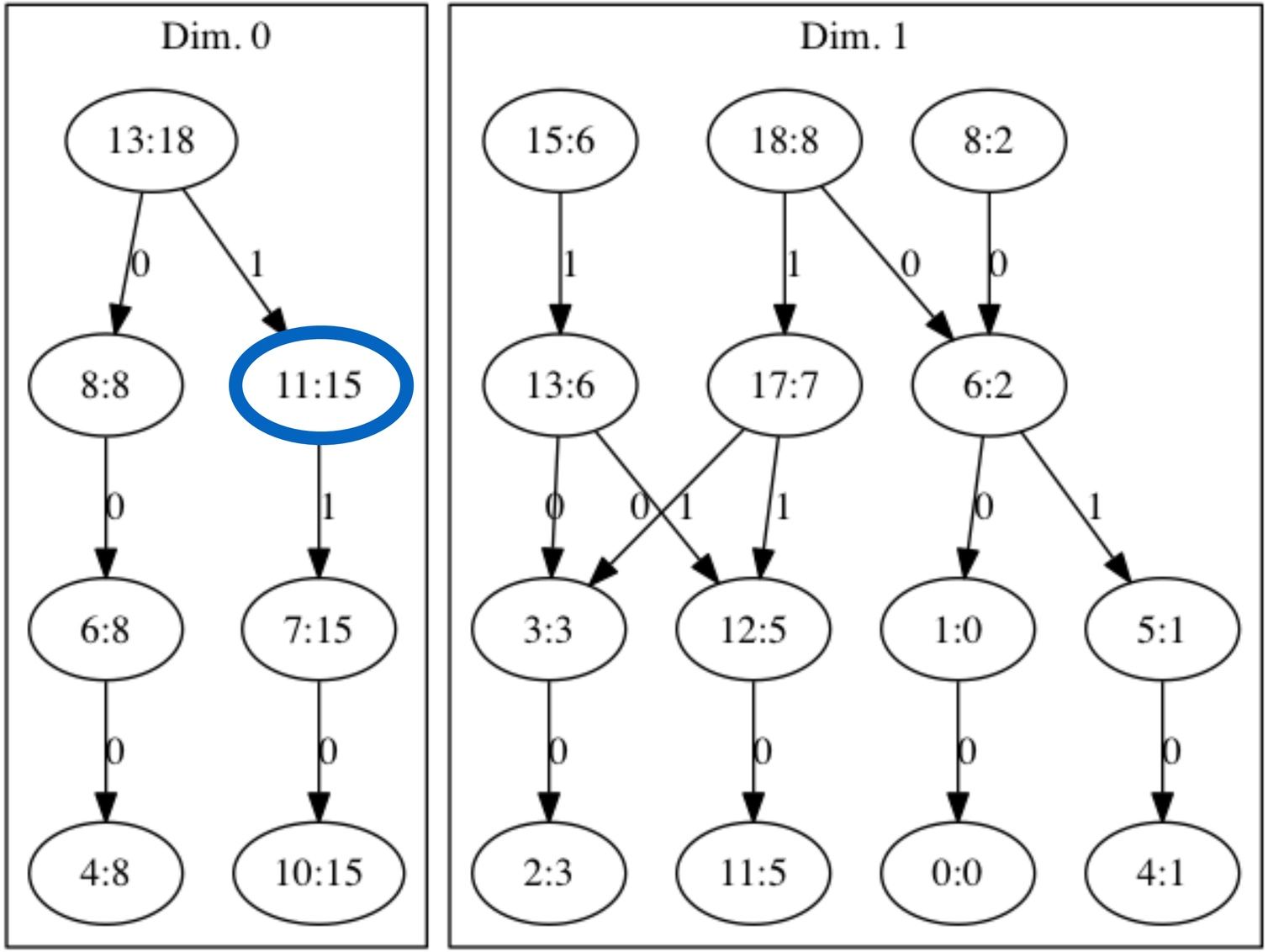
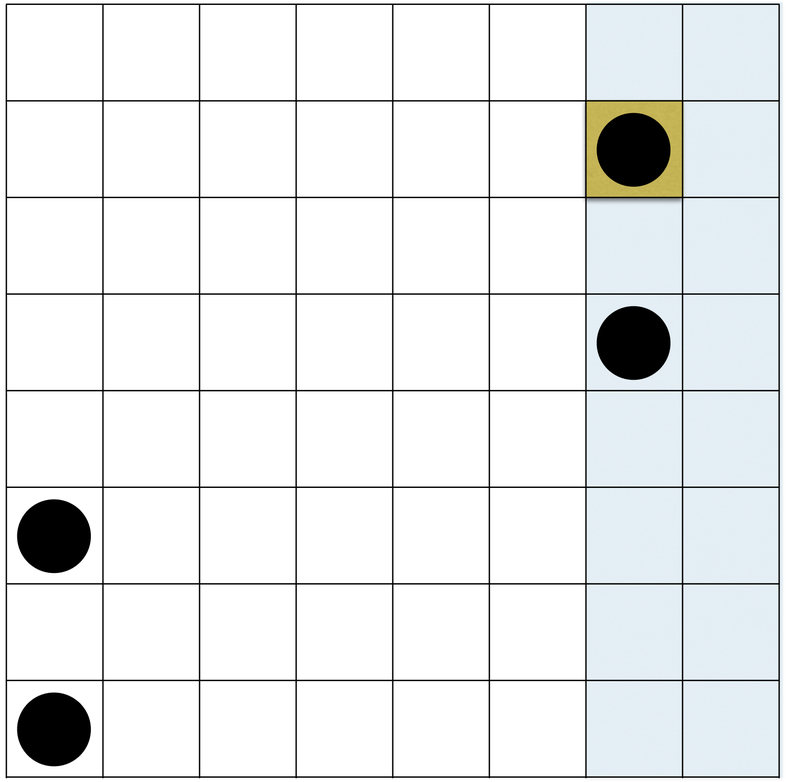


Example 1



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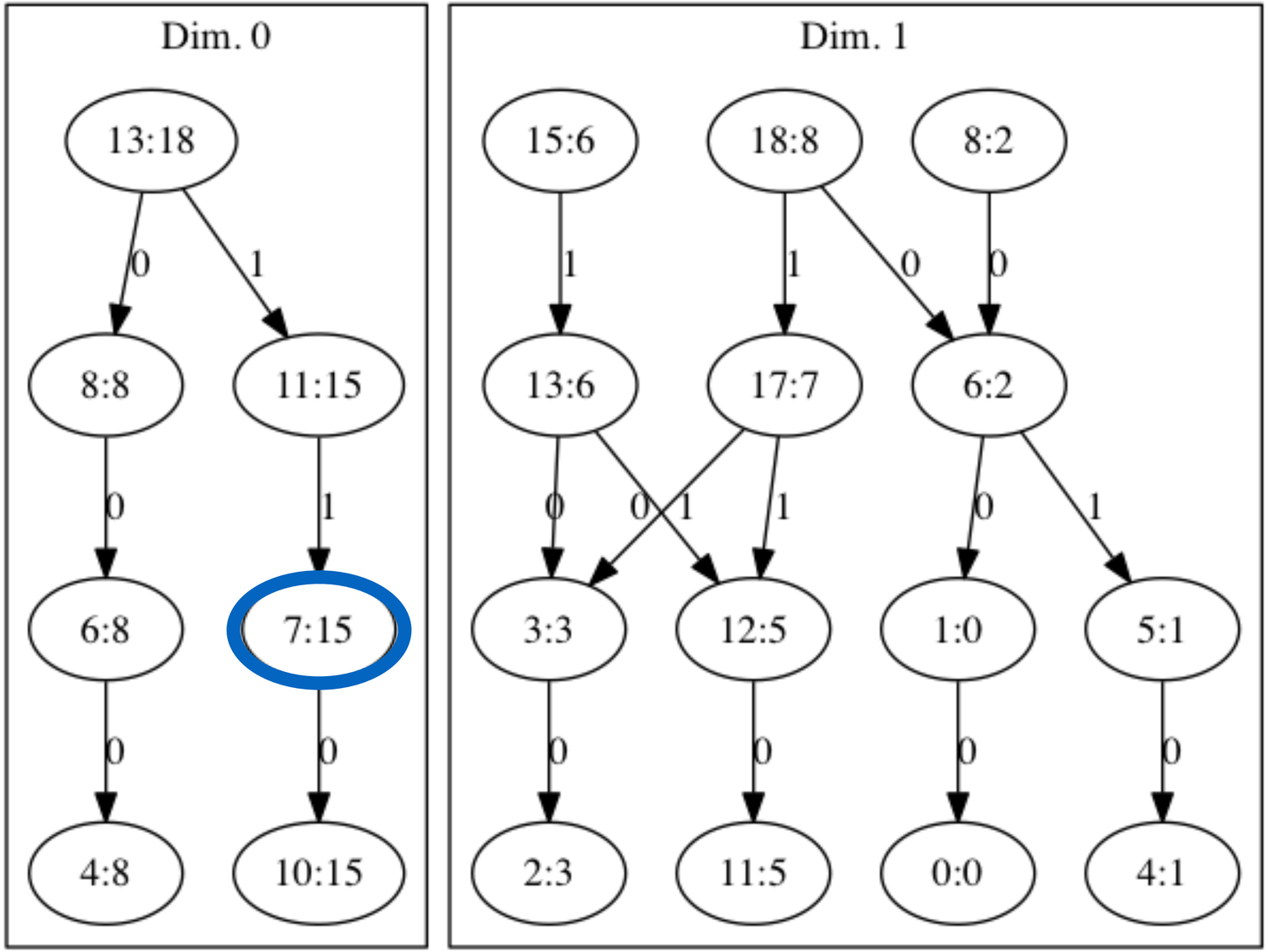
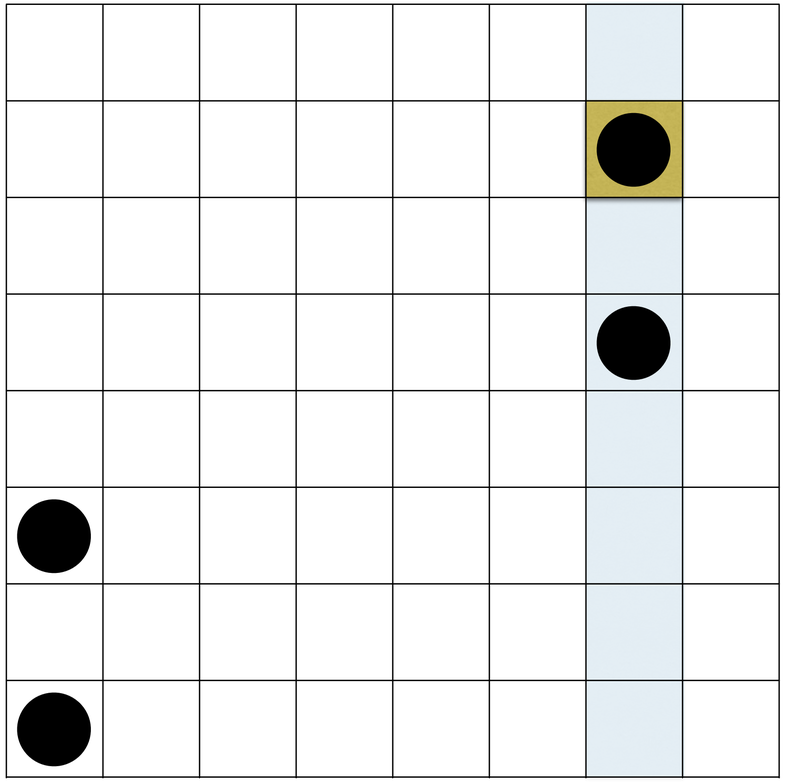


Example 1



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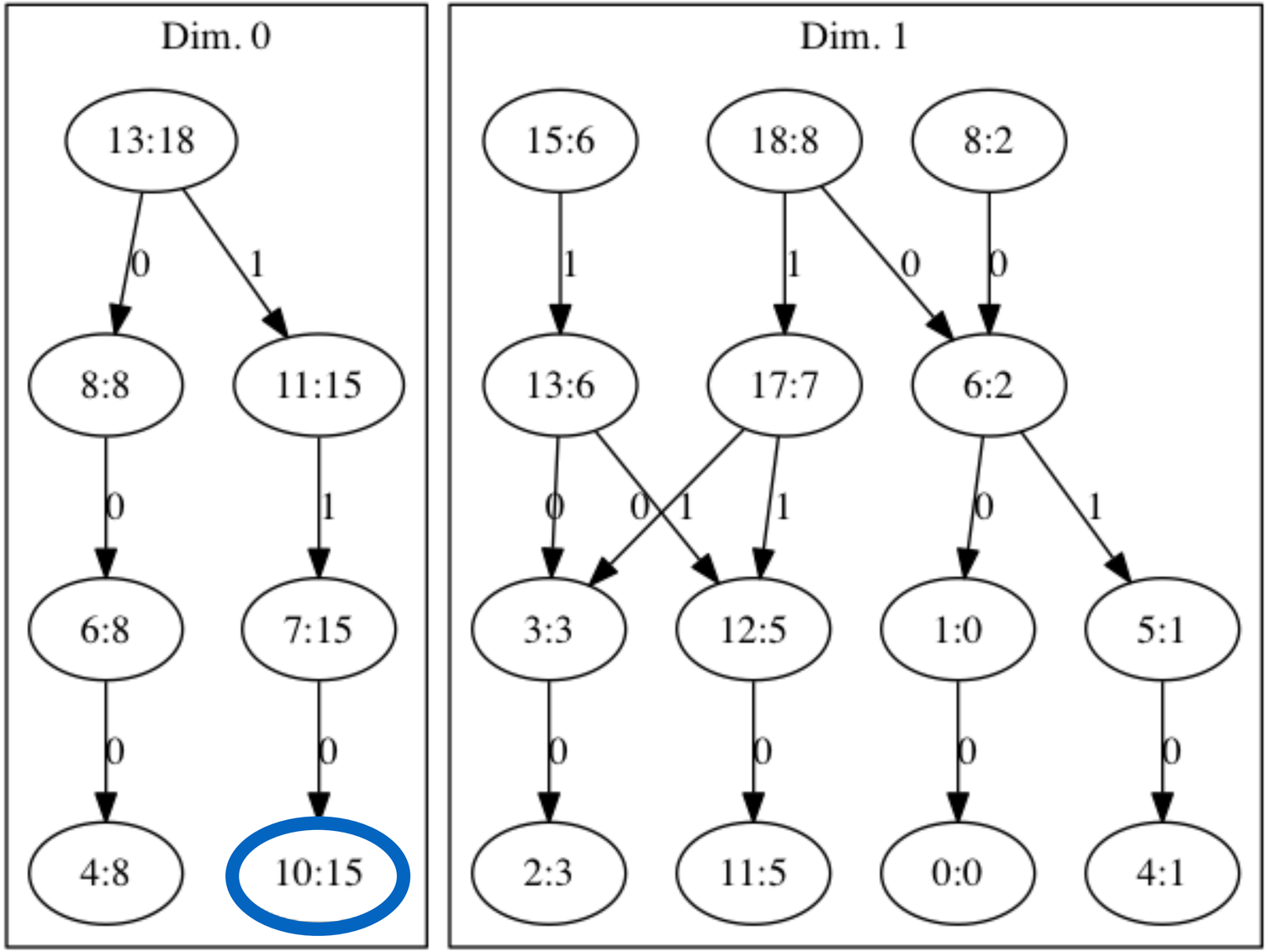
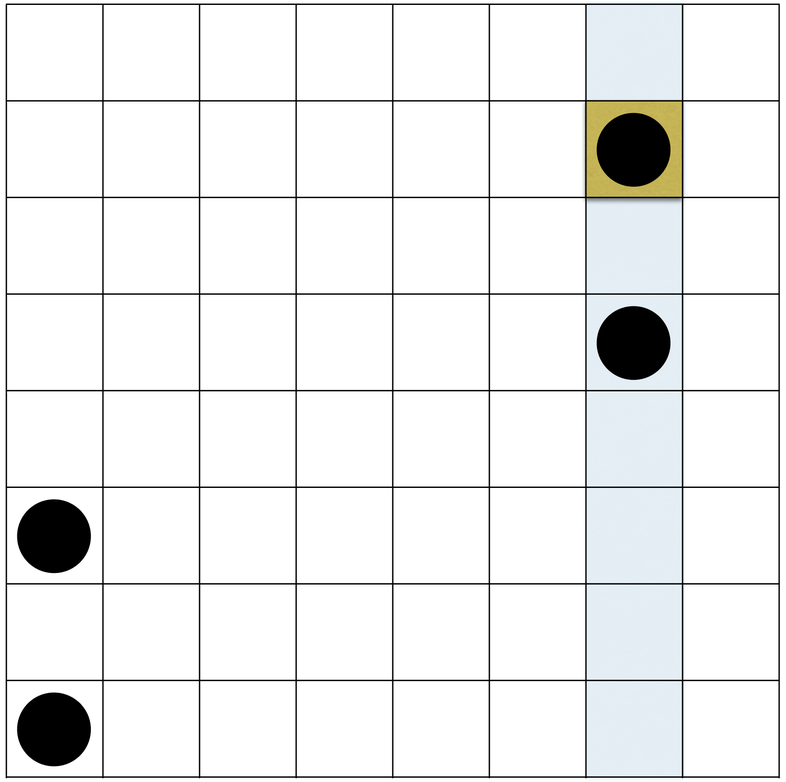


Example 1



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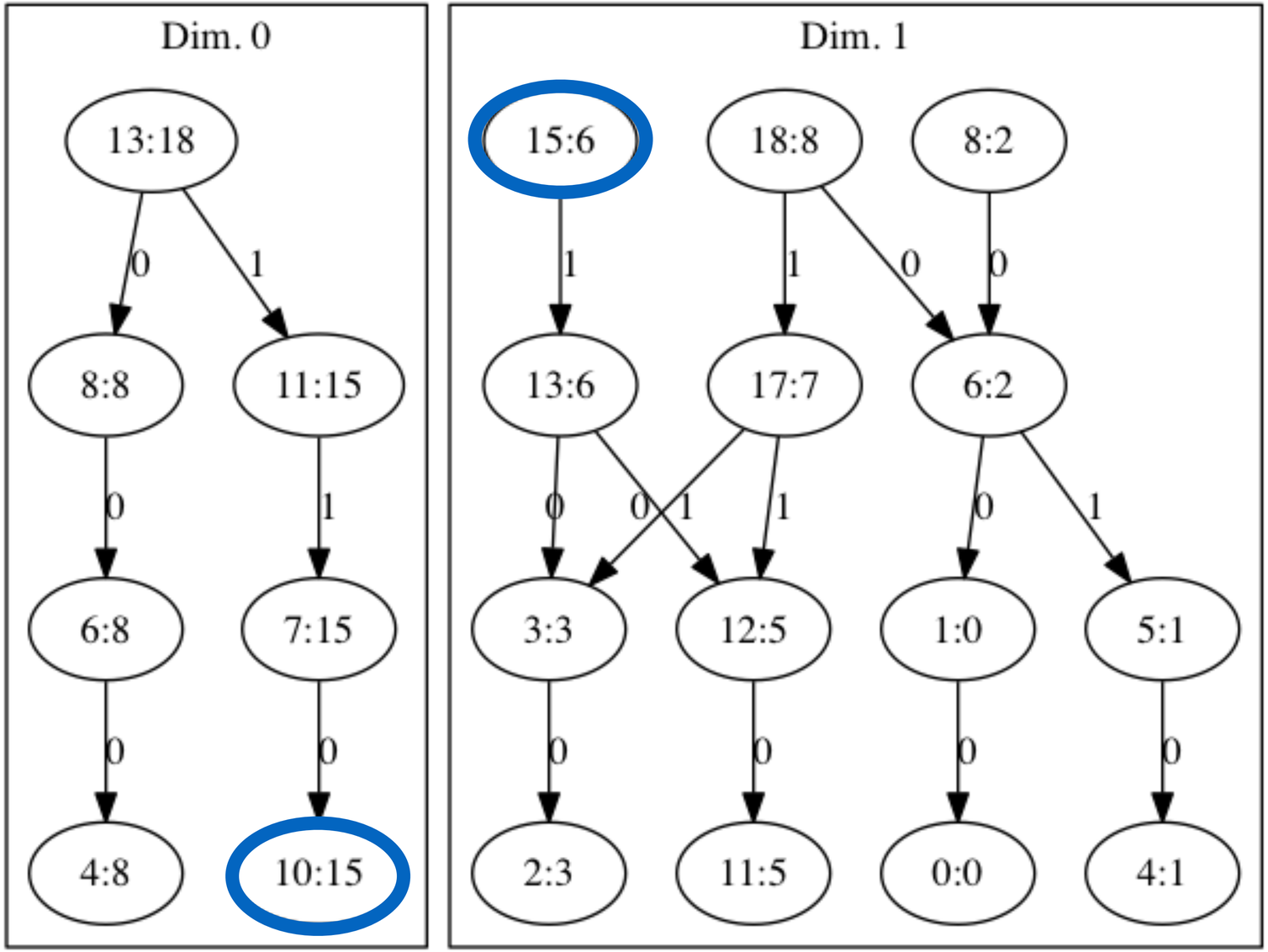
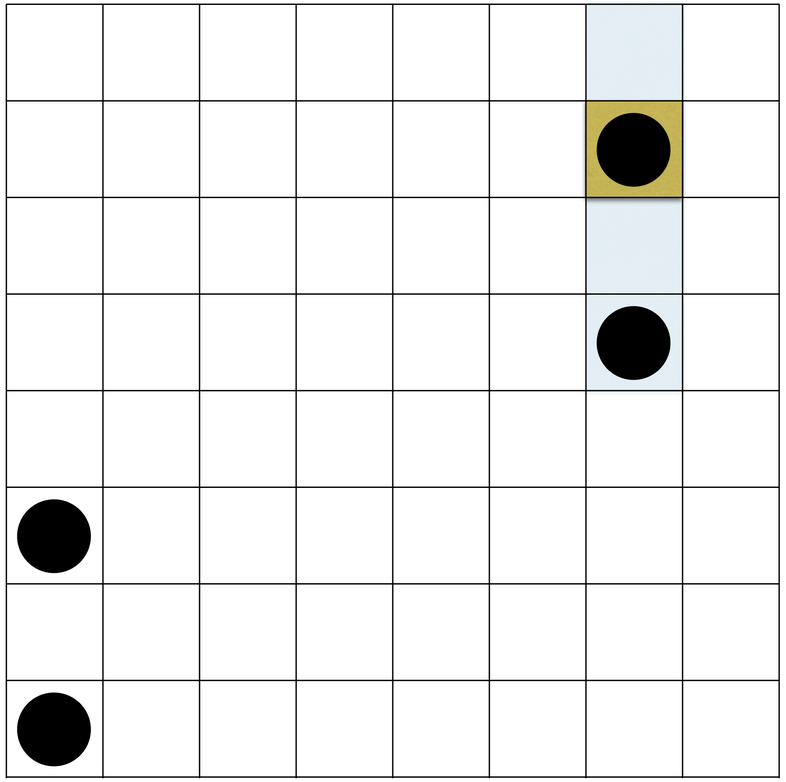


Example 1



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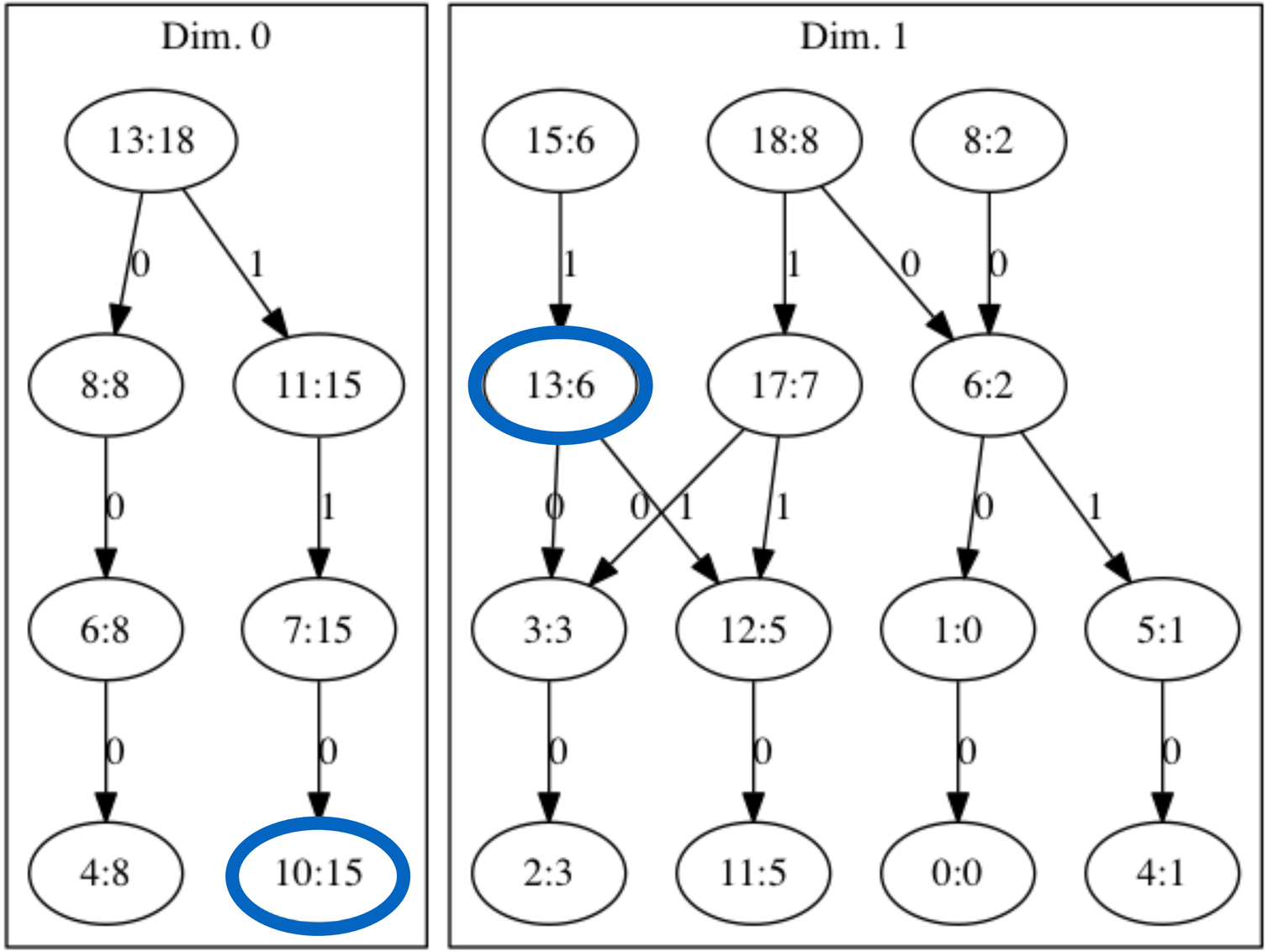
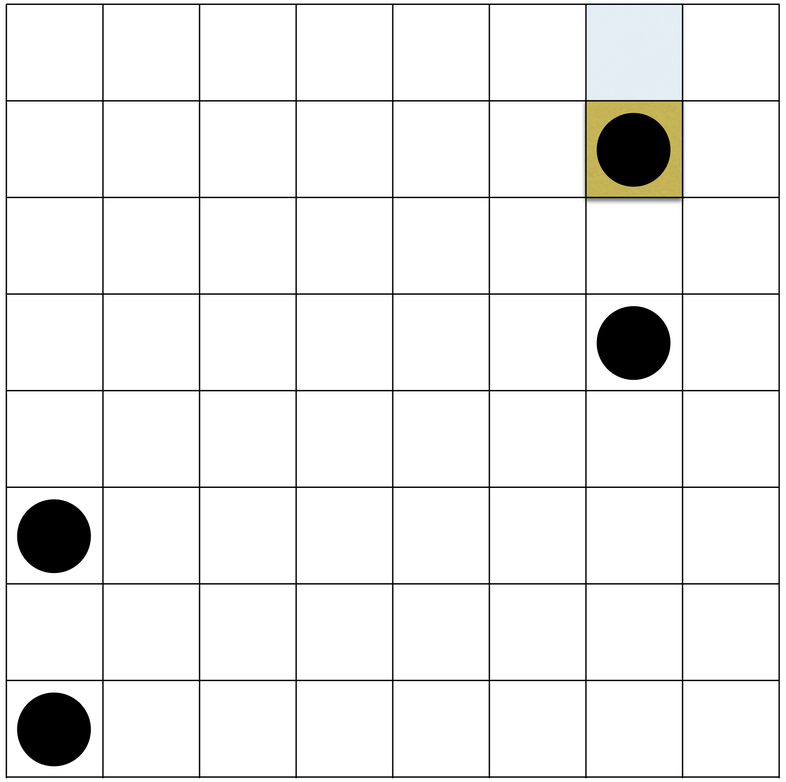


Example 1



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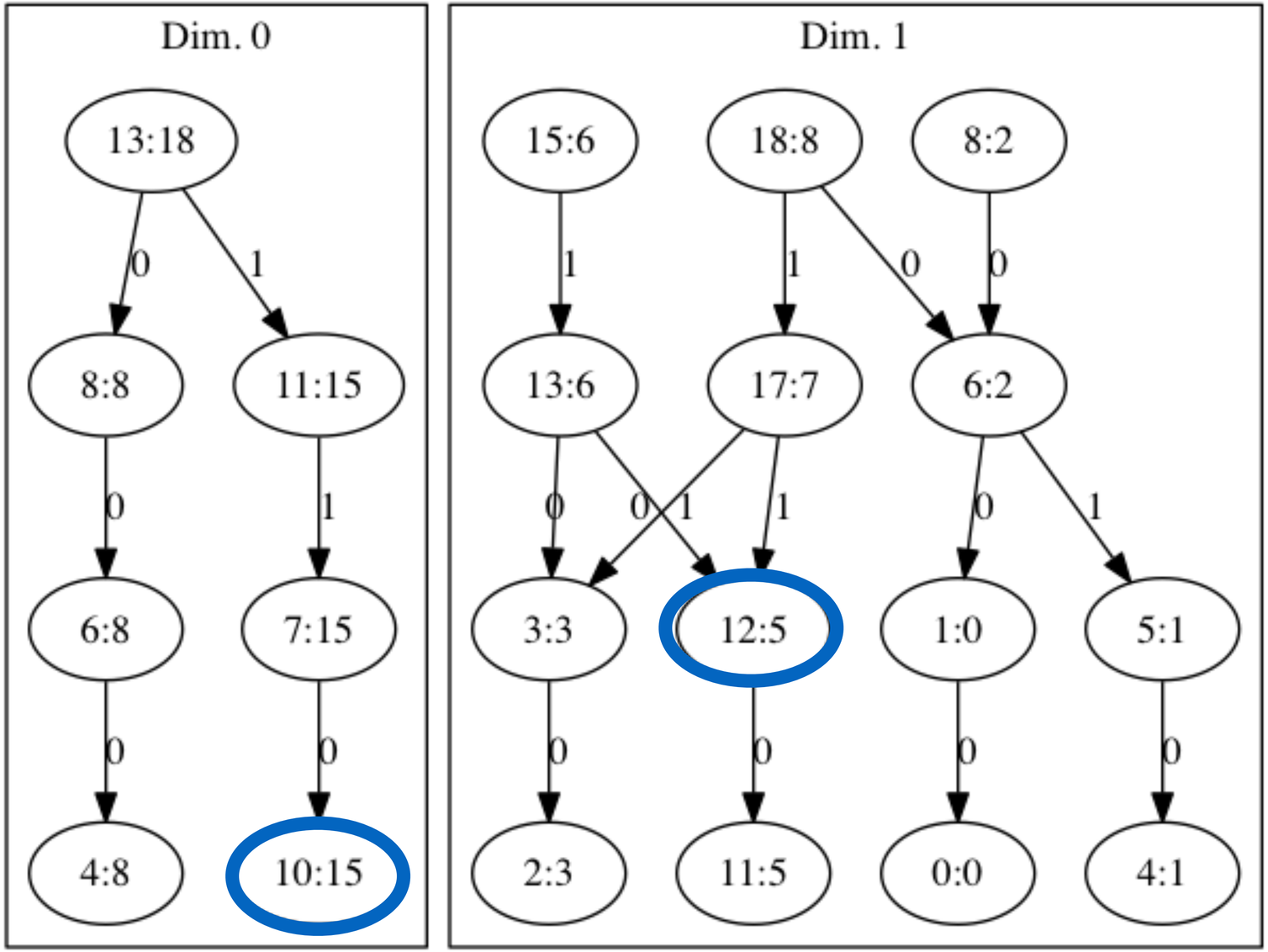
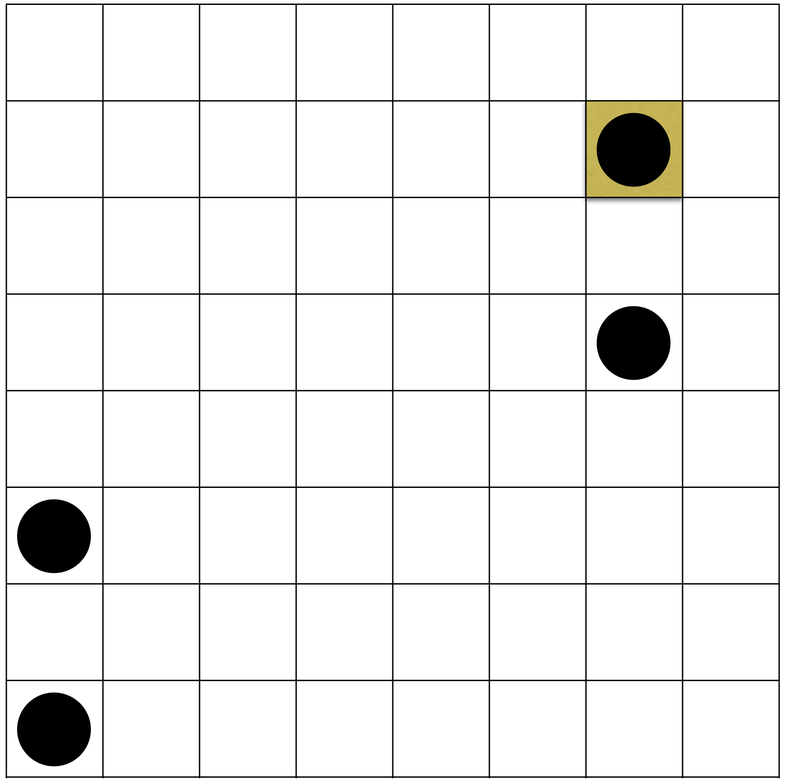


Example 1



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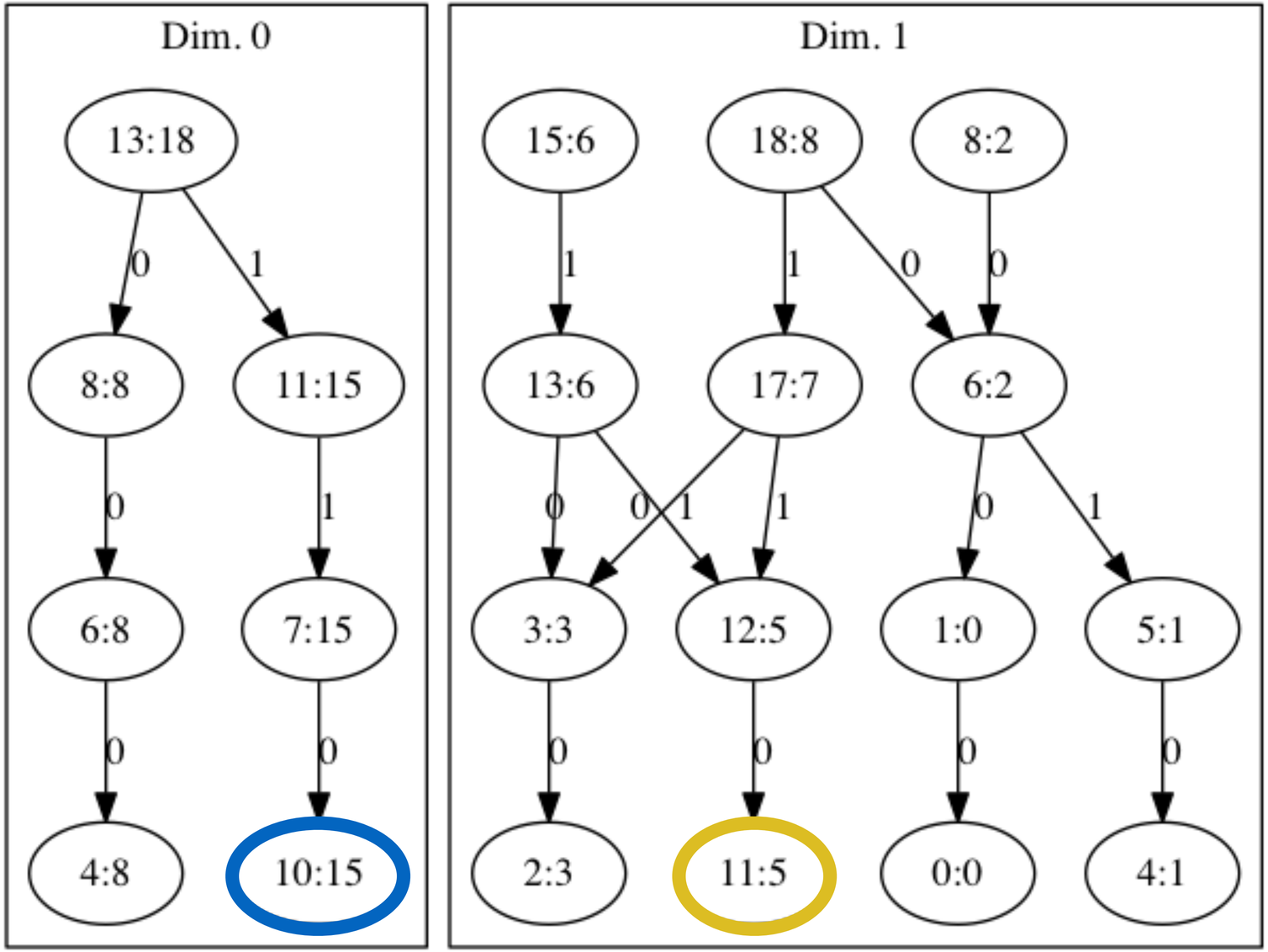
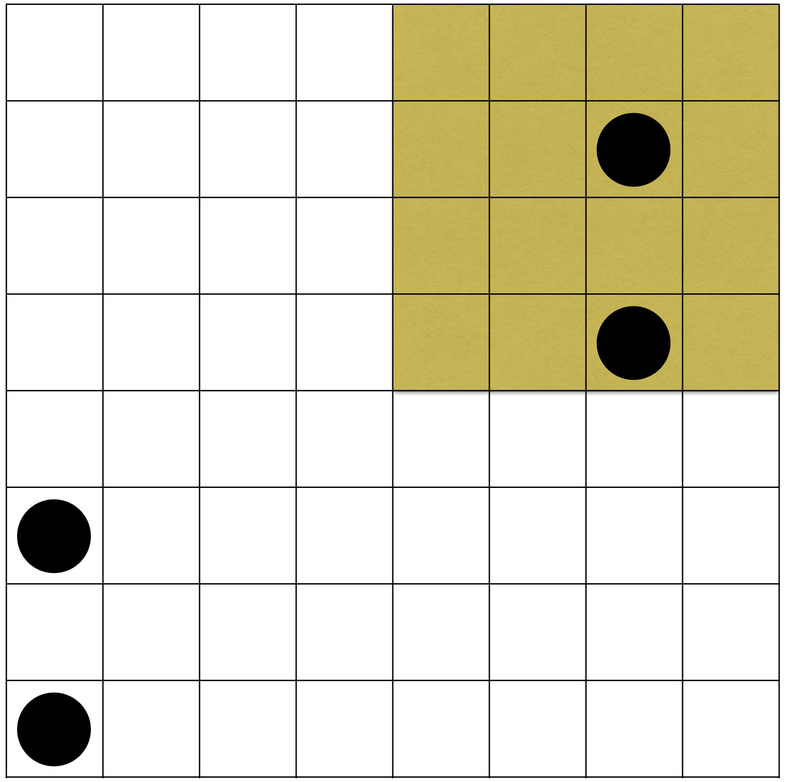


Example 1b



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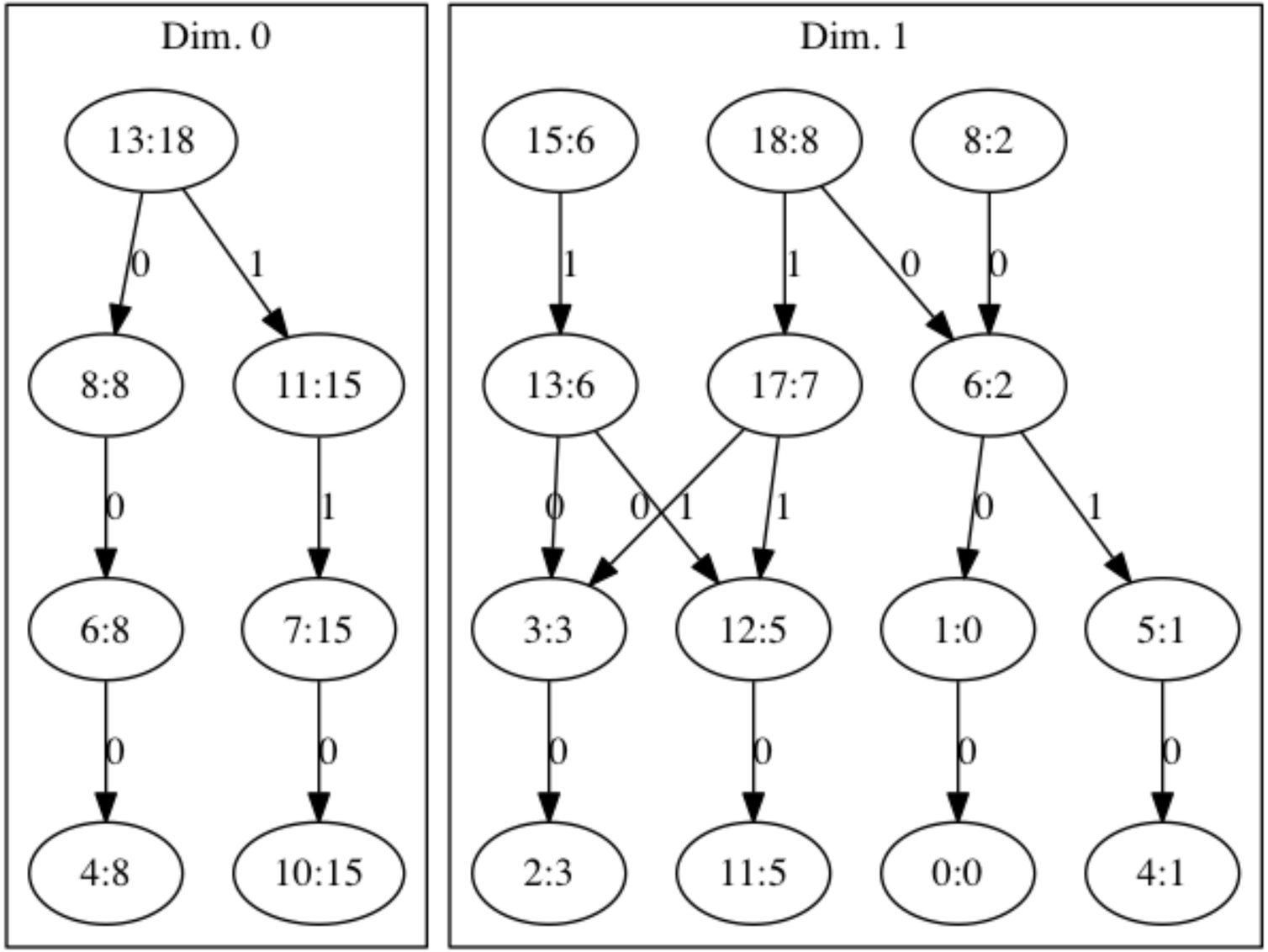
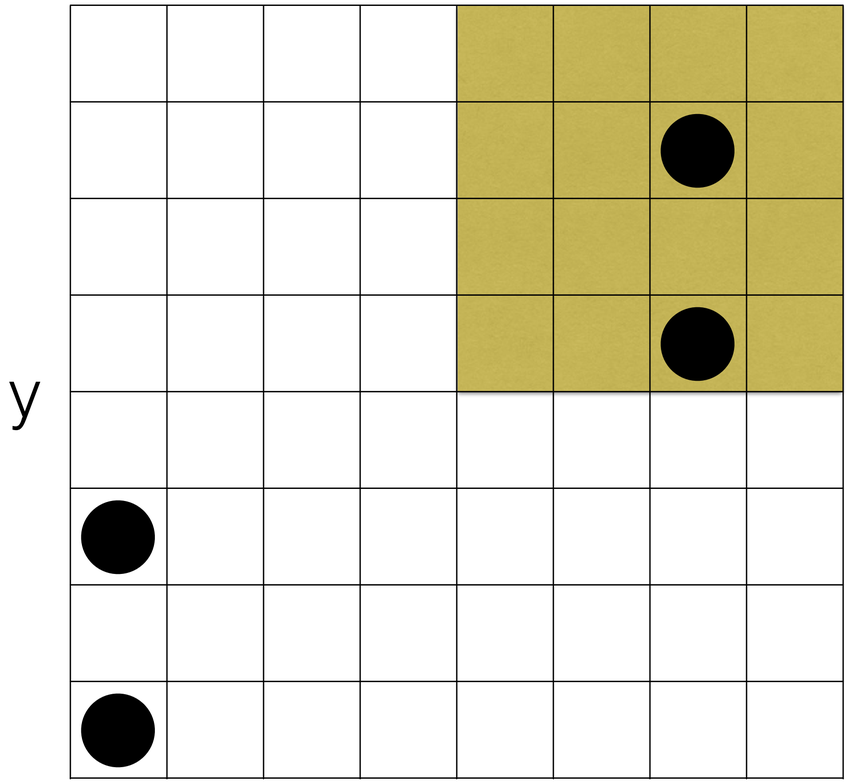


Example 1b



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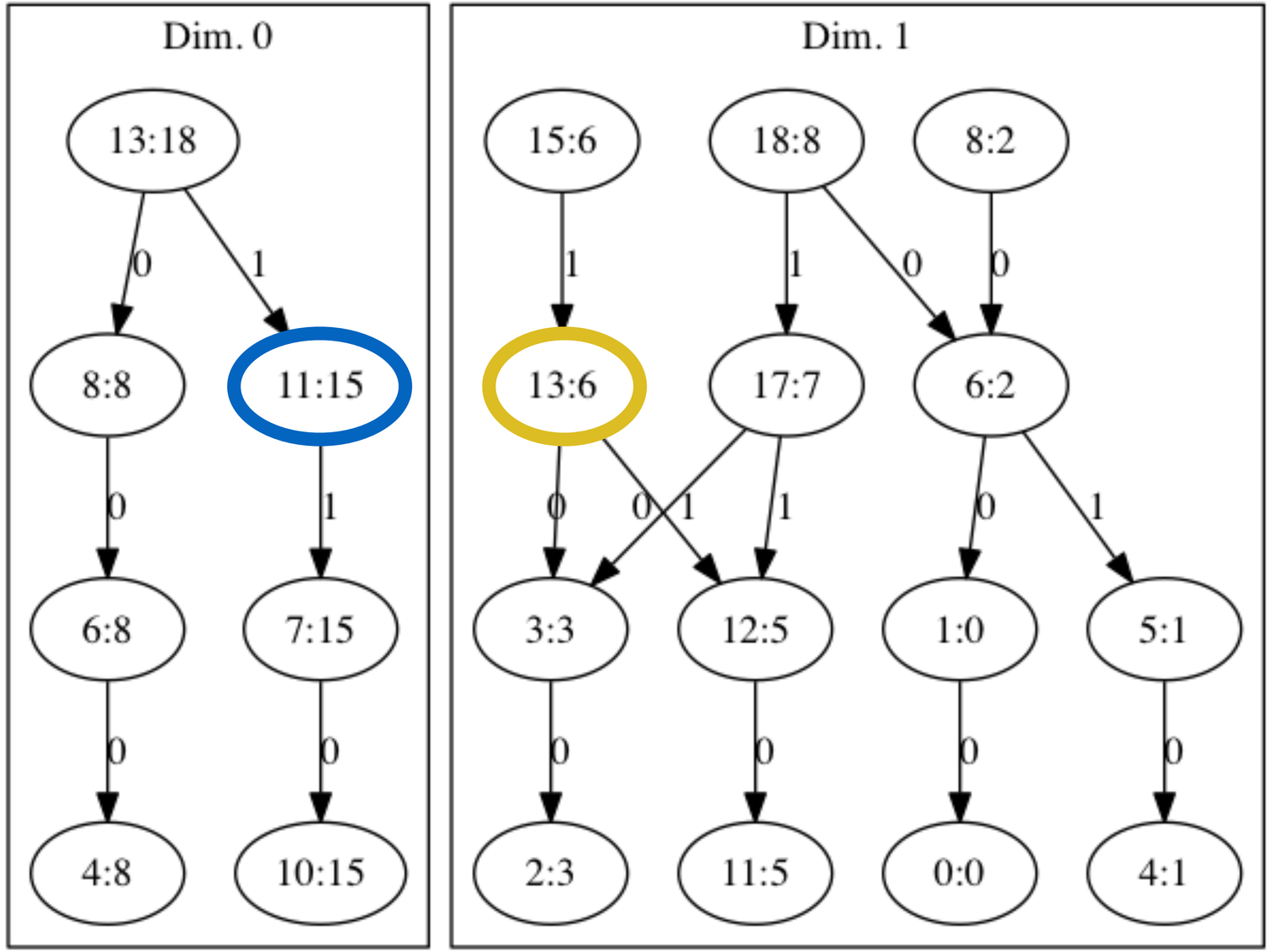
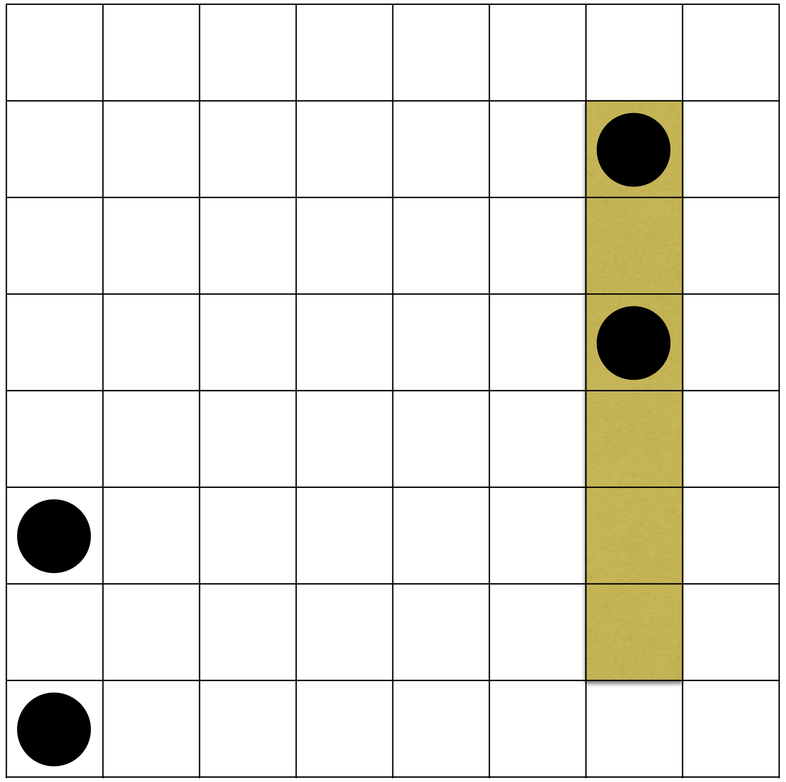


Example 2



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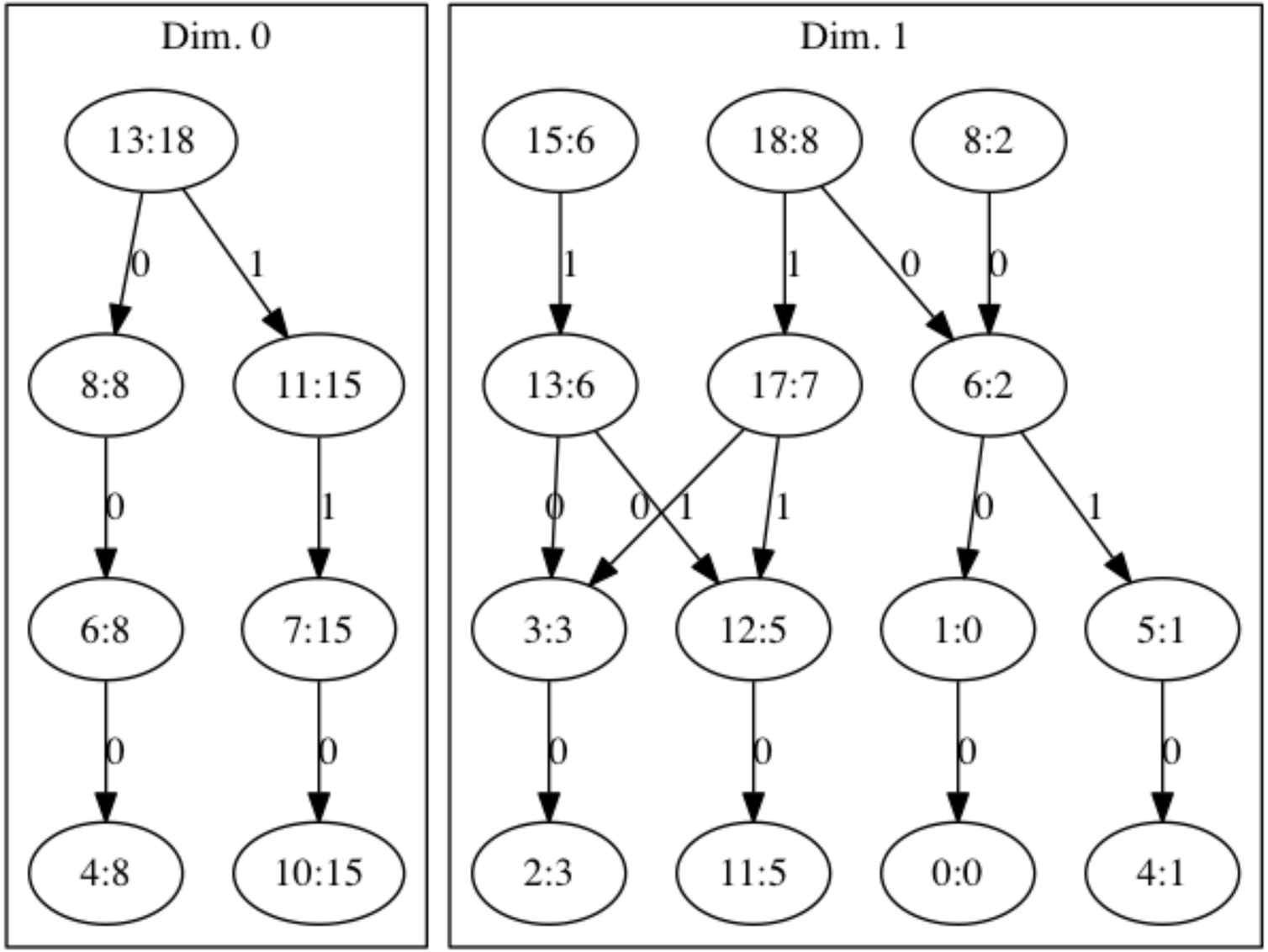

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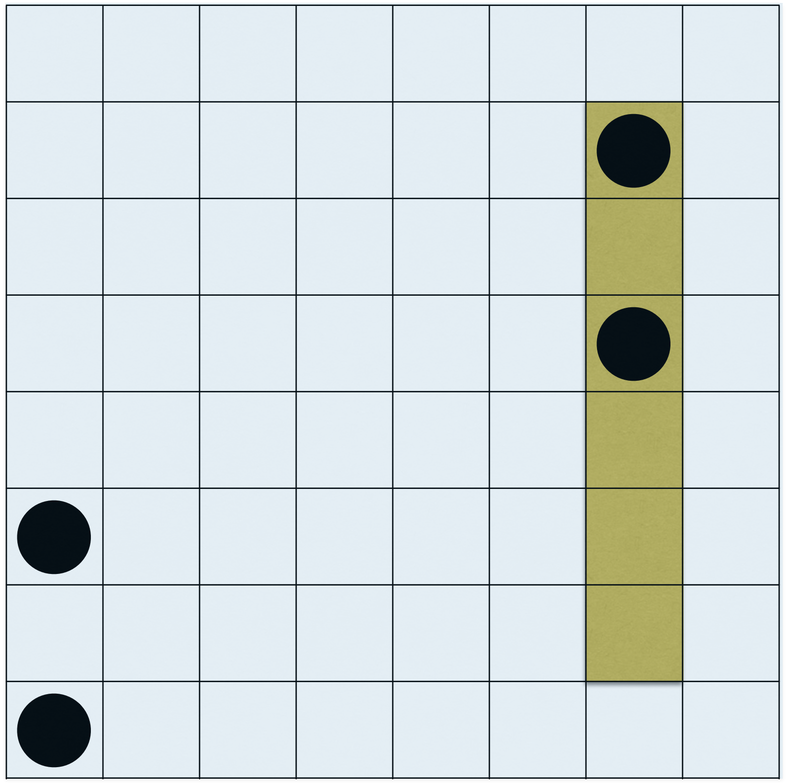

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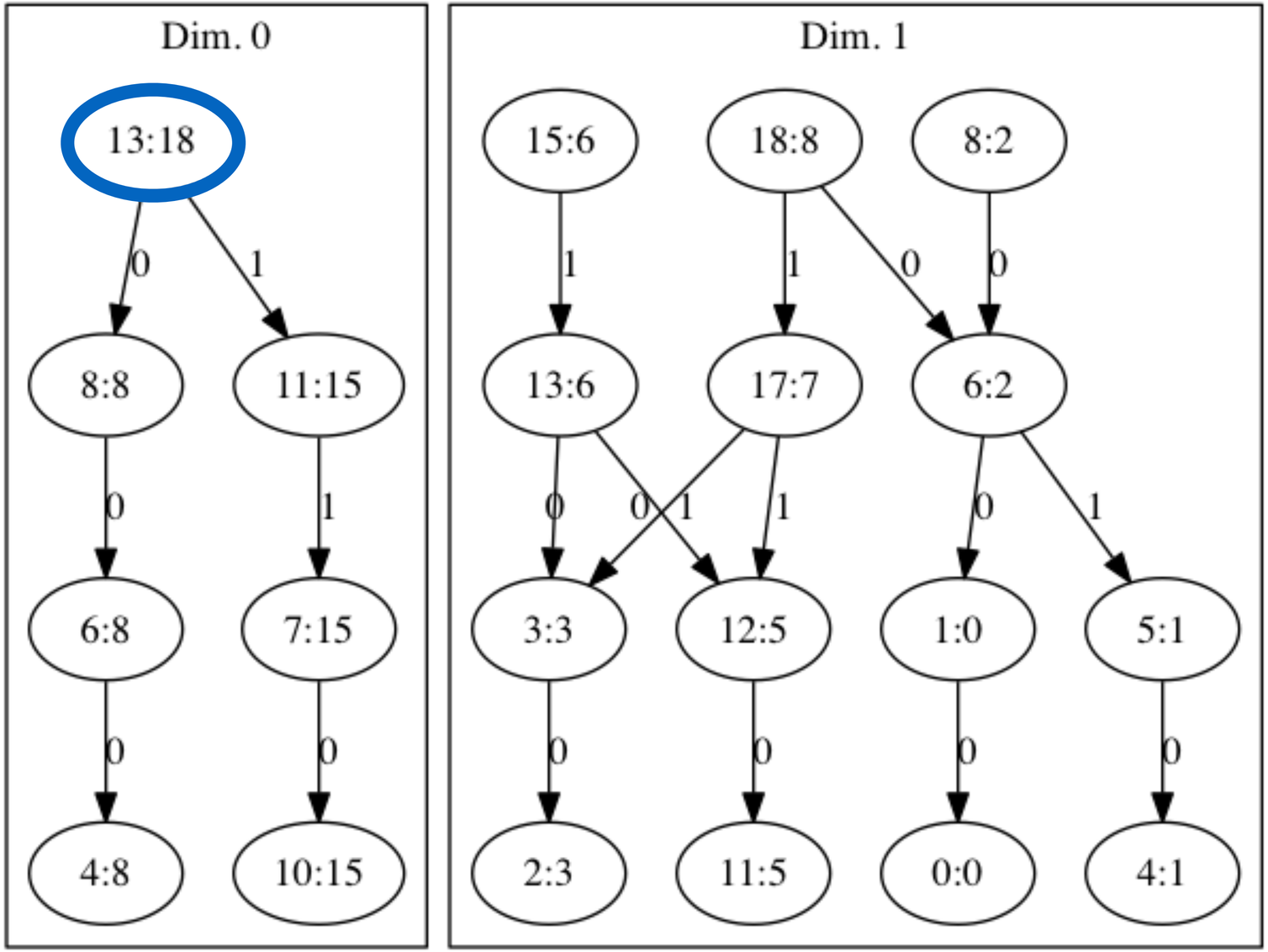
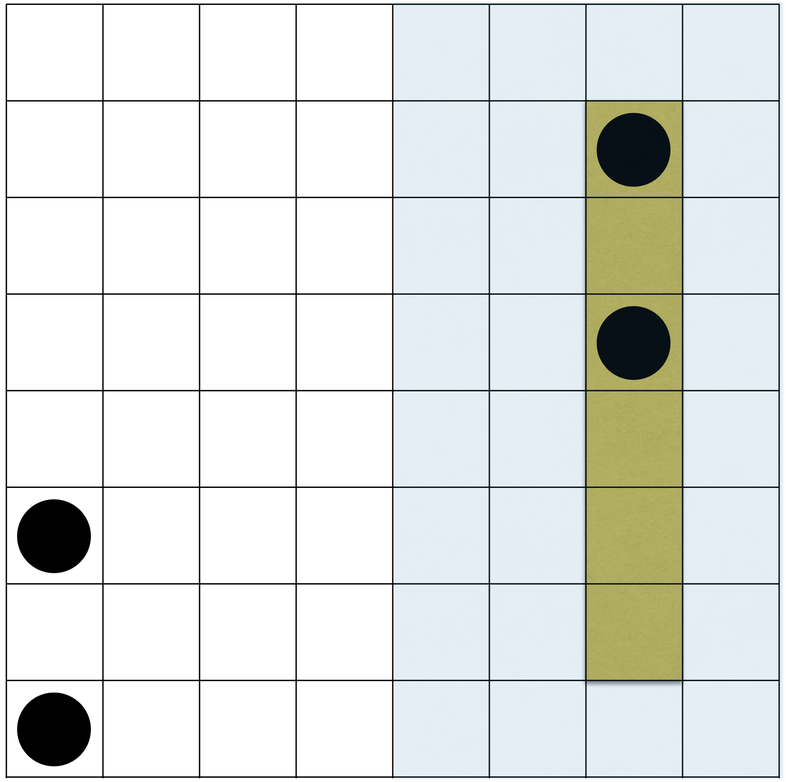


Example 2



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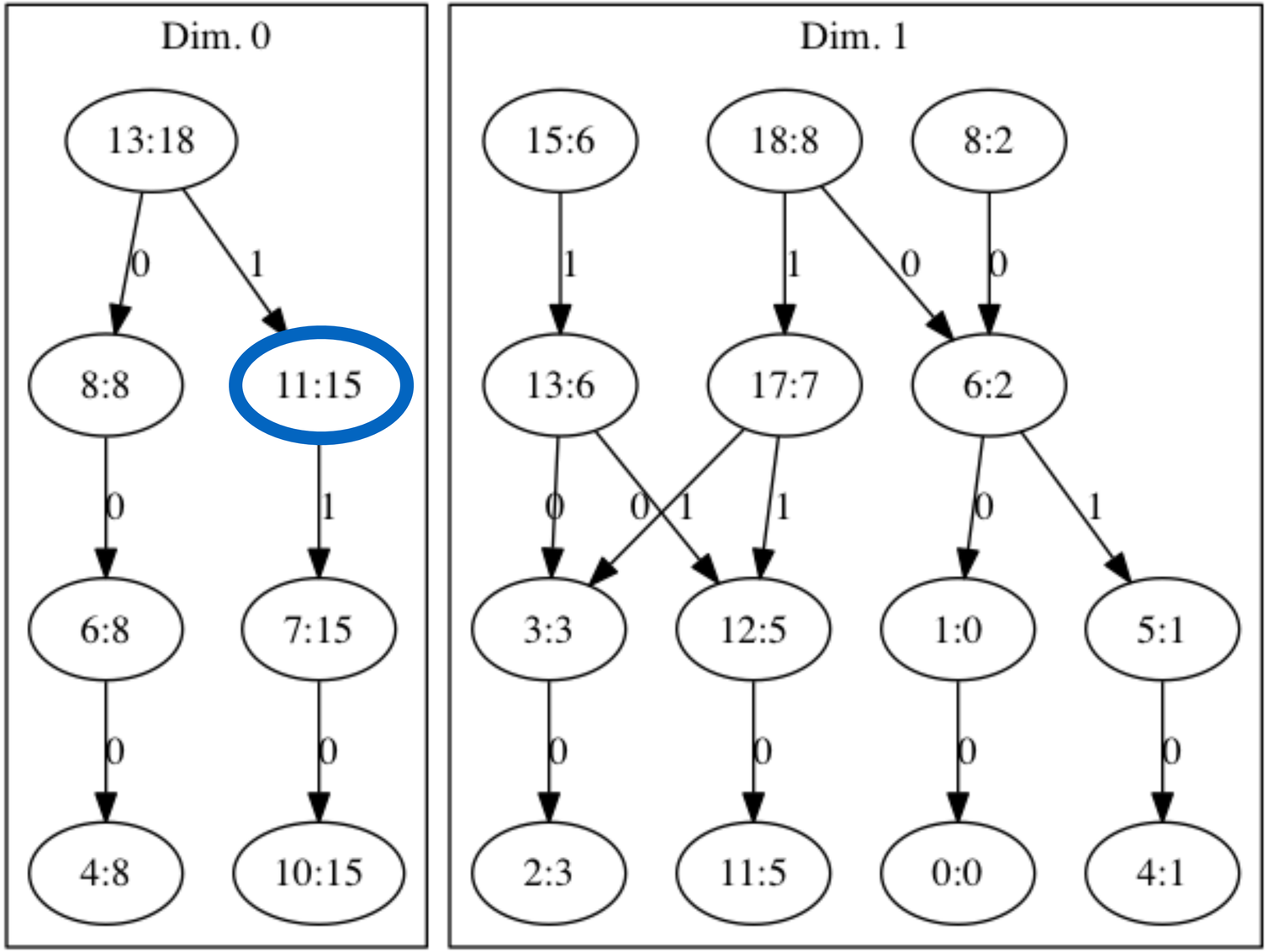
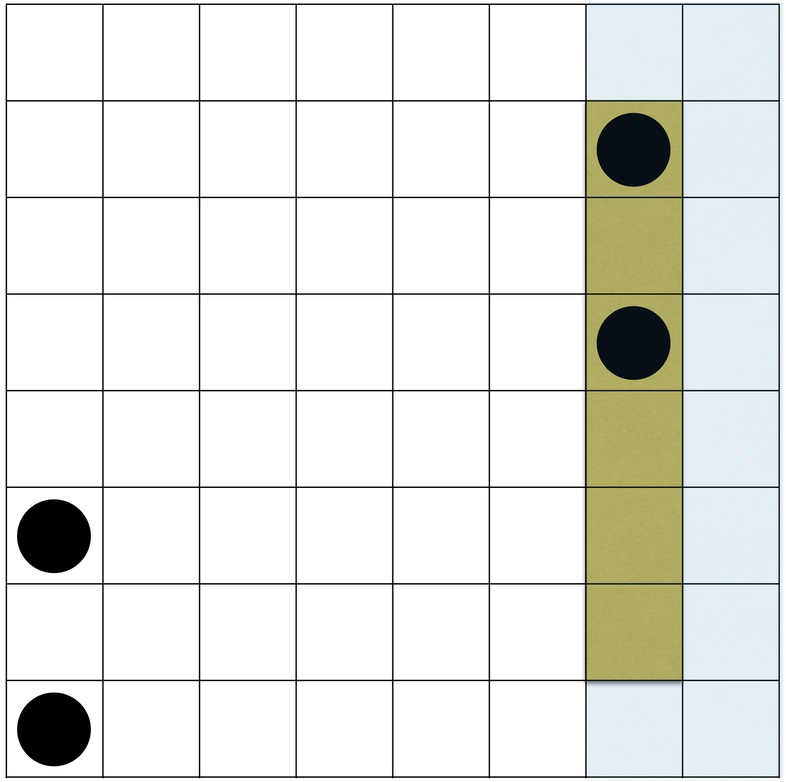


Example 2



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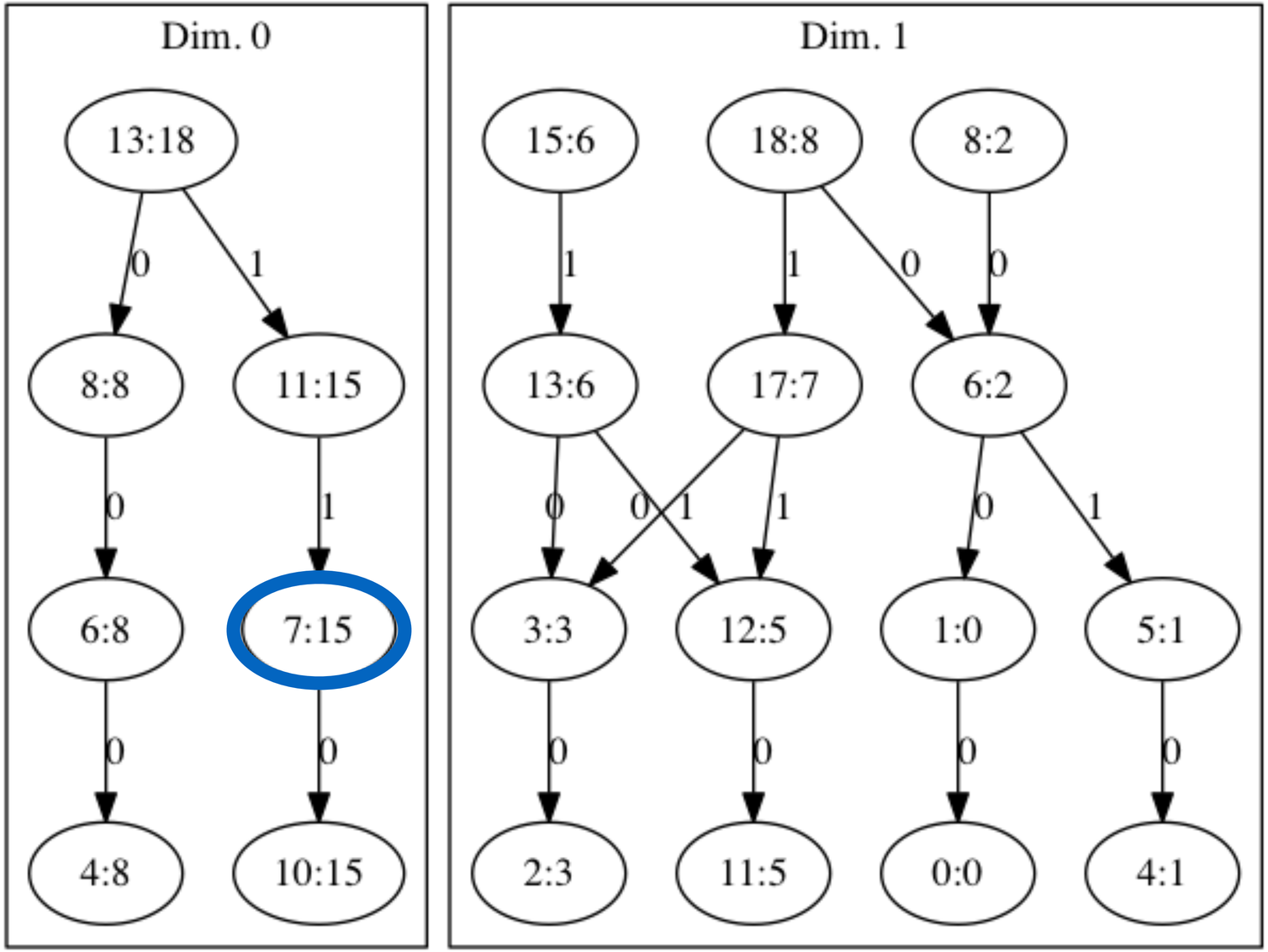
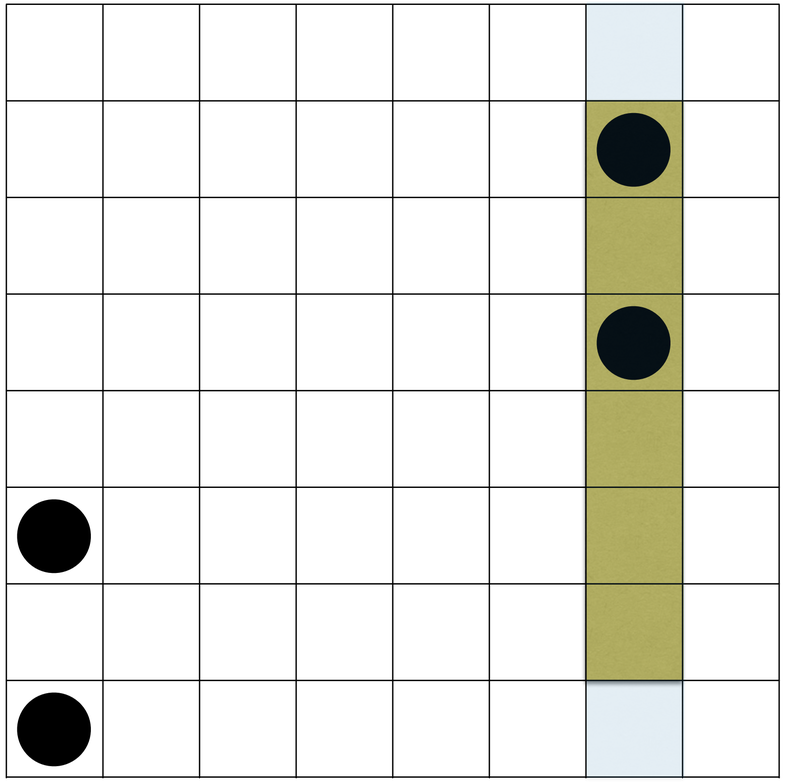


Example 2



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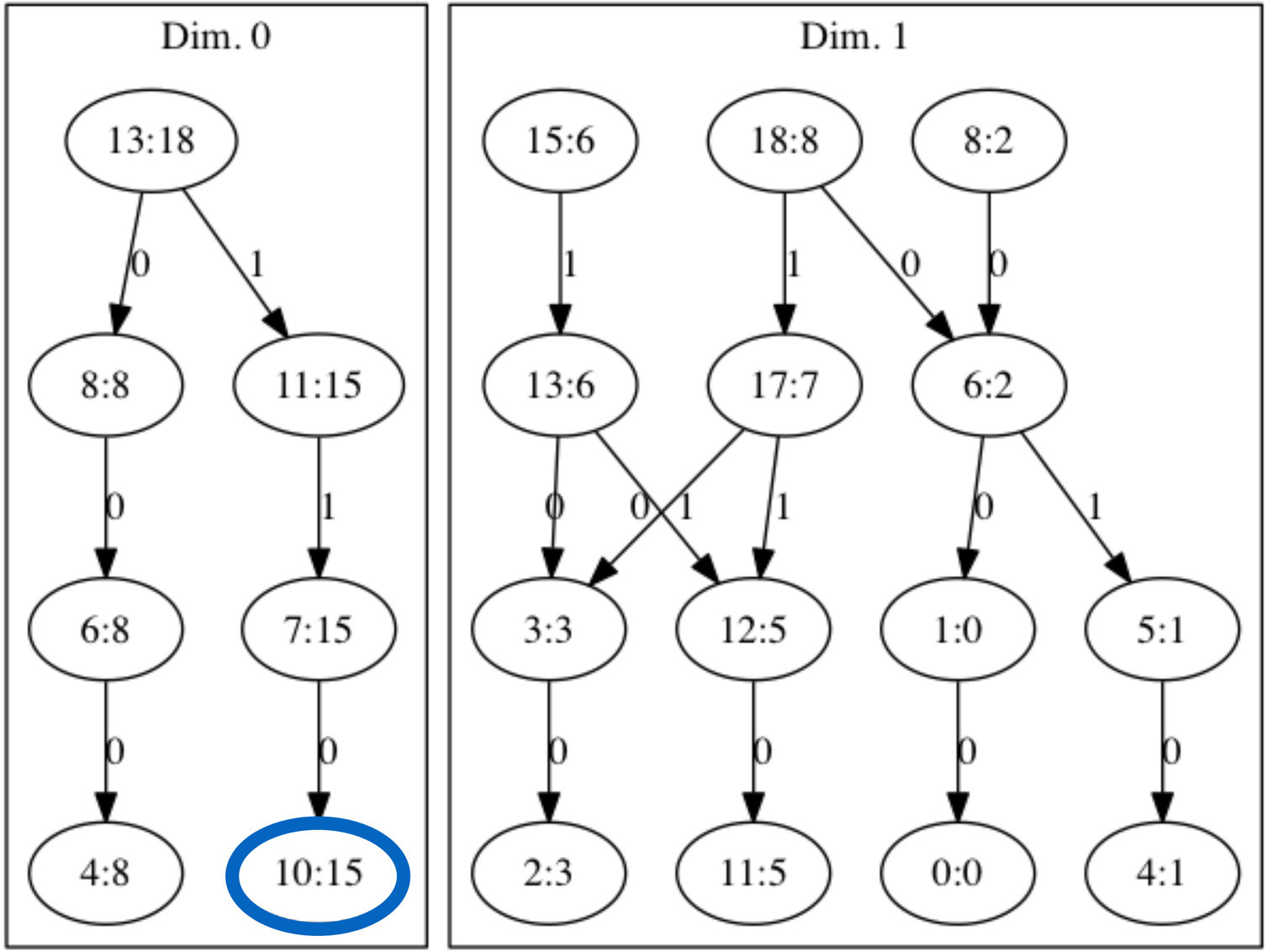
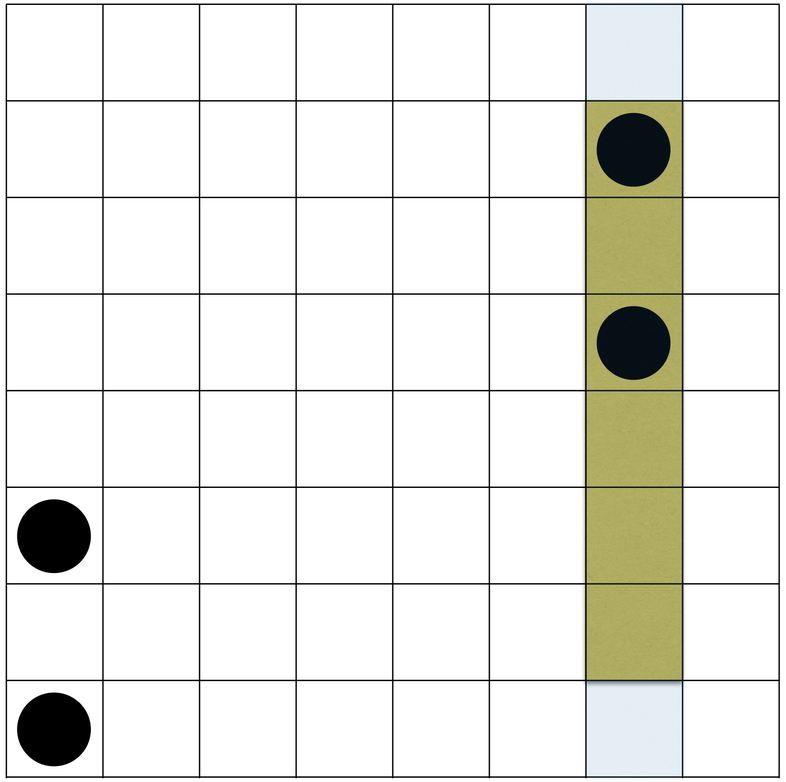


Example 2



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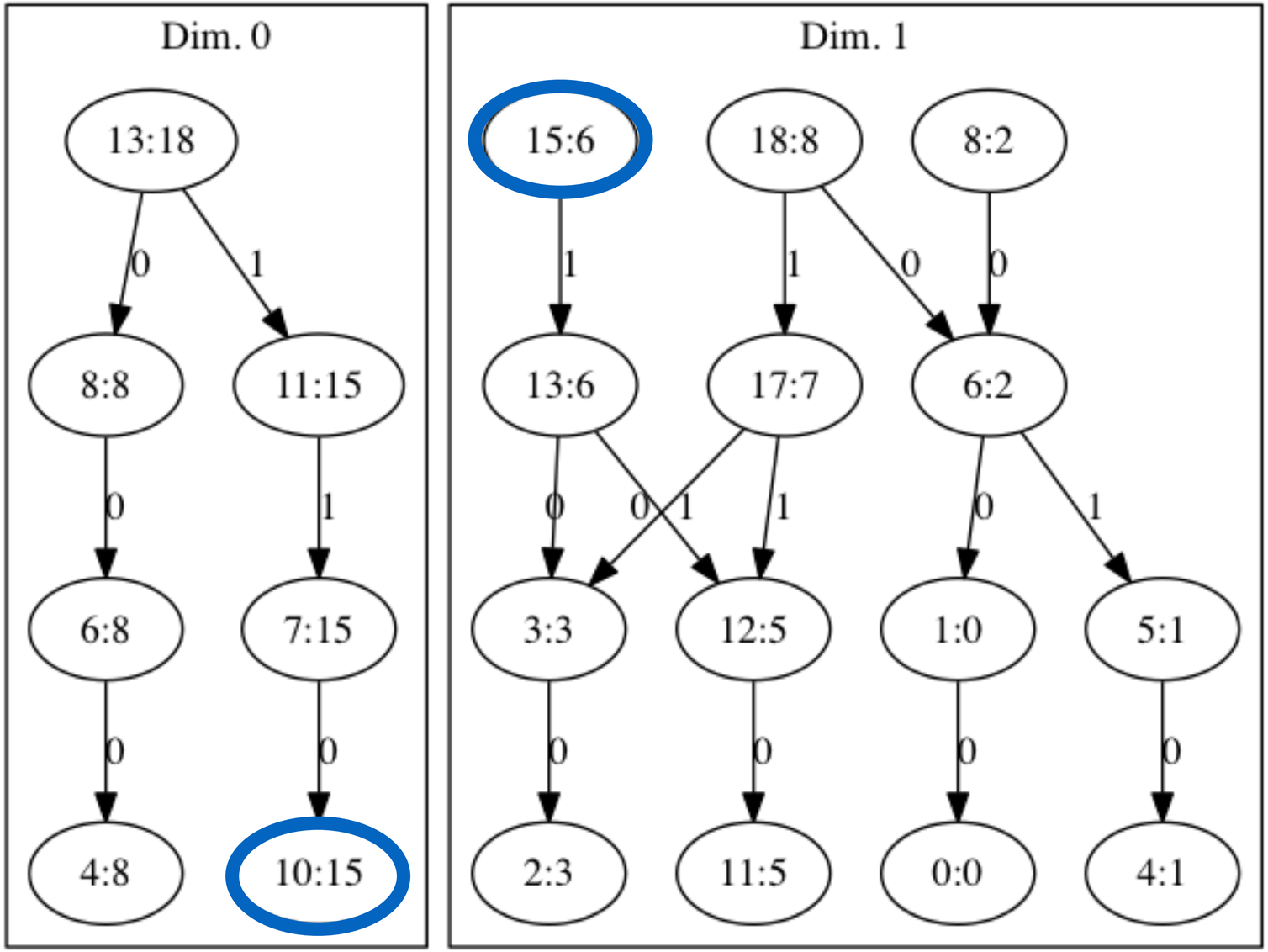

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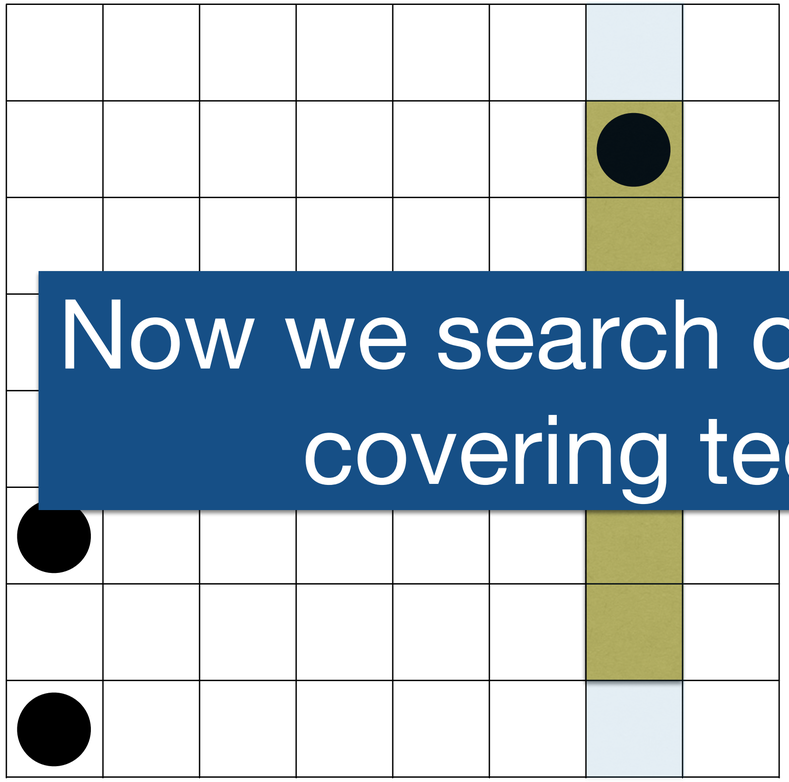

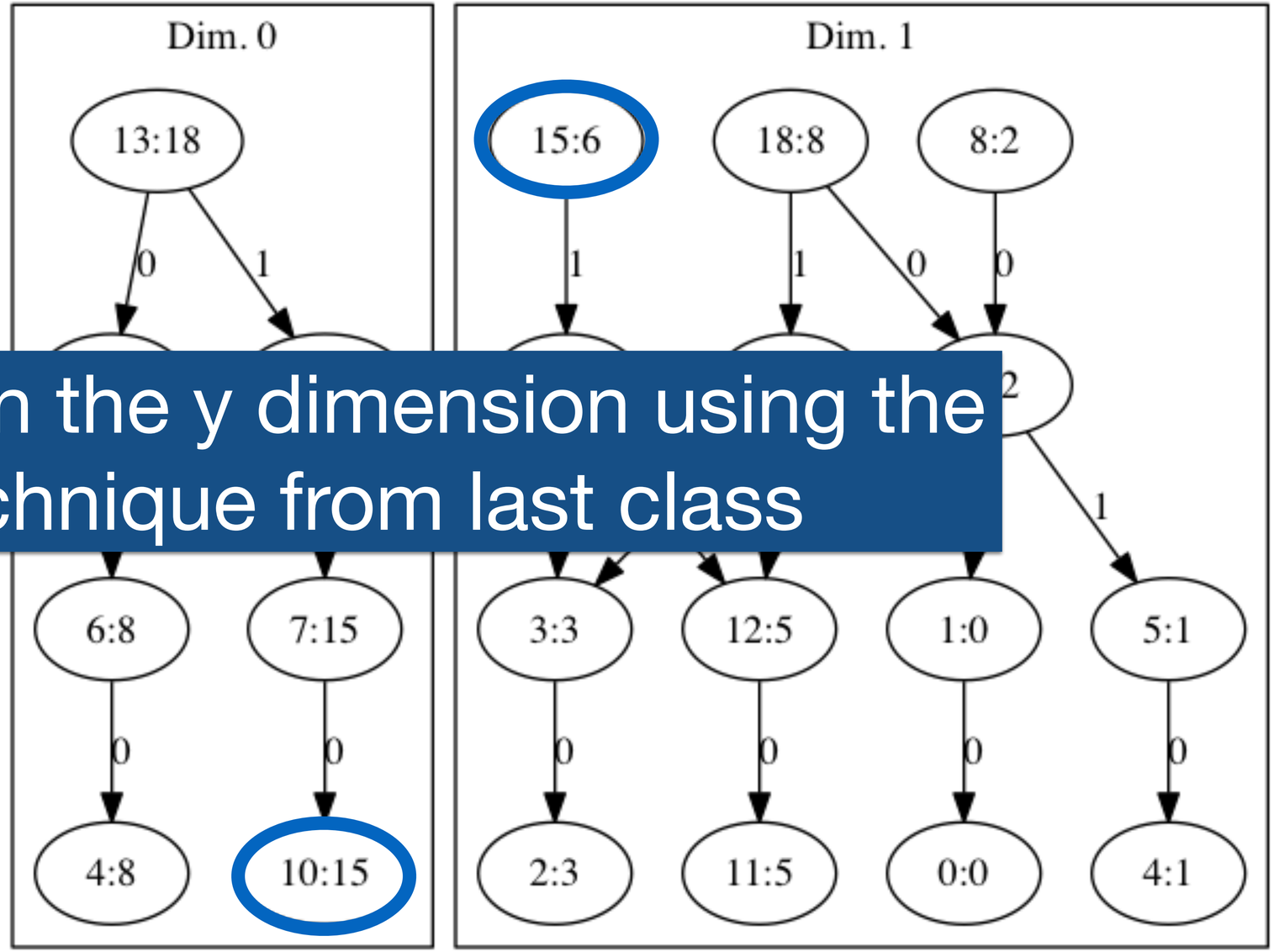

Now we search on the y dimension using the covering technique from last class

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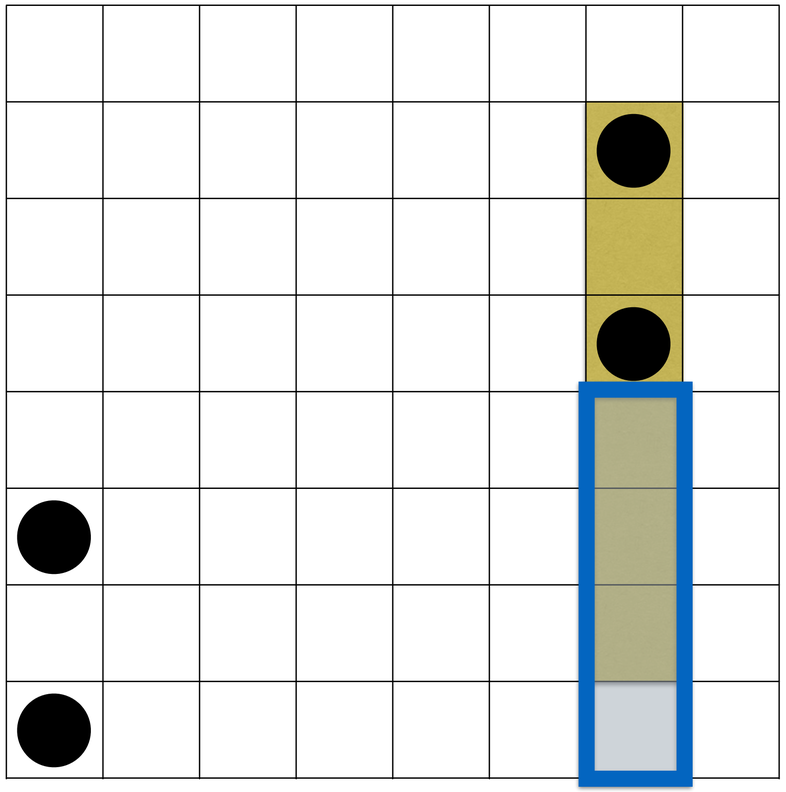
Example 2



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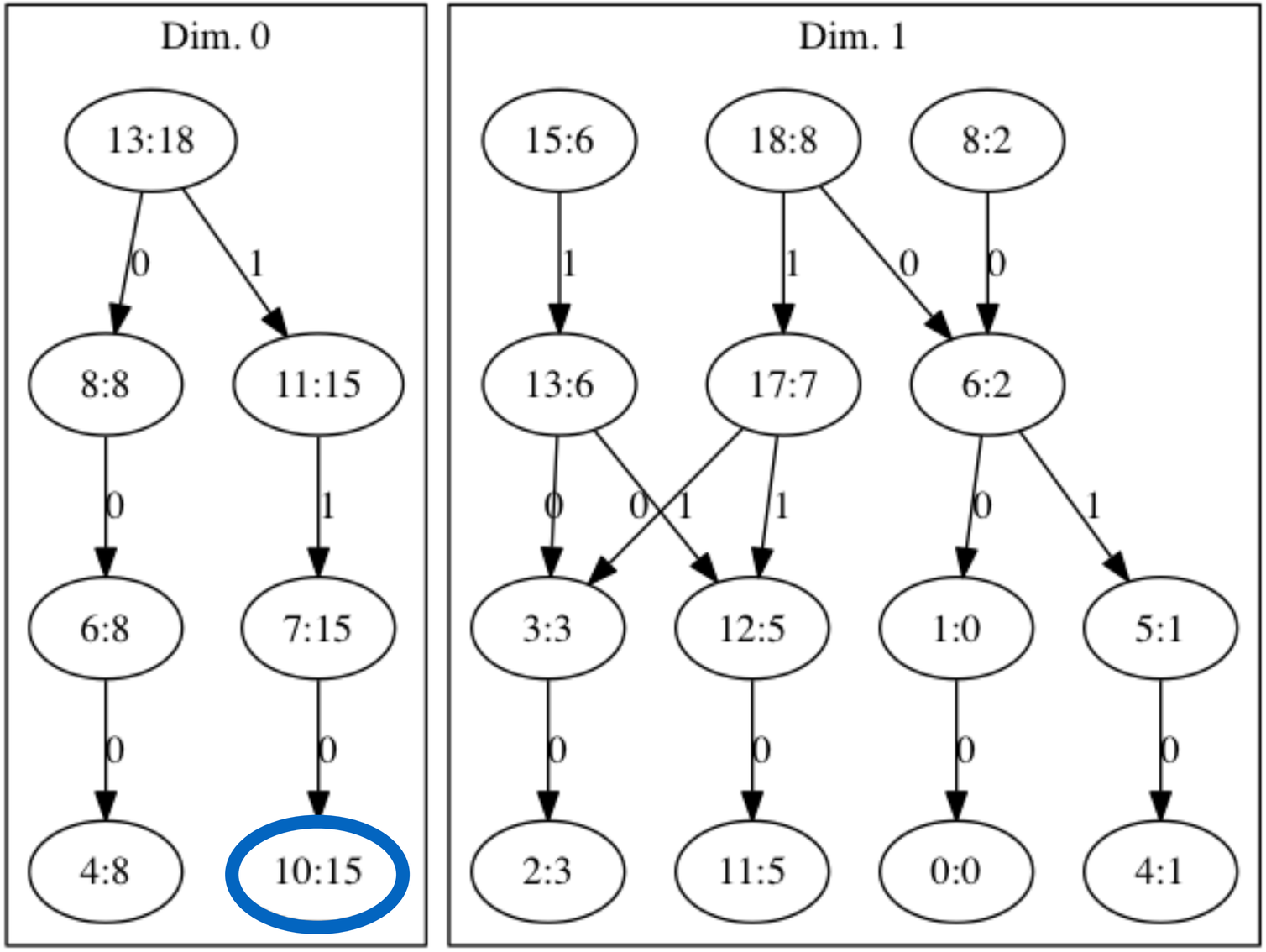
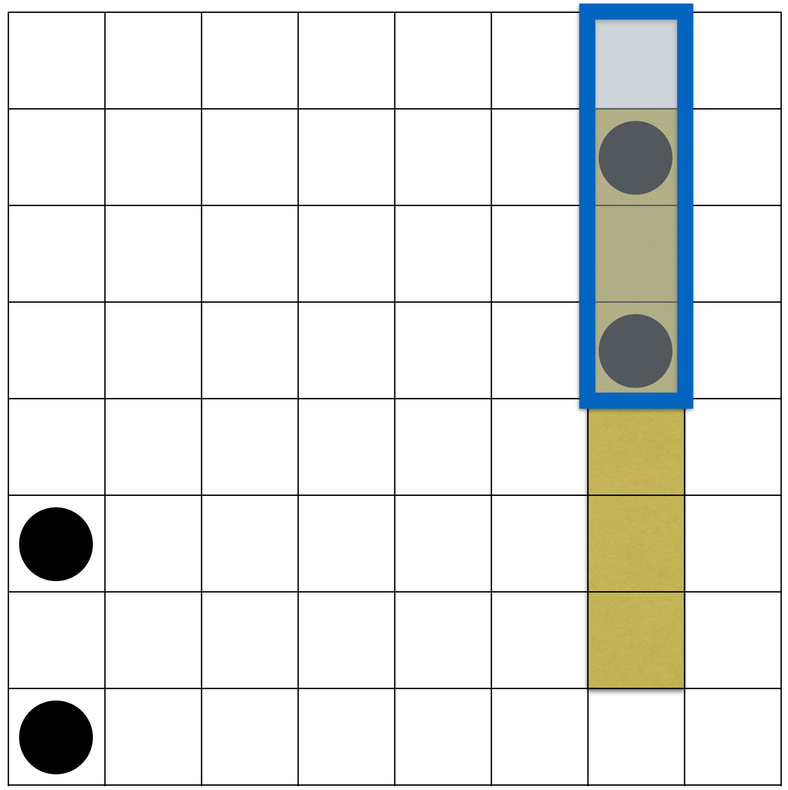


Example 2



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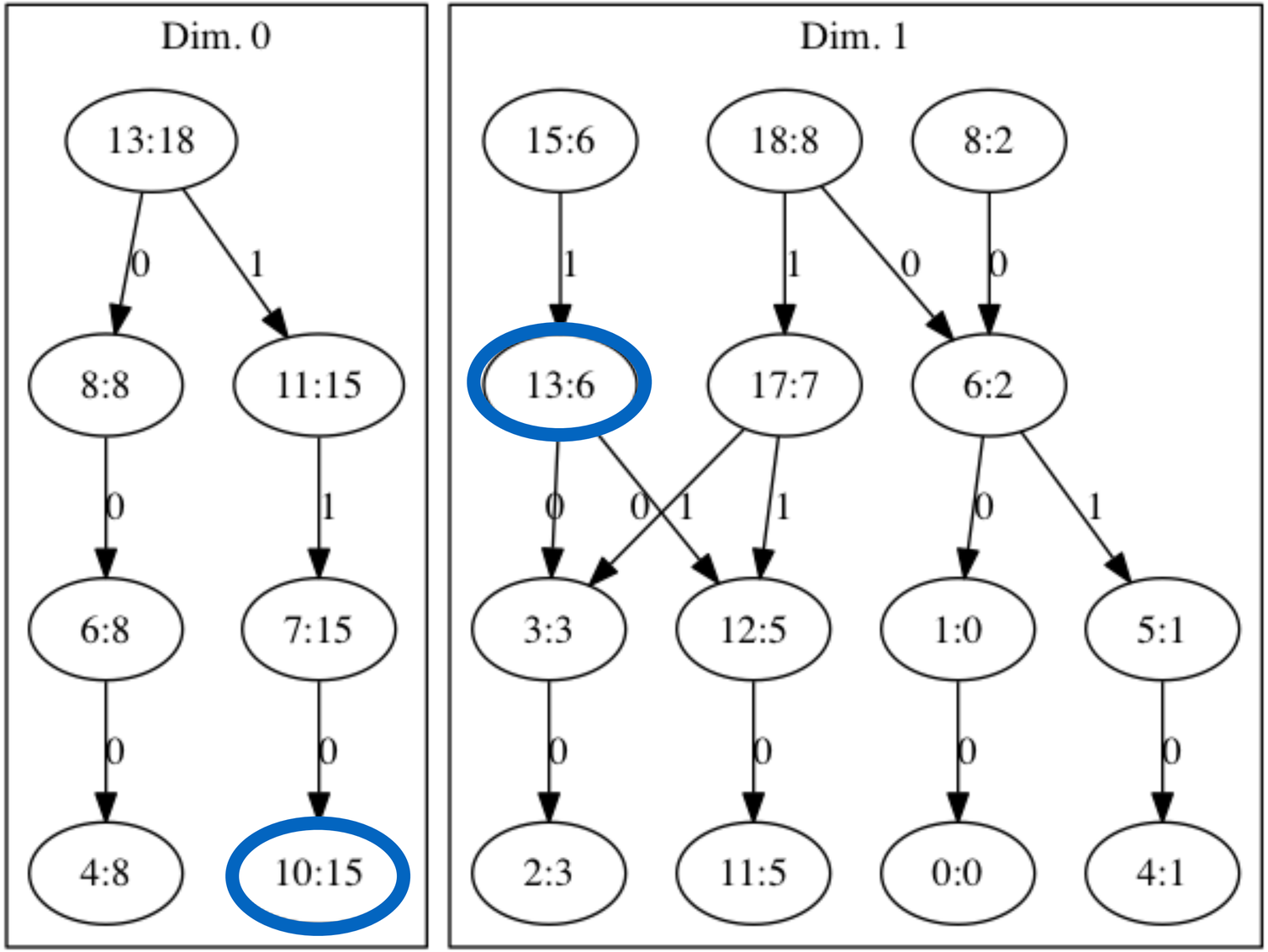
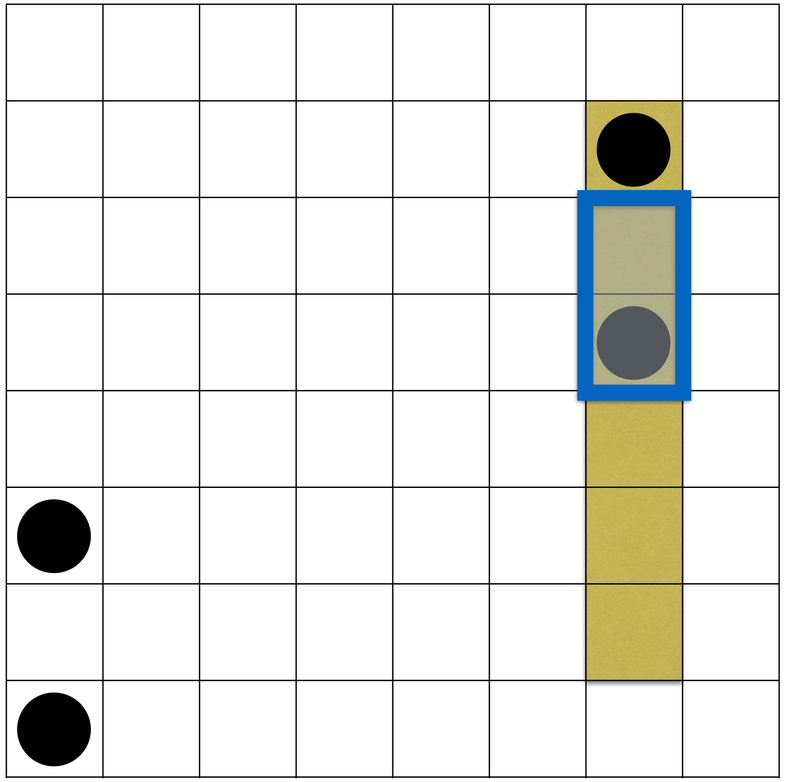


Example 2



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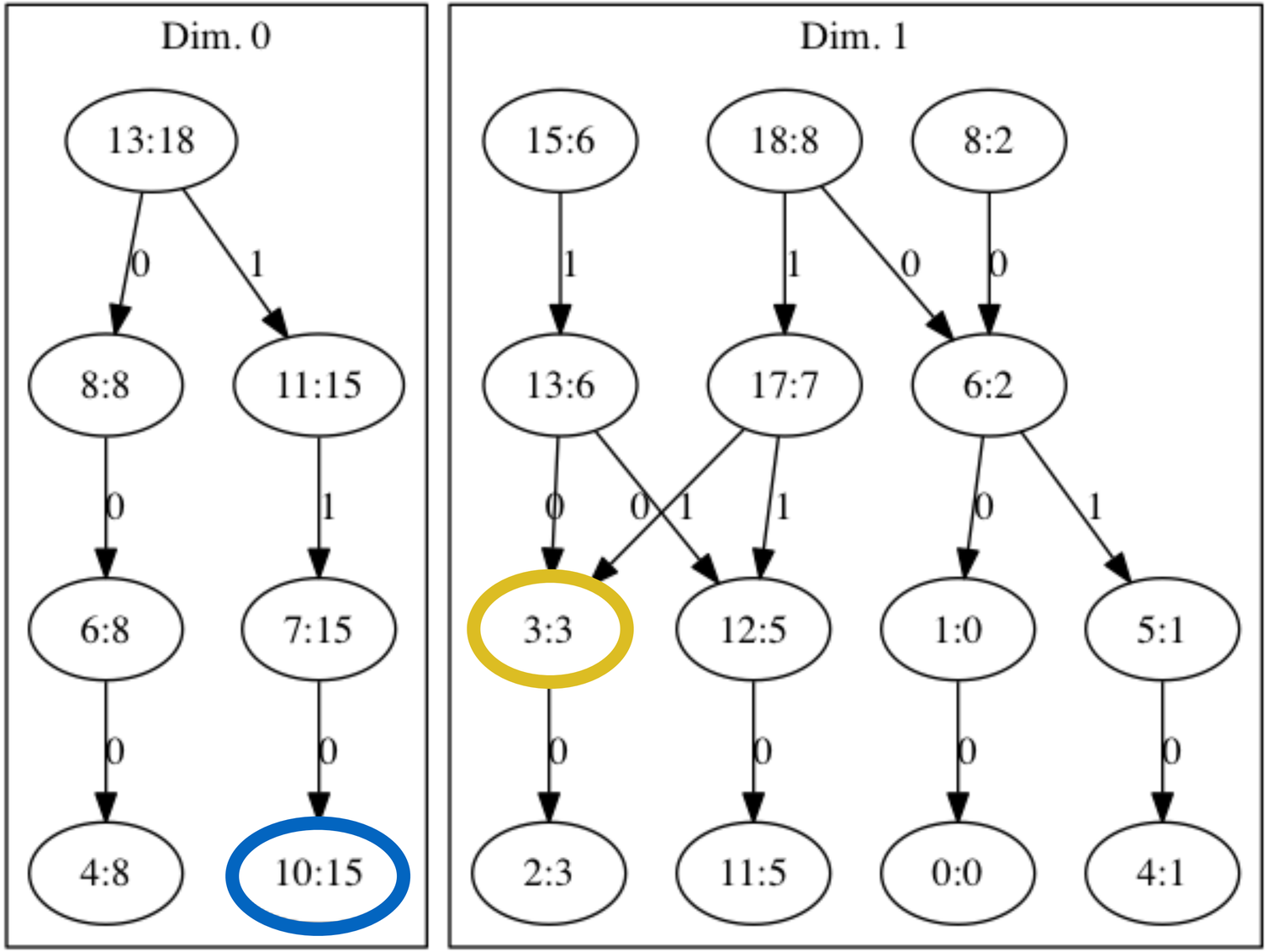

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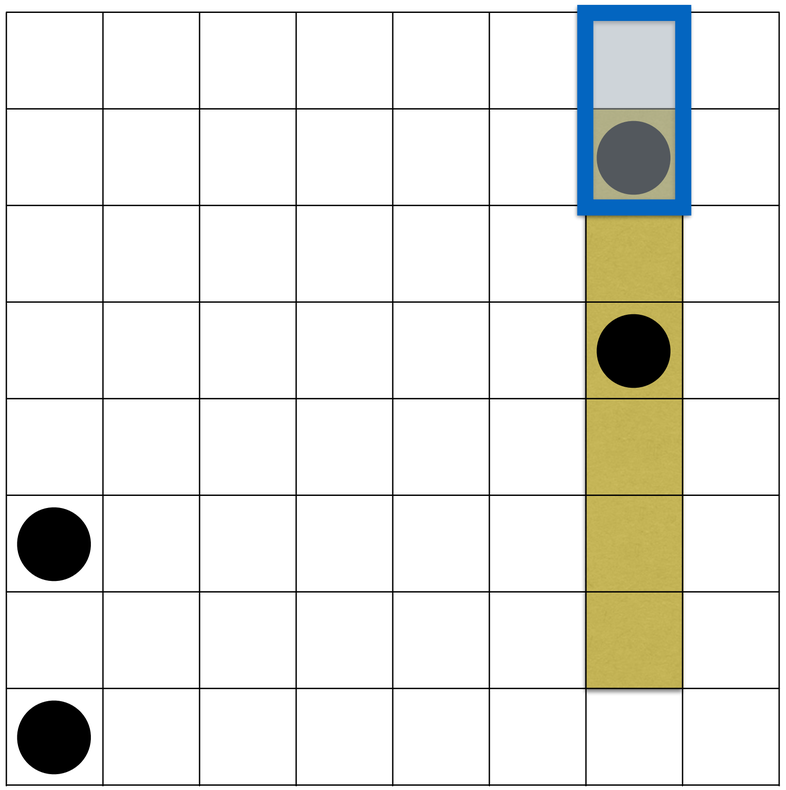

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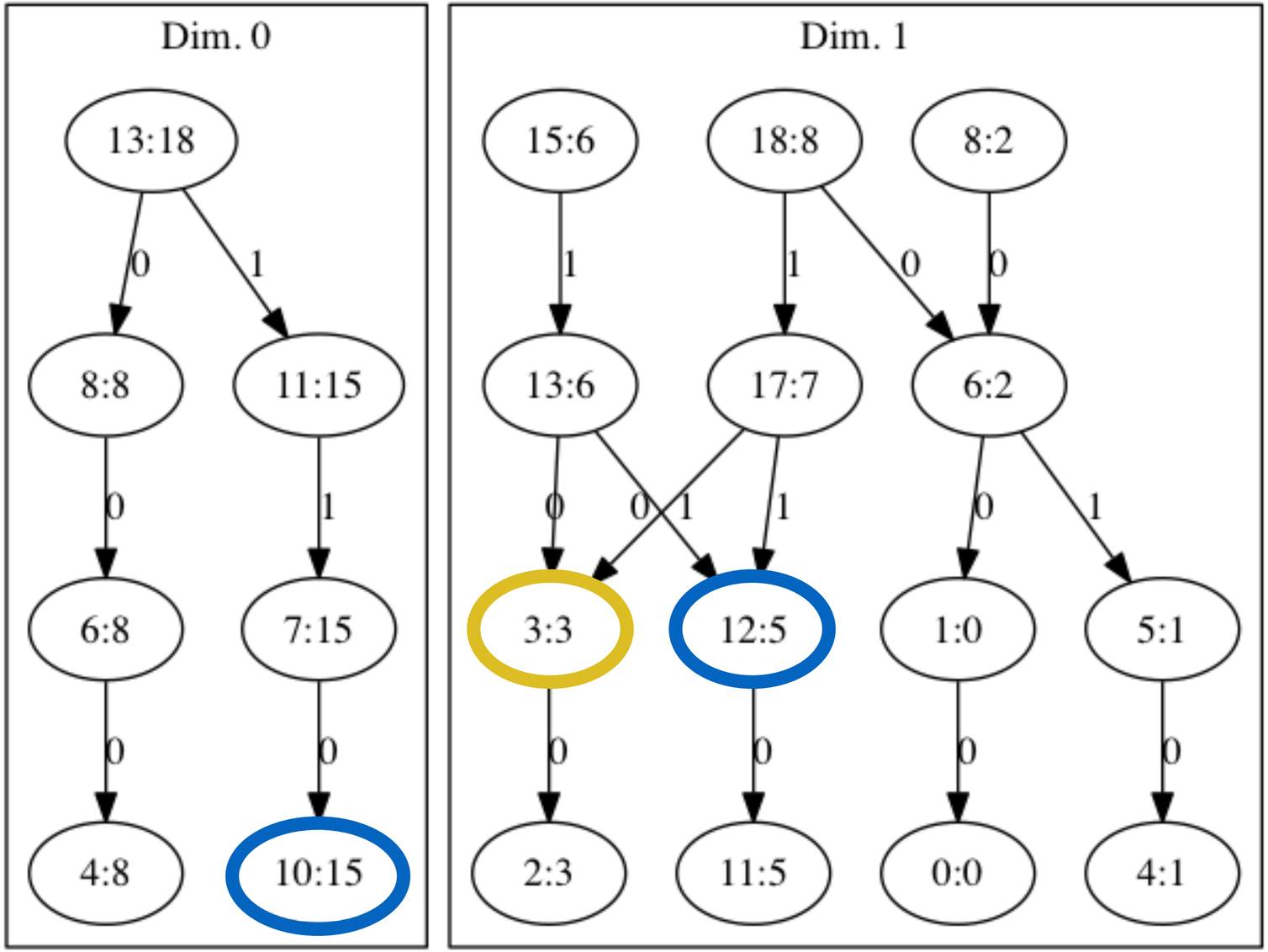
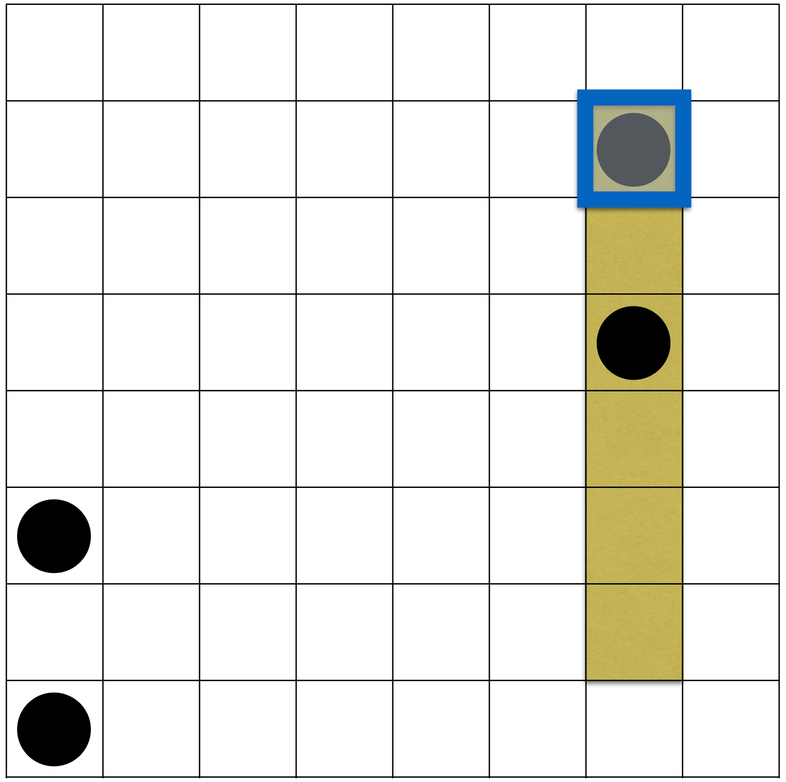


Example 2



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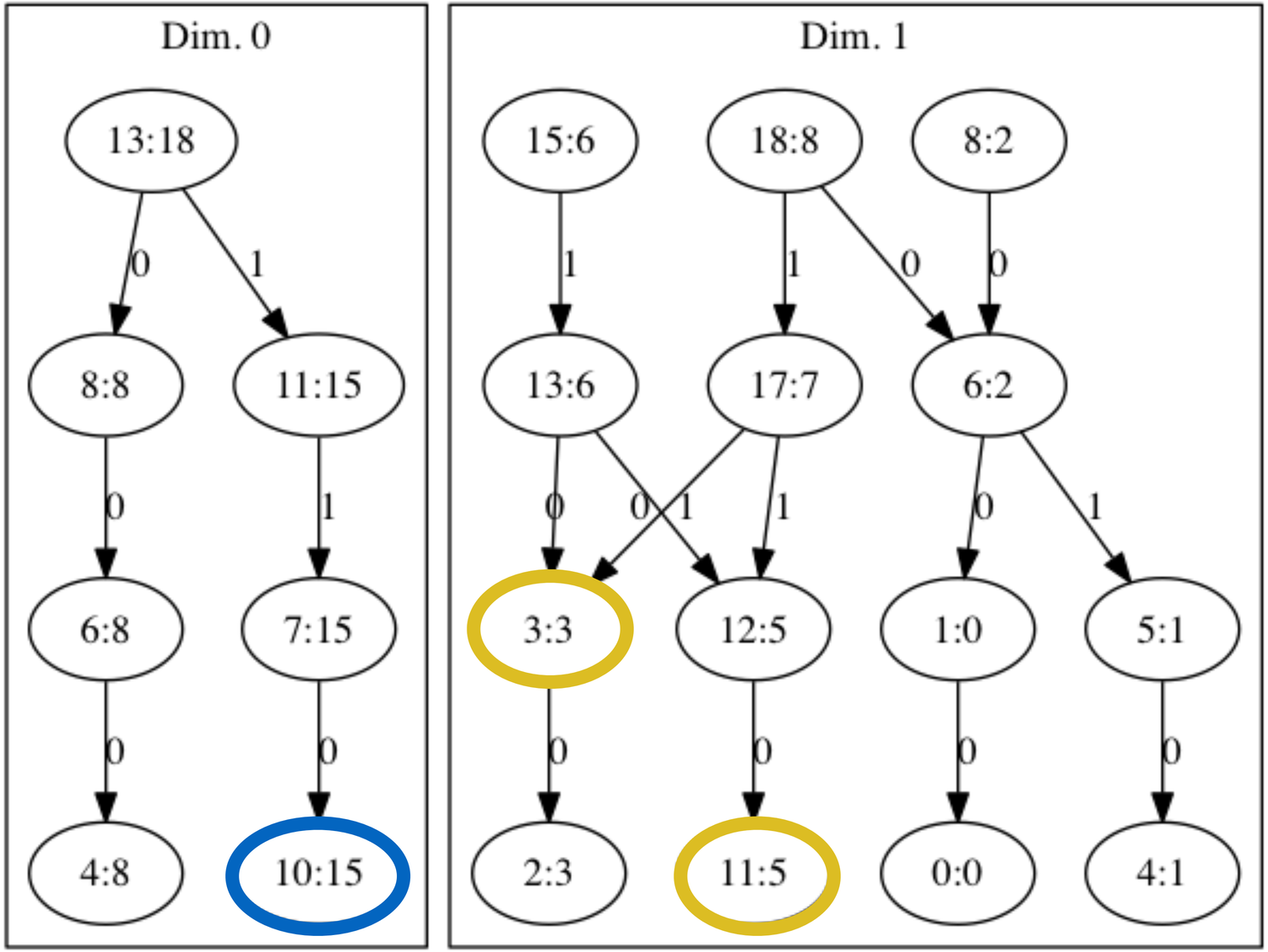

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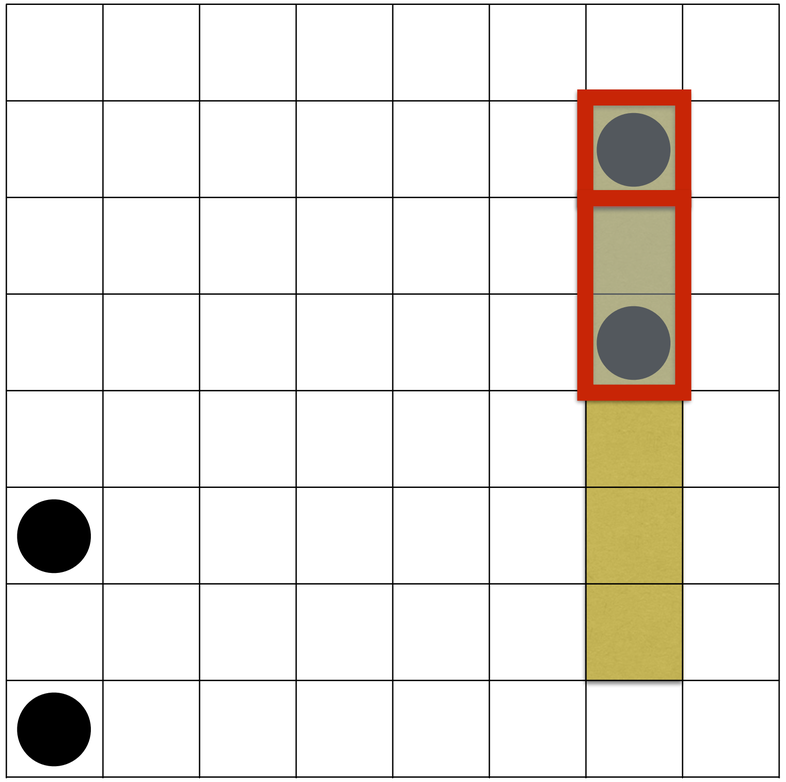

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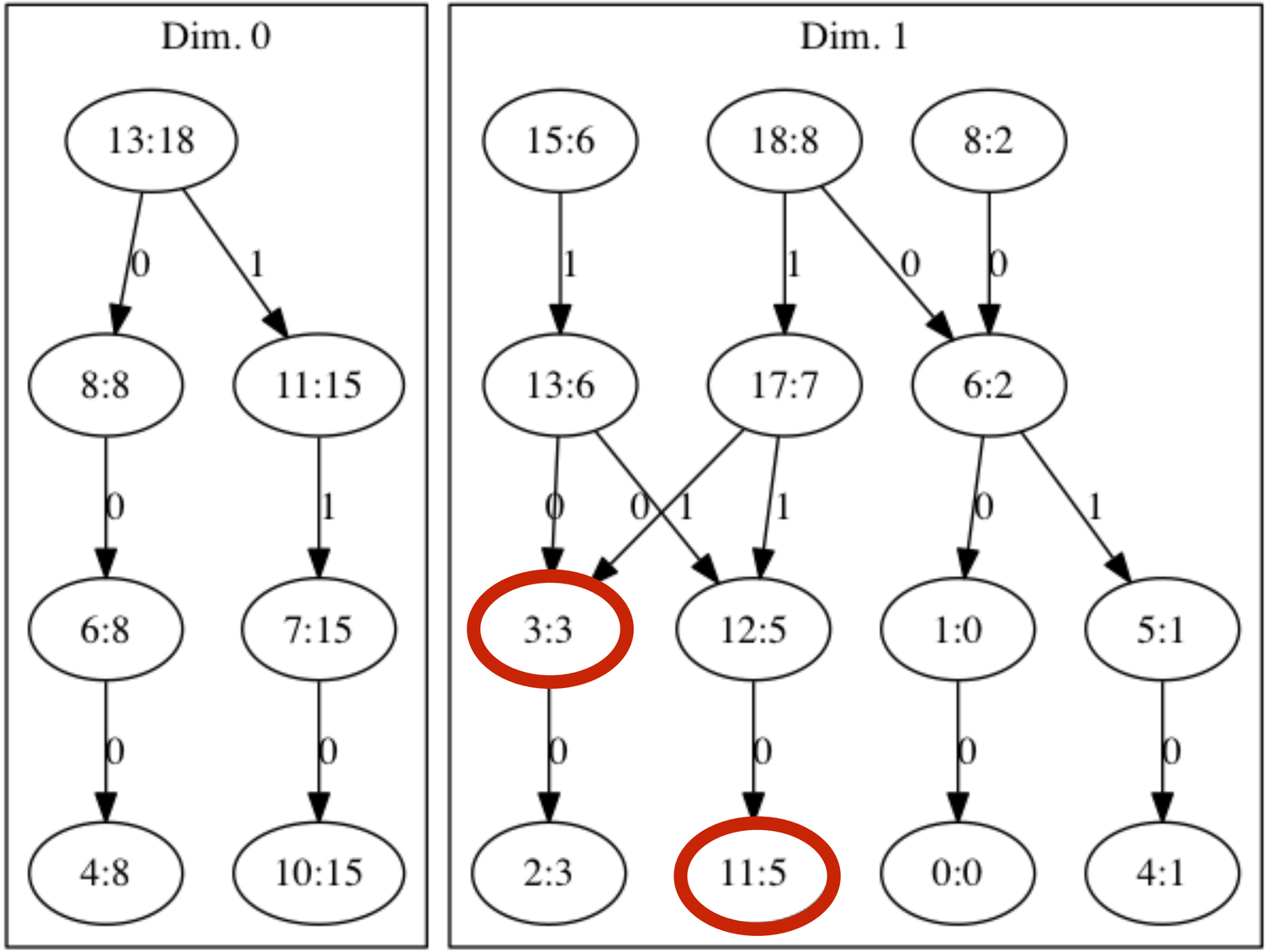
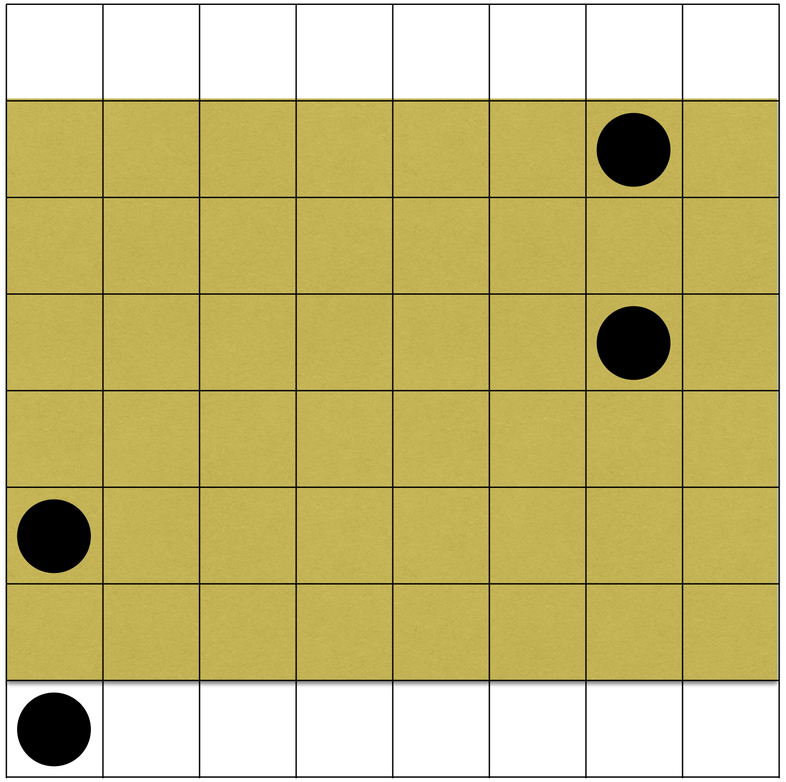


Example 3



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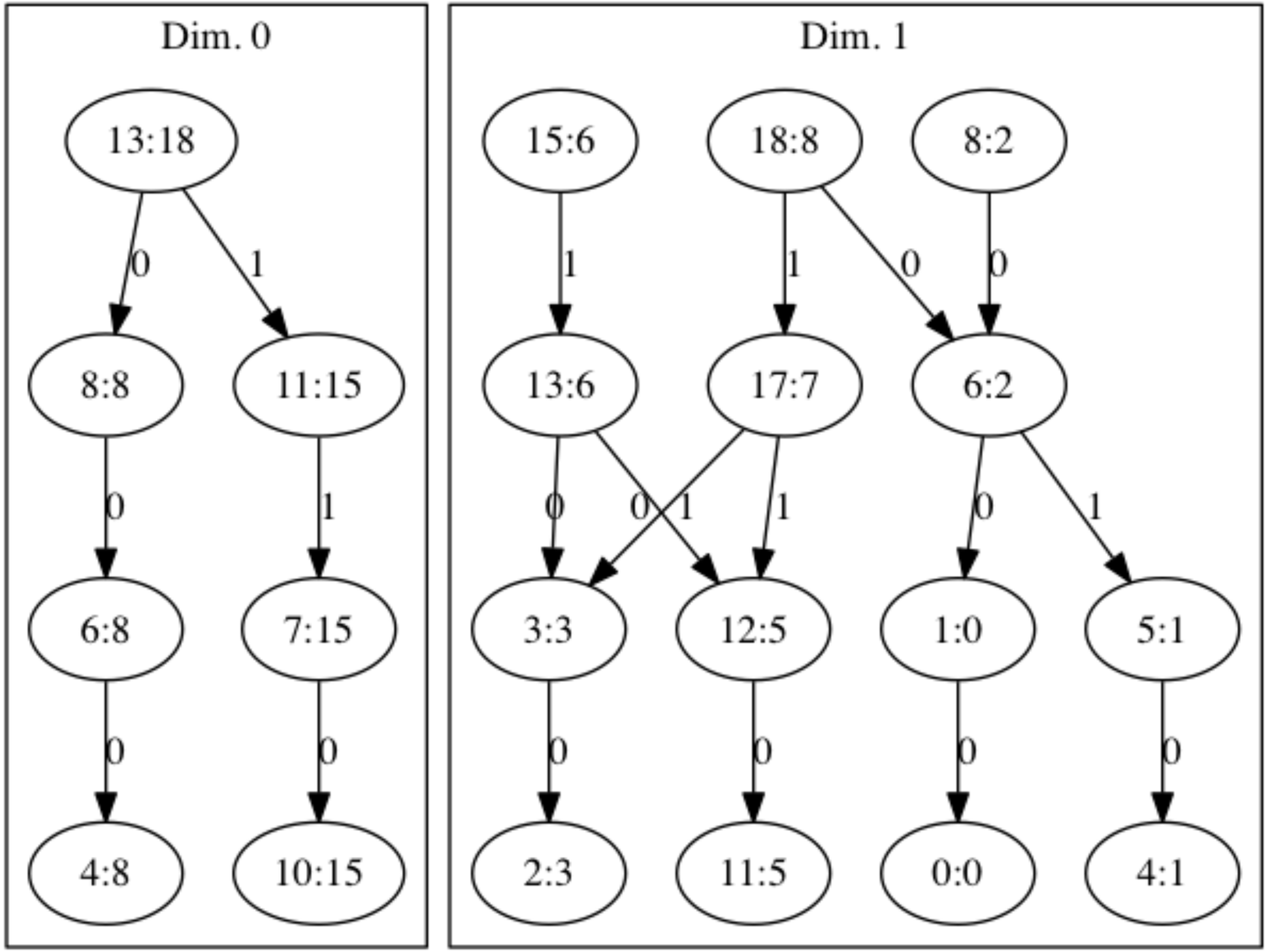

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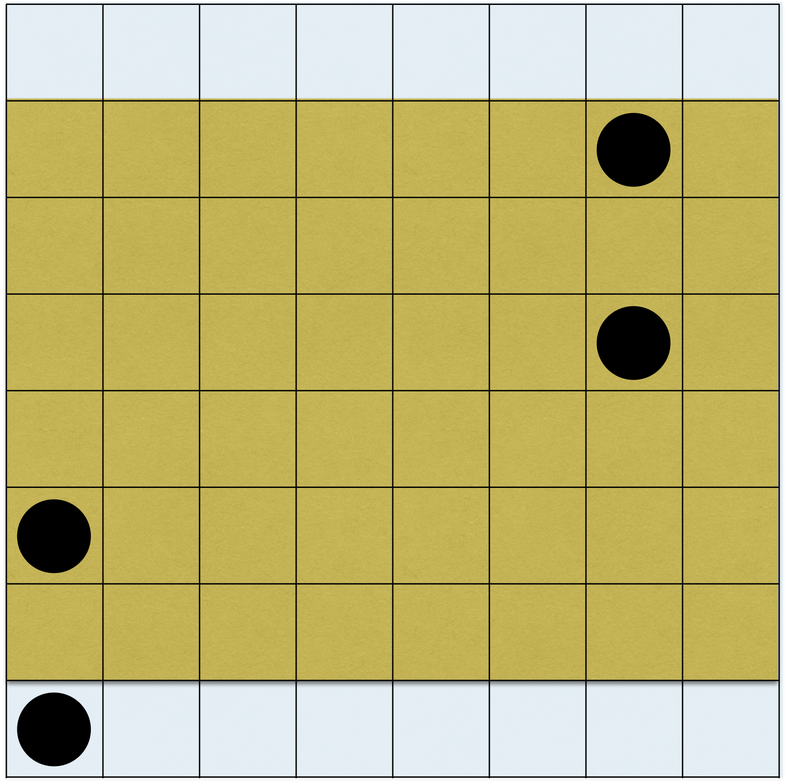

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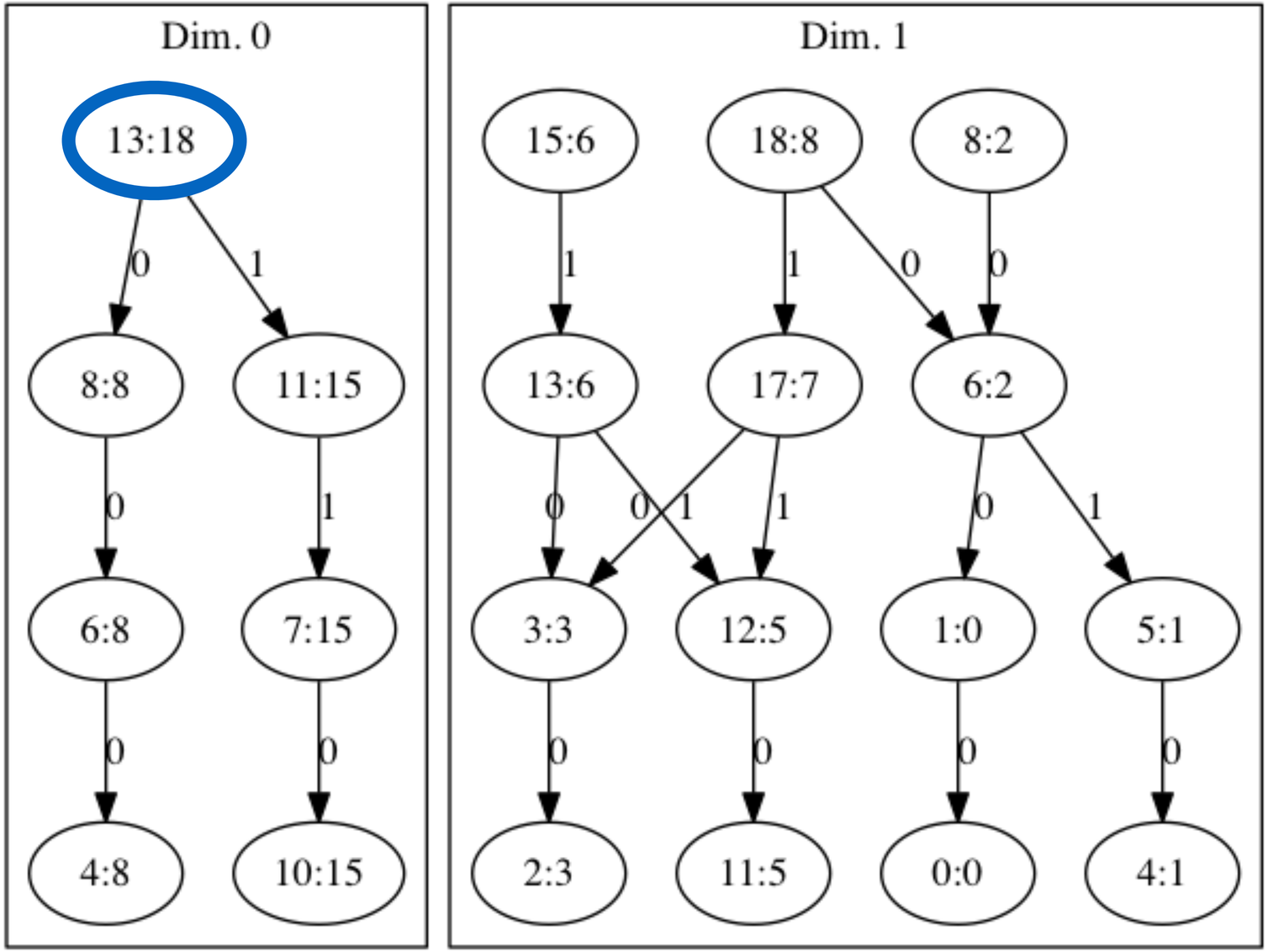
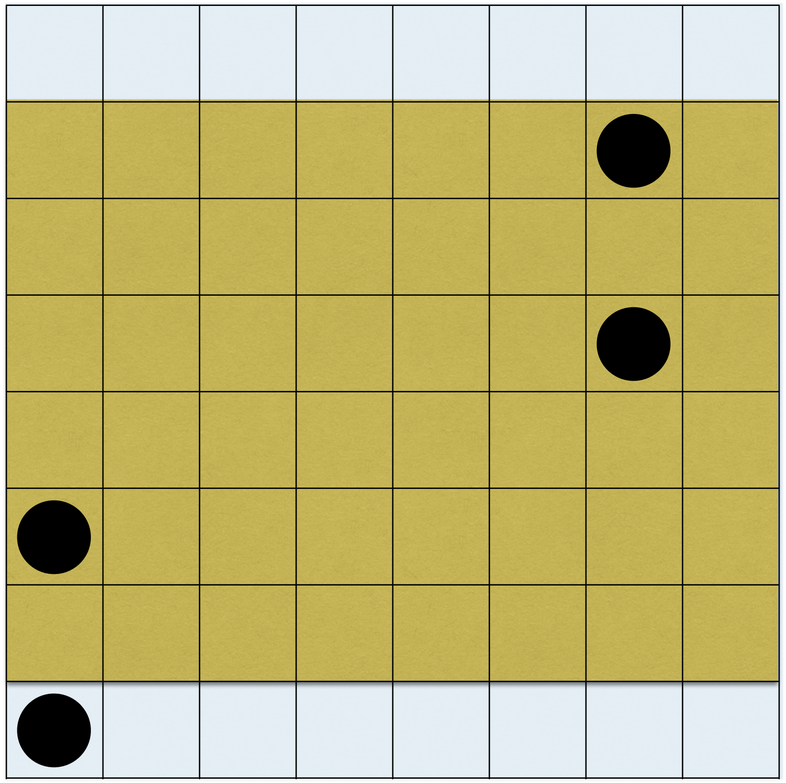


Example 3



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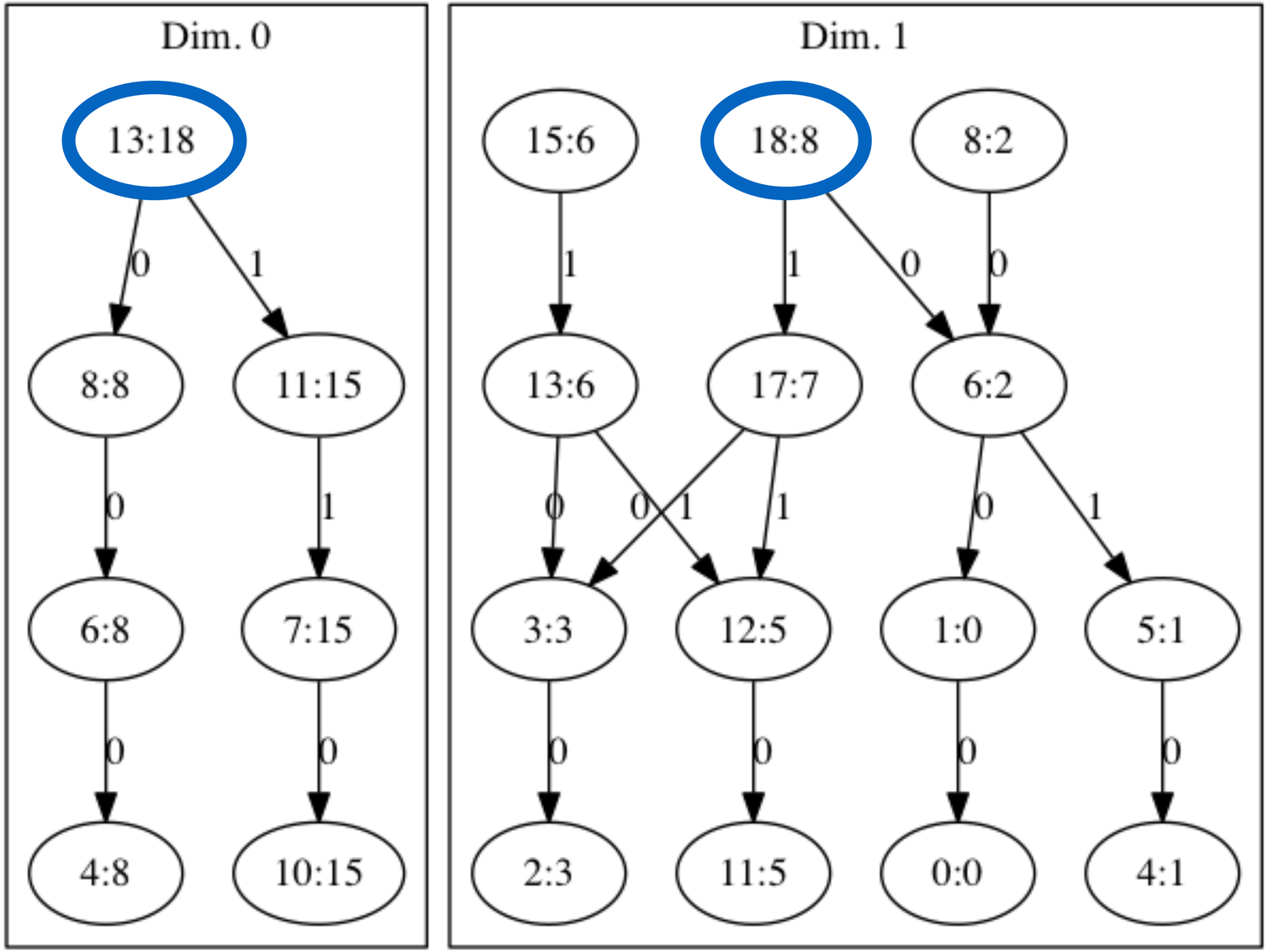
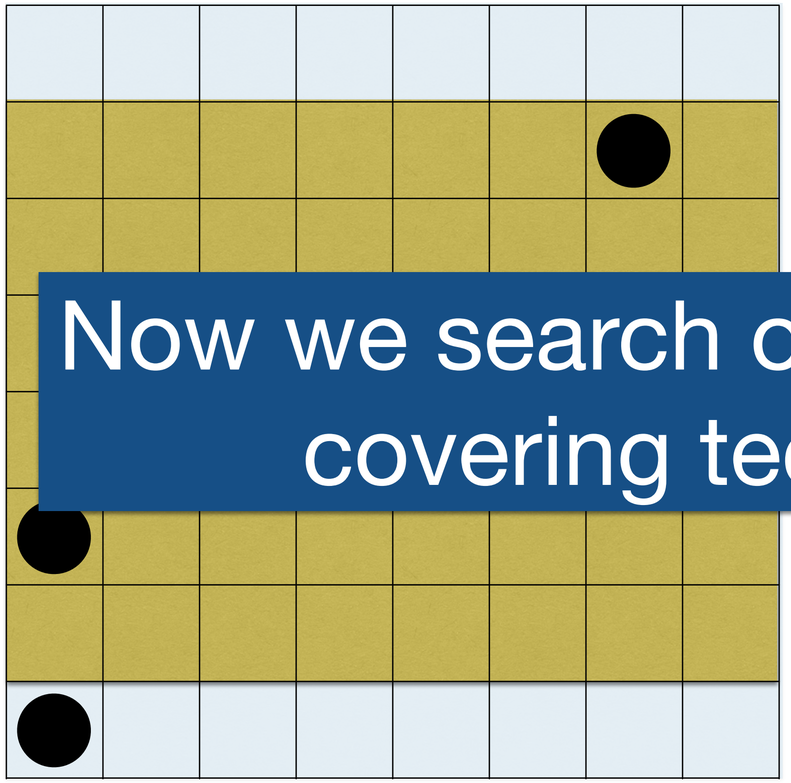


Example 3



y

x

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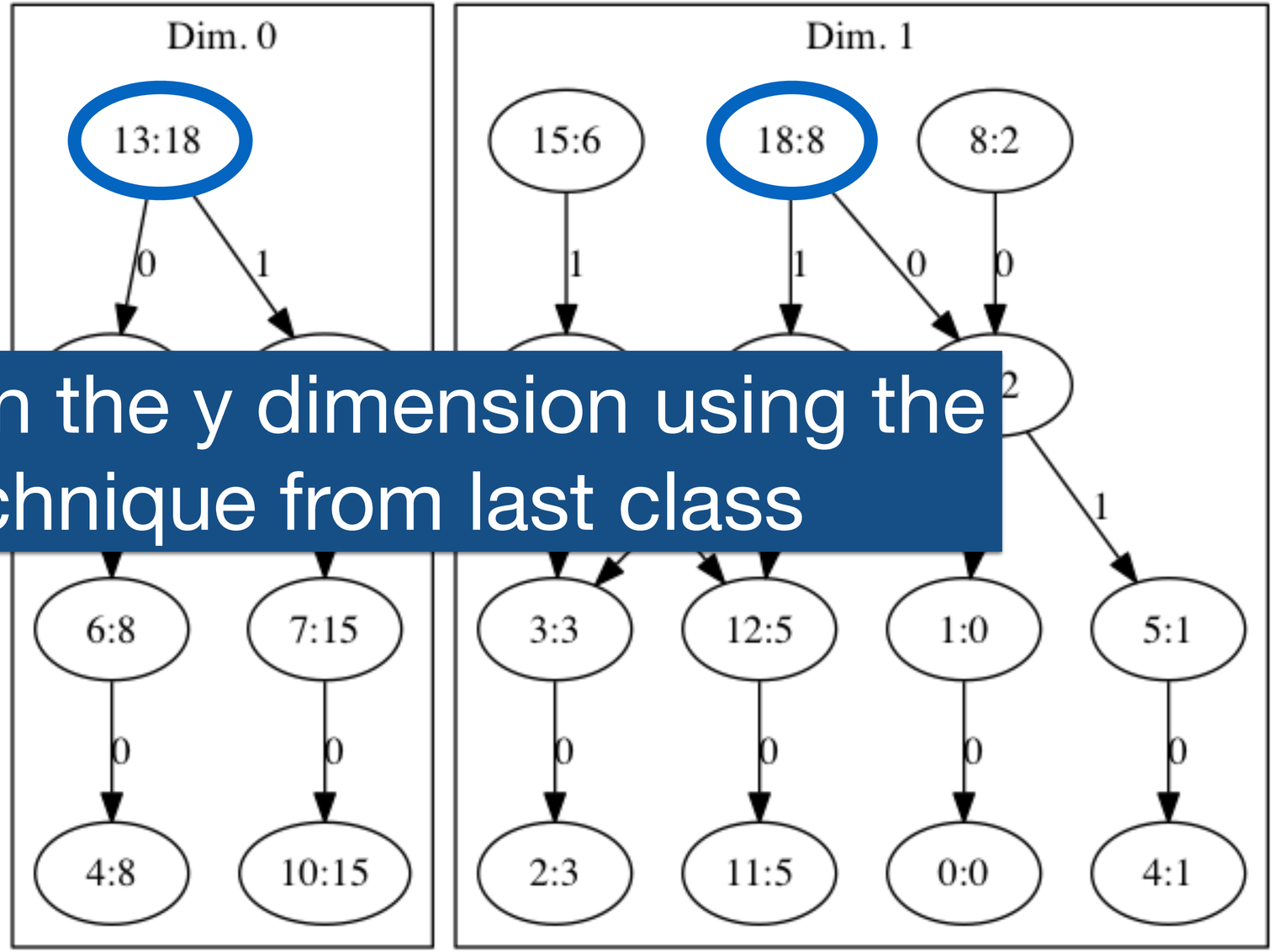
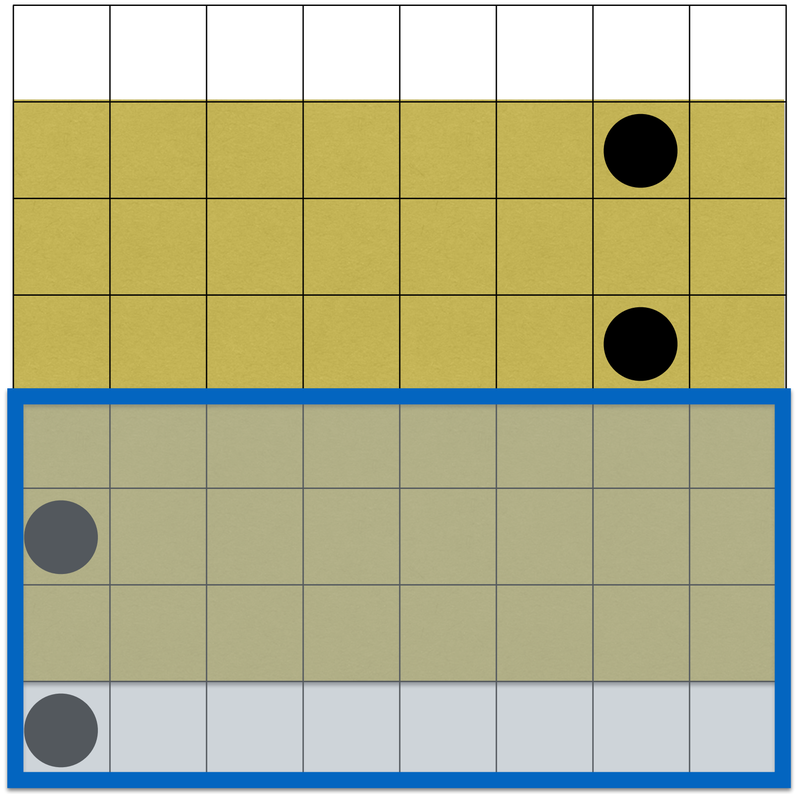


Now we search on the y dimension using the covering technique from last class

Example 3



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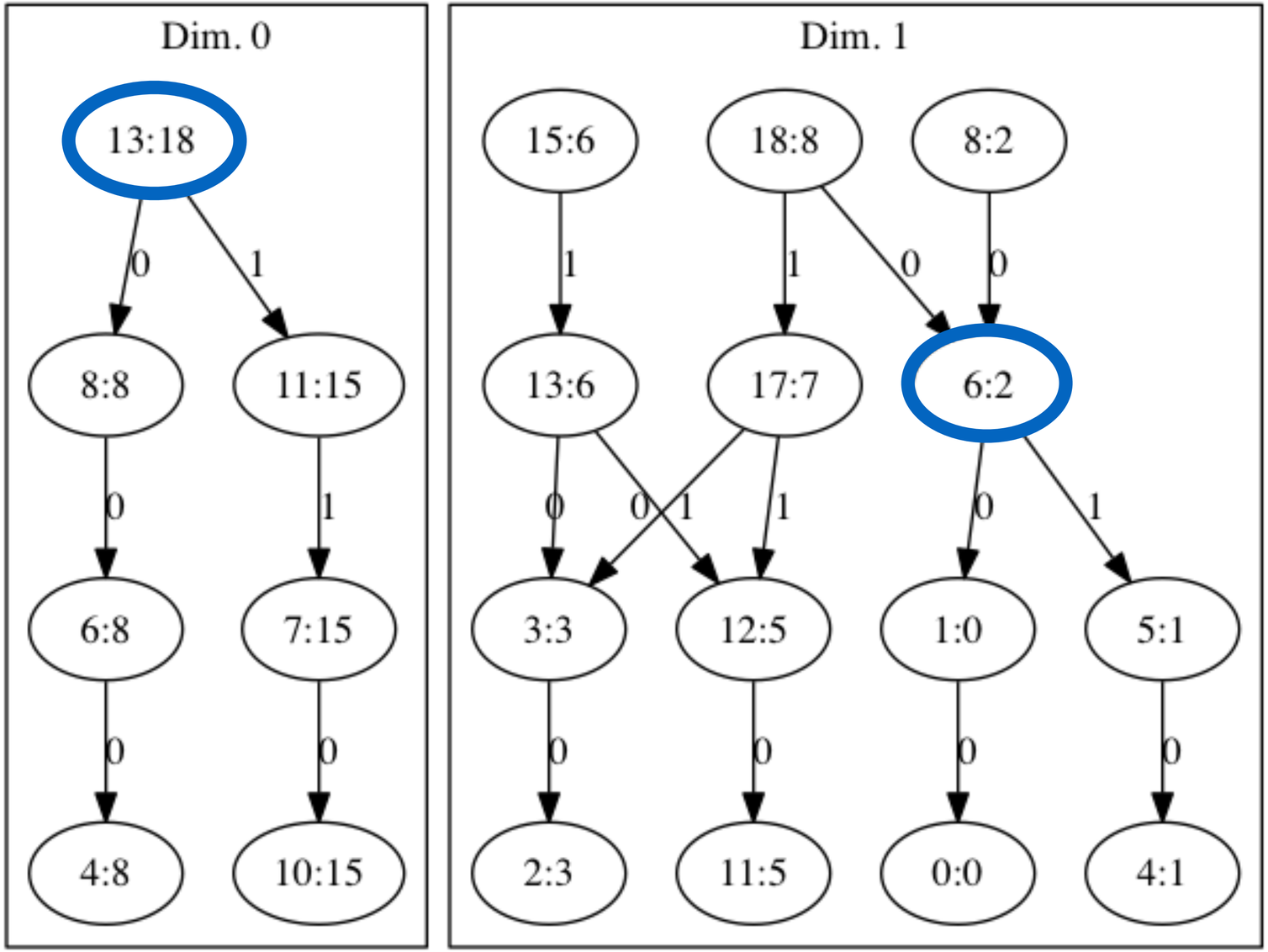
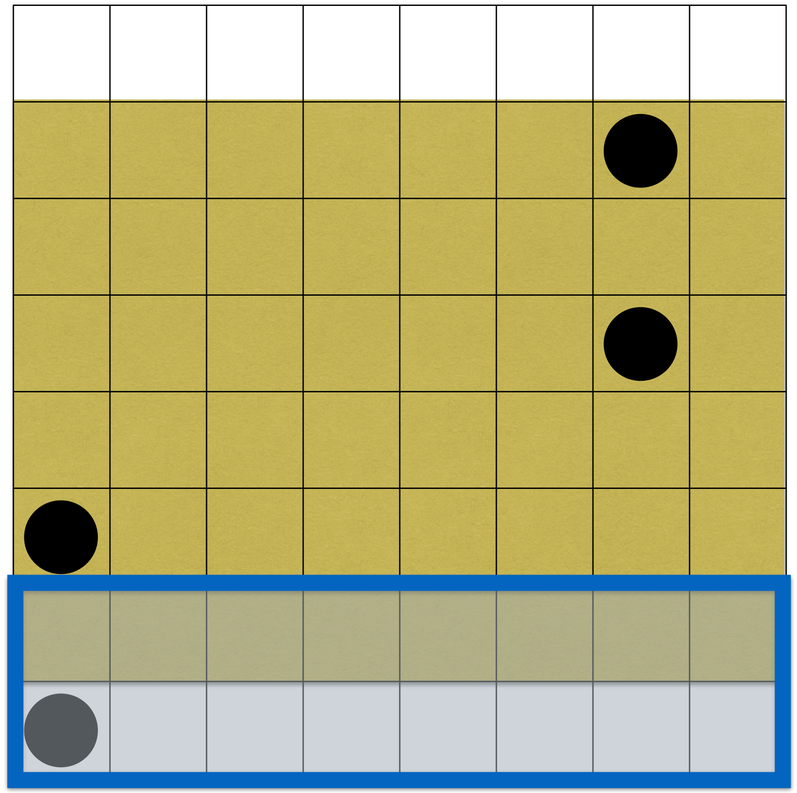


Example 3



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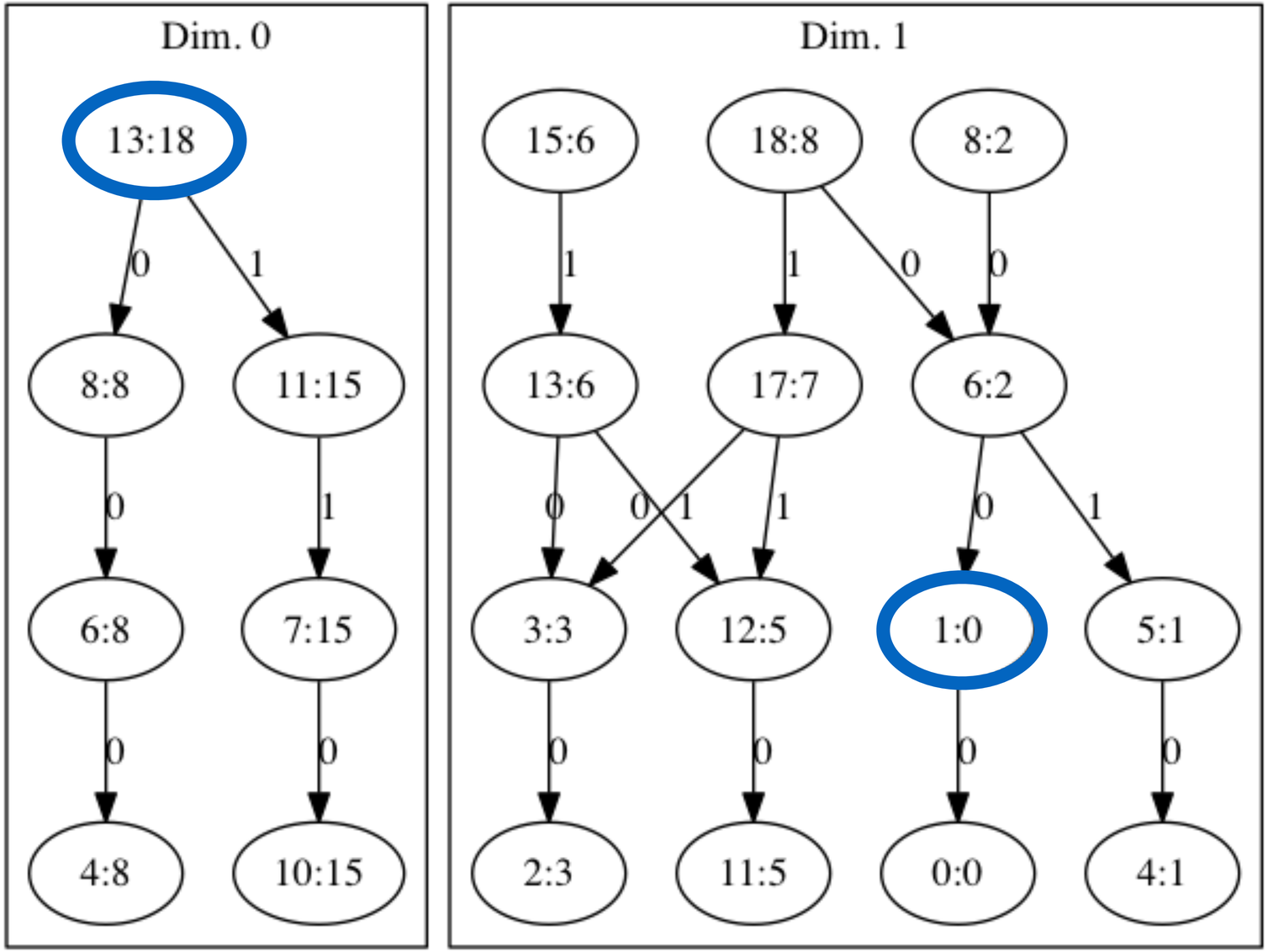
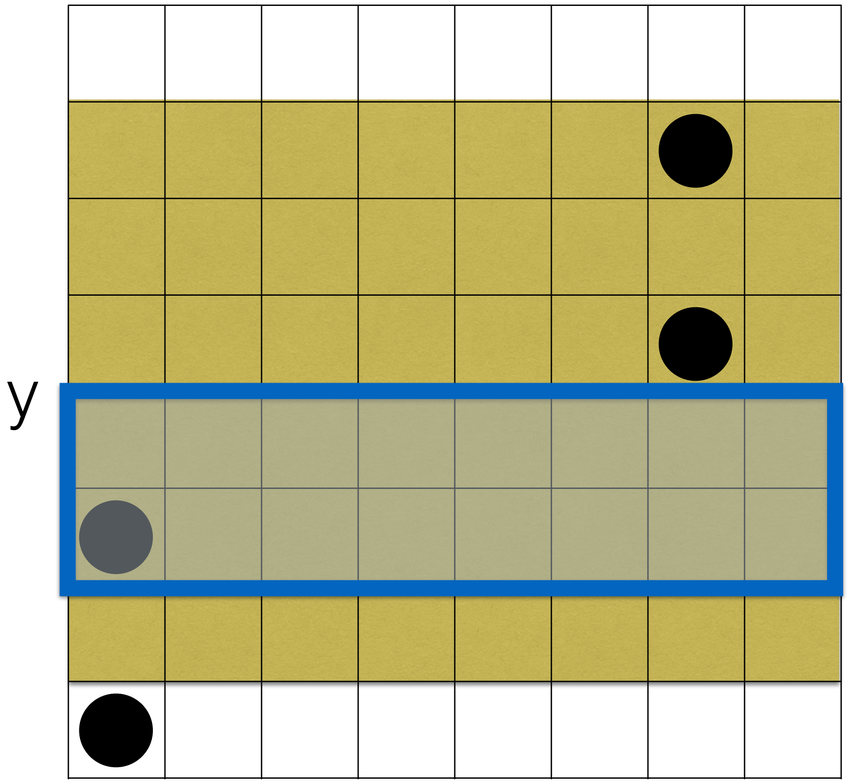


Example 3



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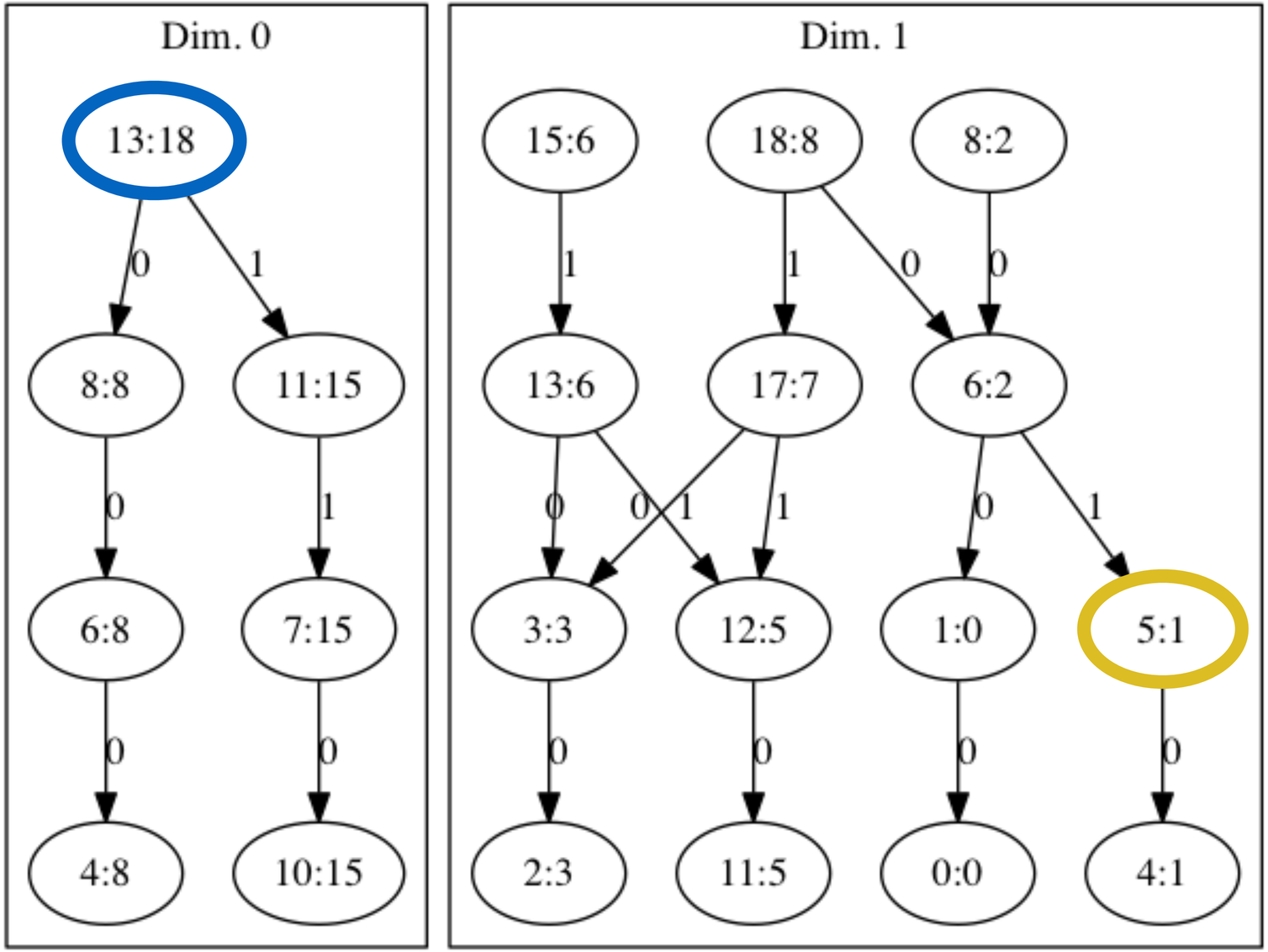
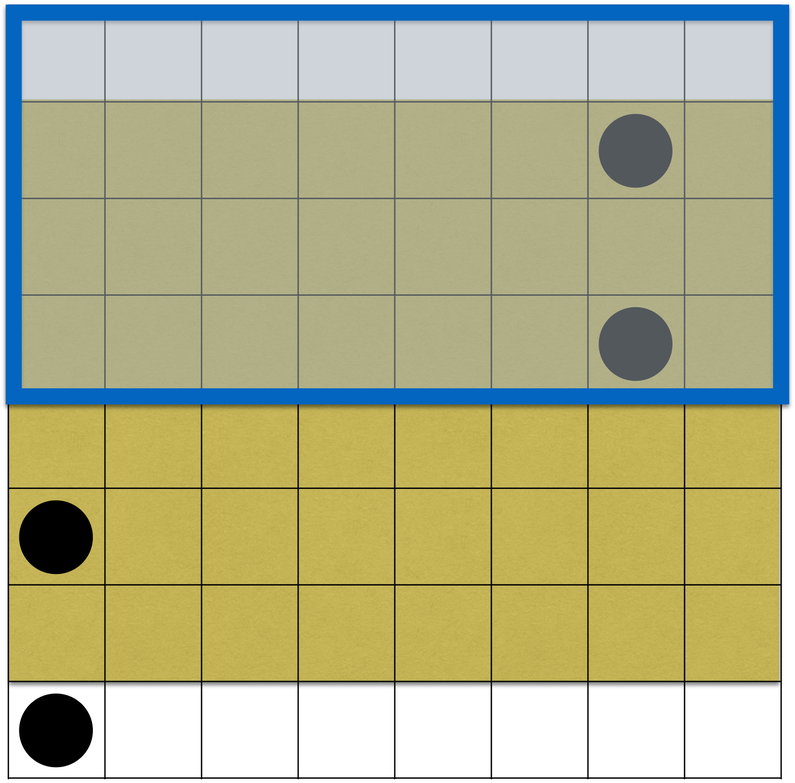


Example 3



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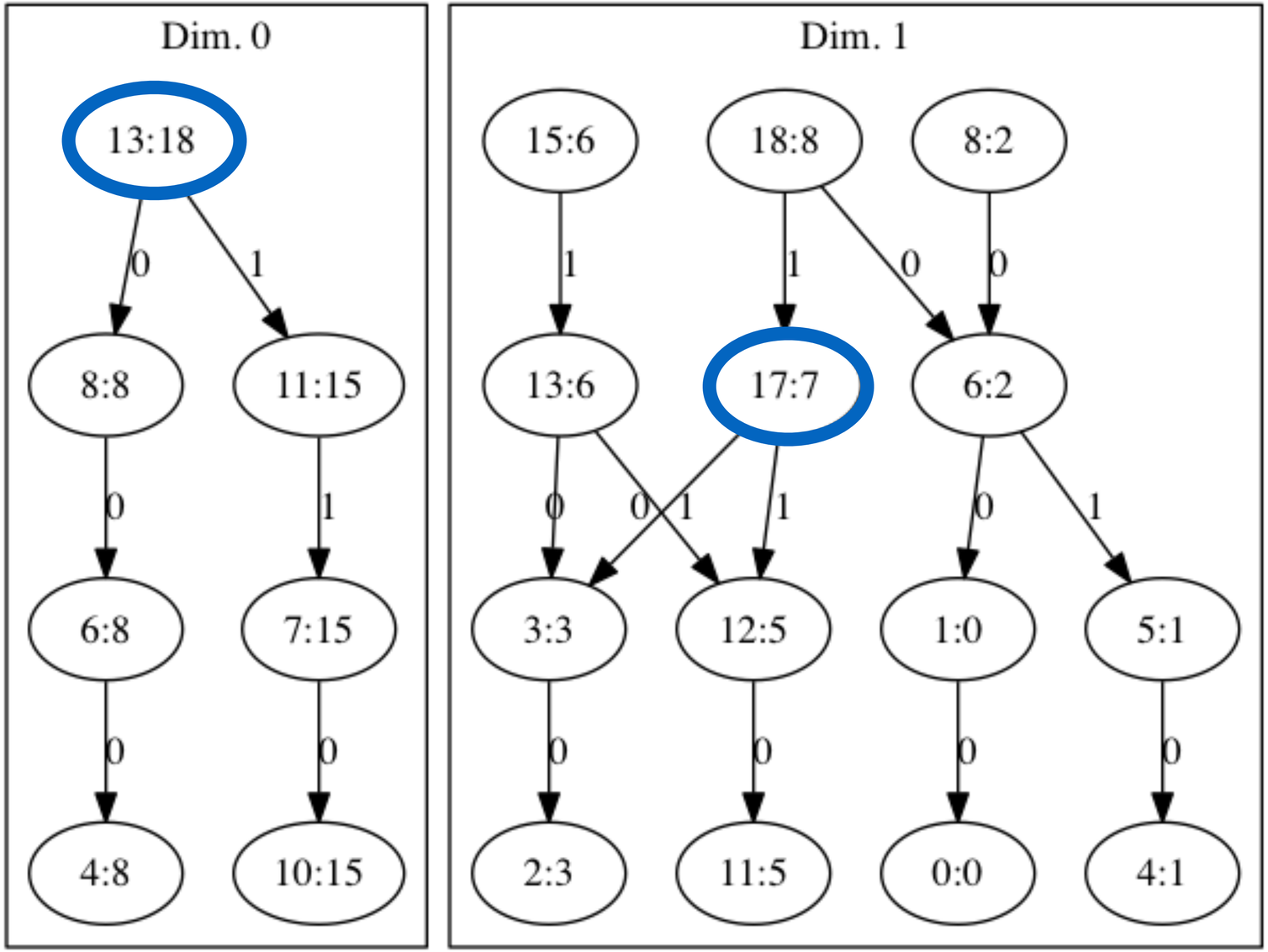
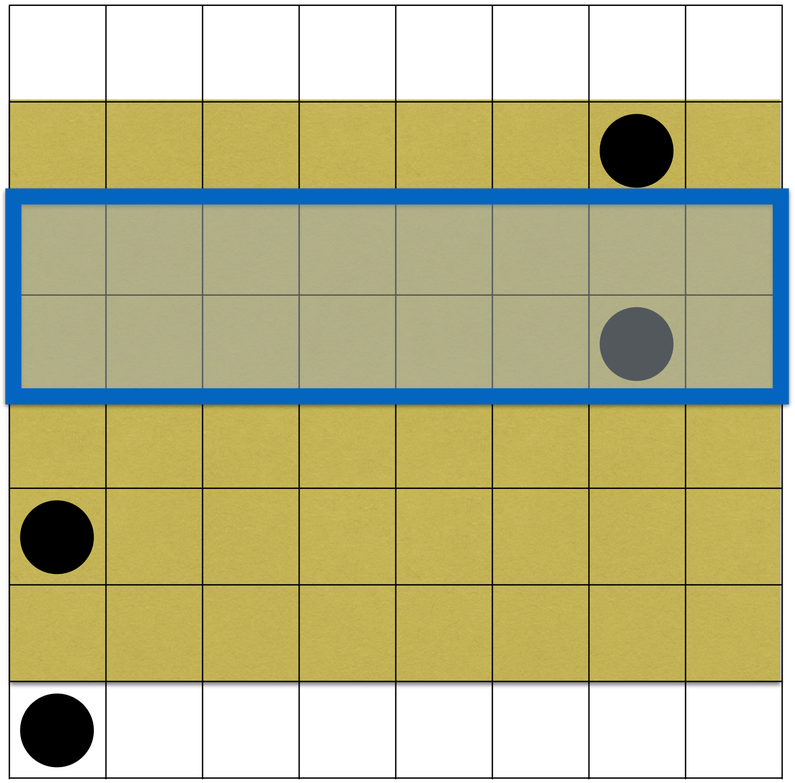


Example 3



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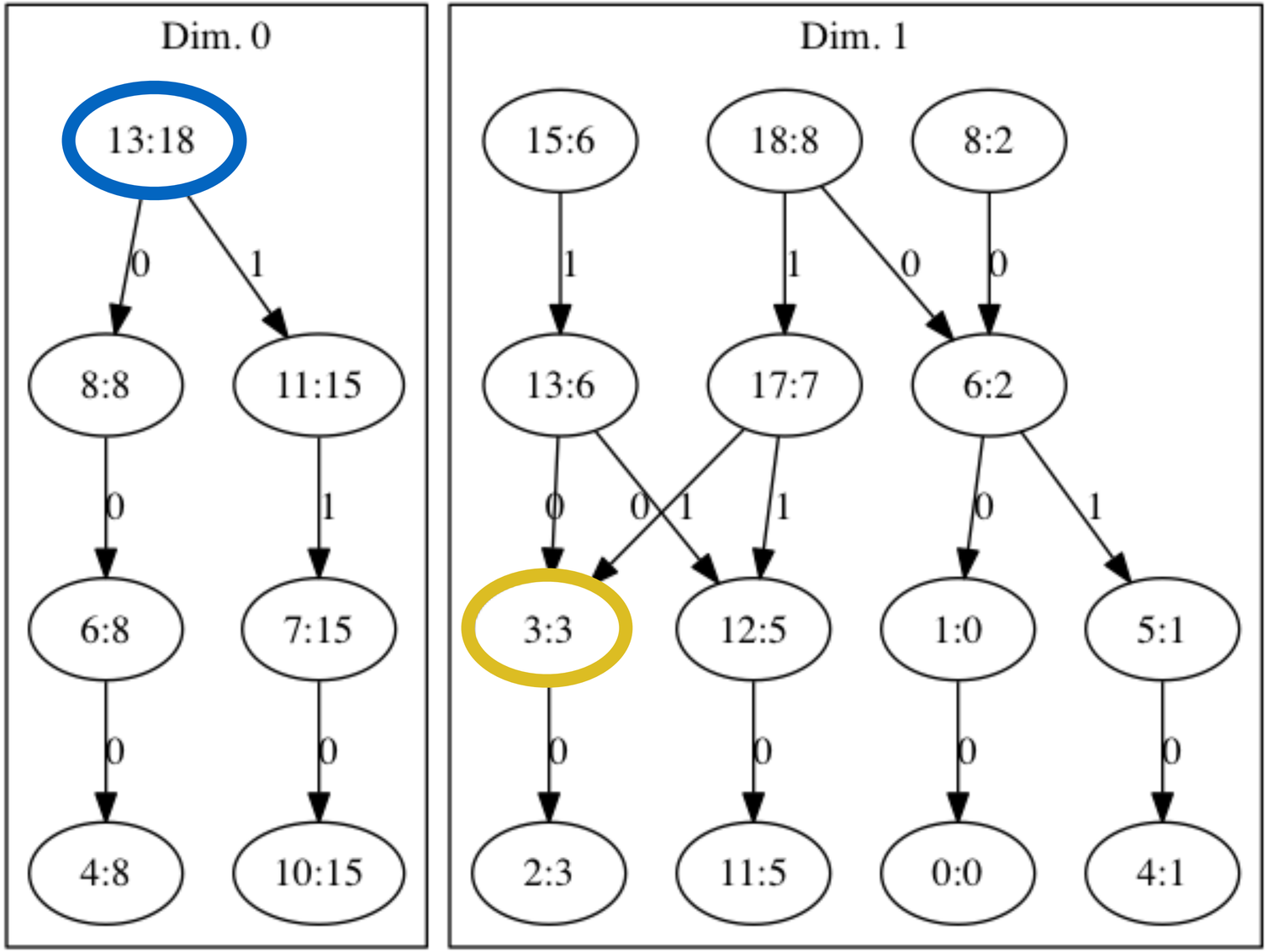
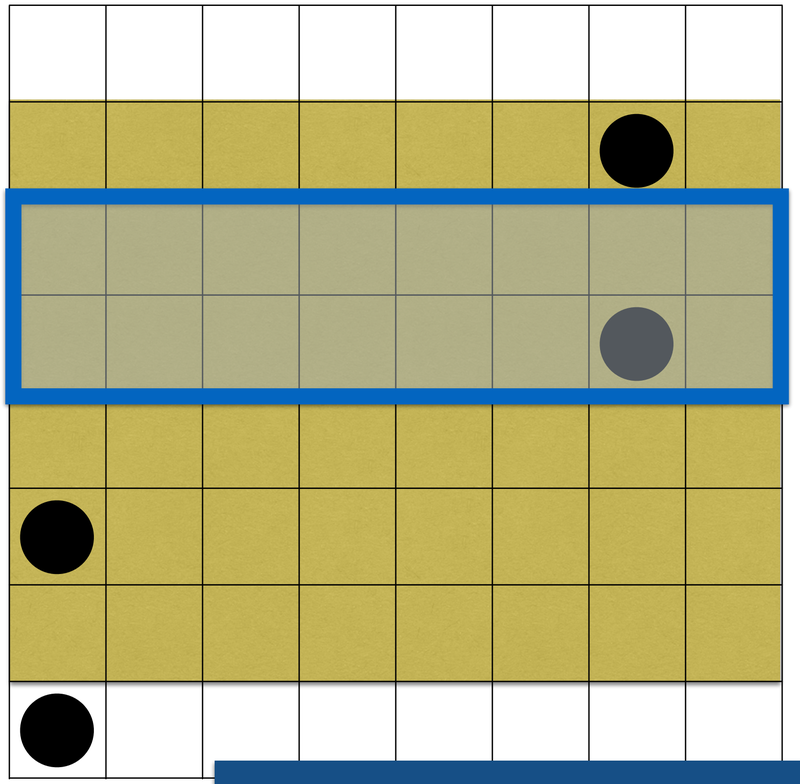
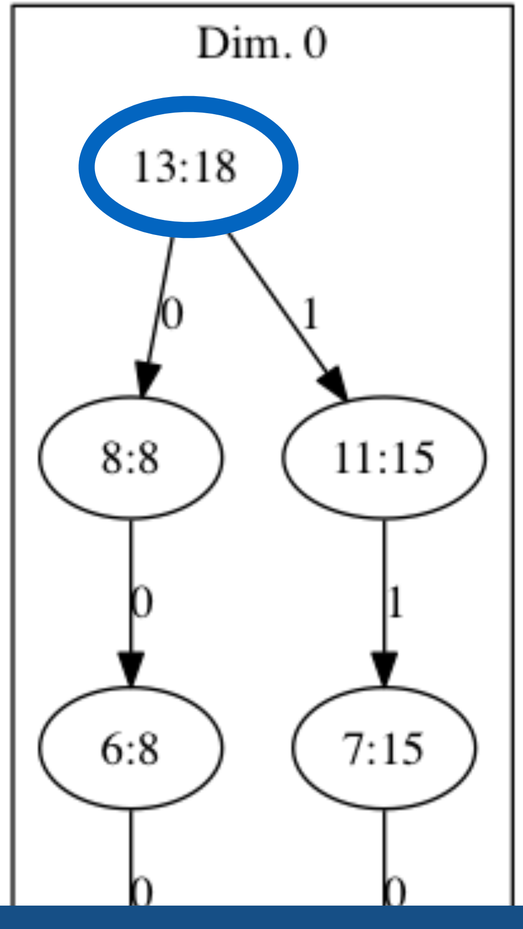
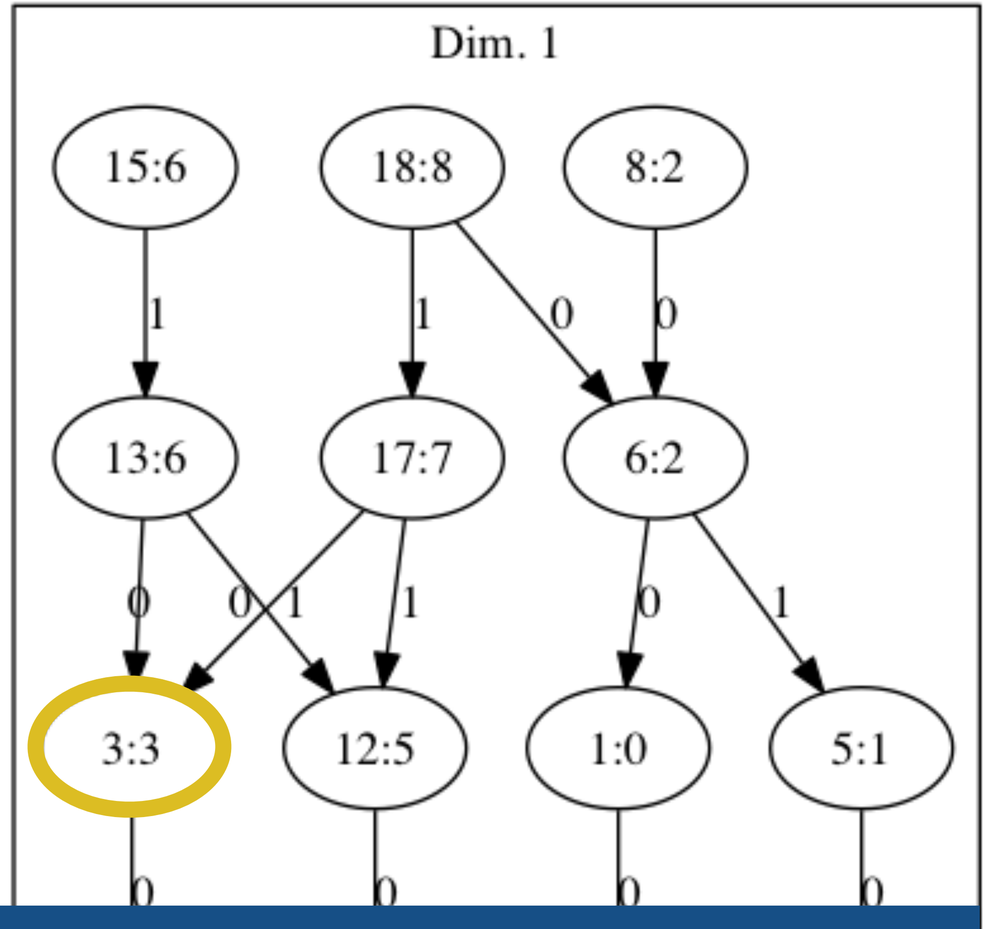


Example 3







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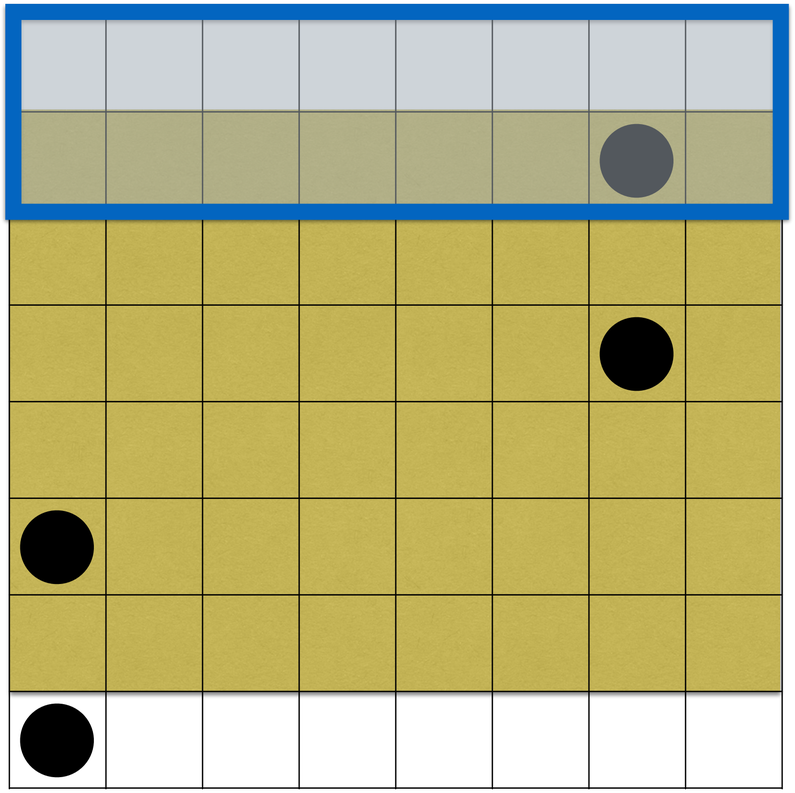
Note that we have visited this node before, on a different search! This is how shared pieces of the data structure allow space savings.

Example 3



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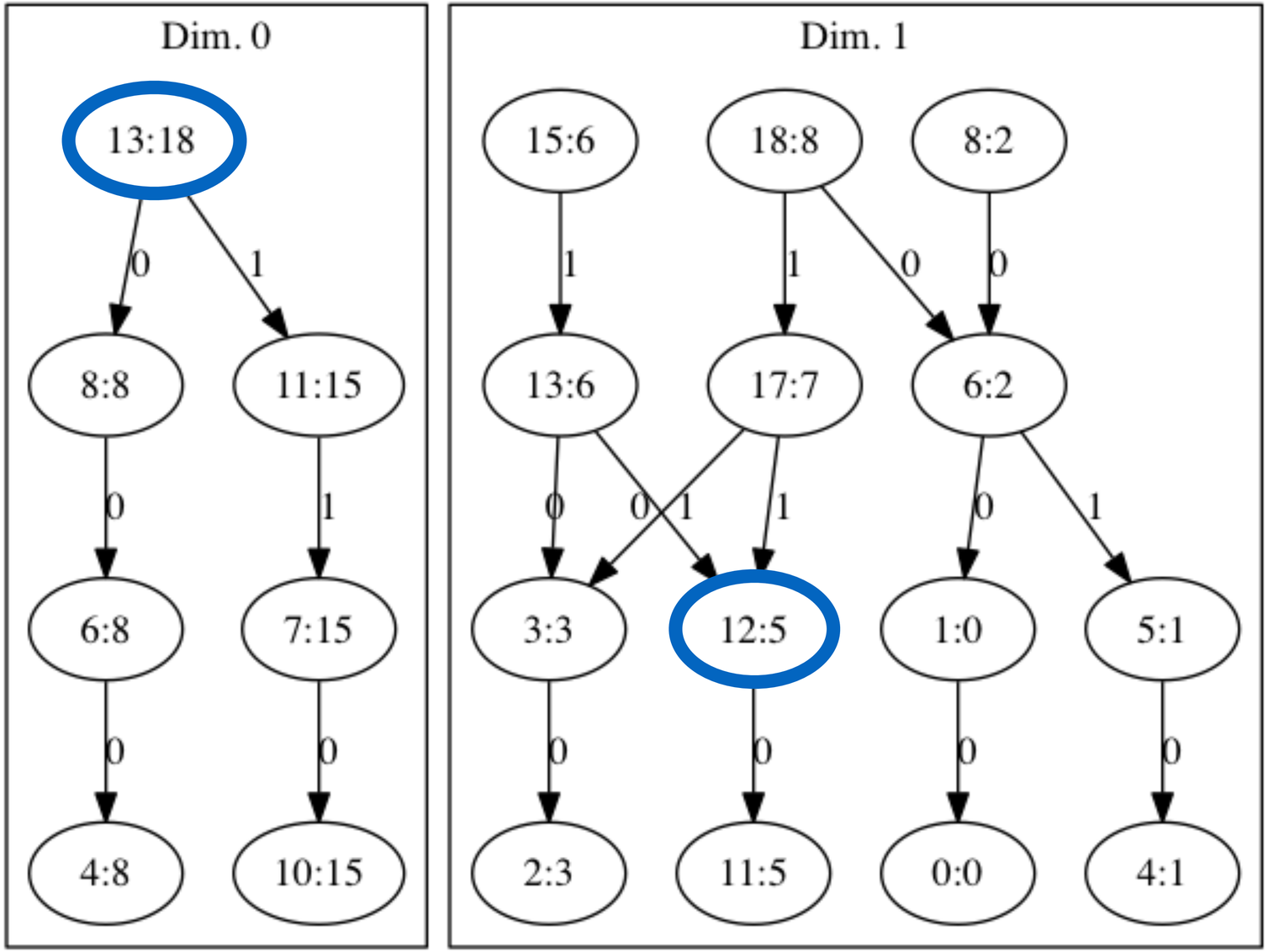
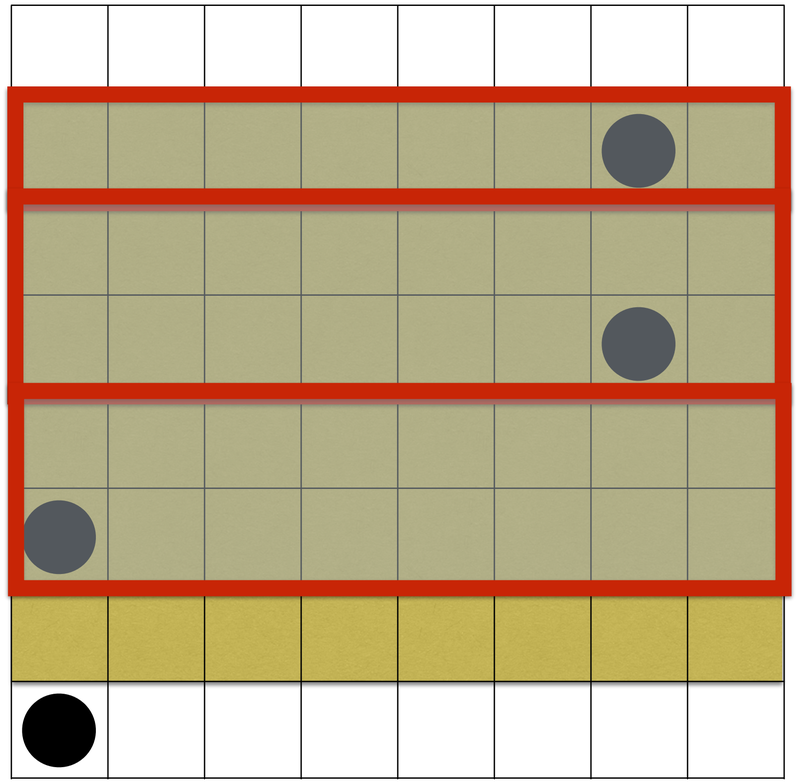


Example 3



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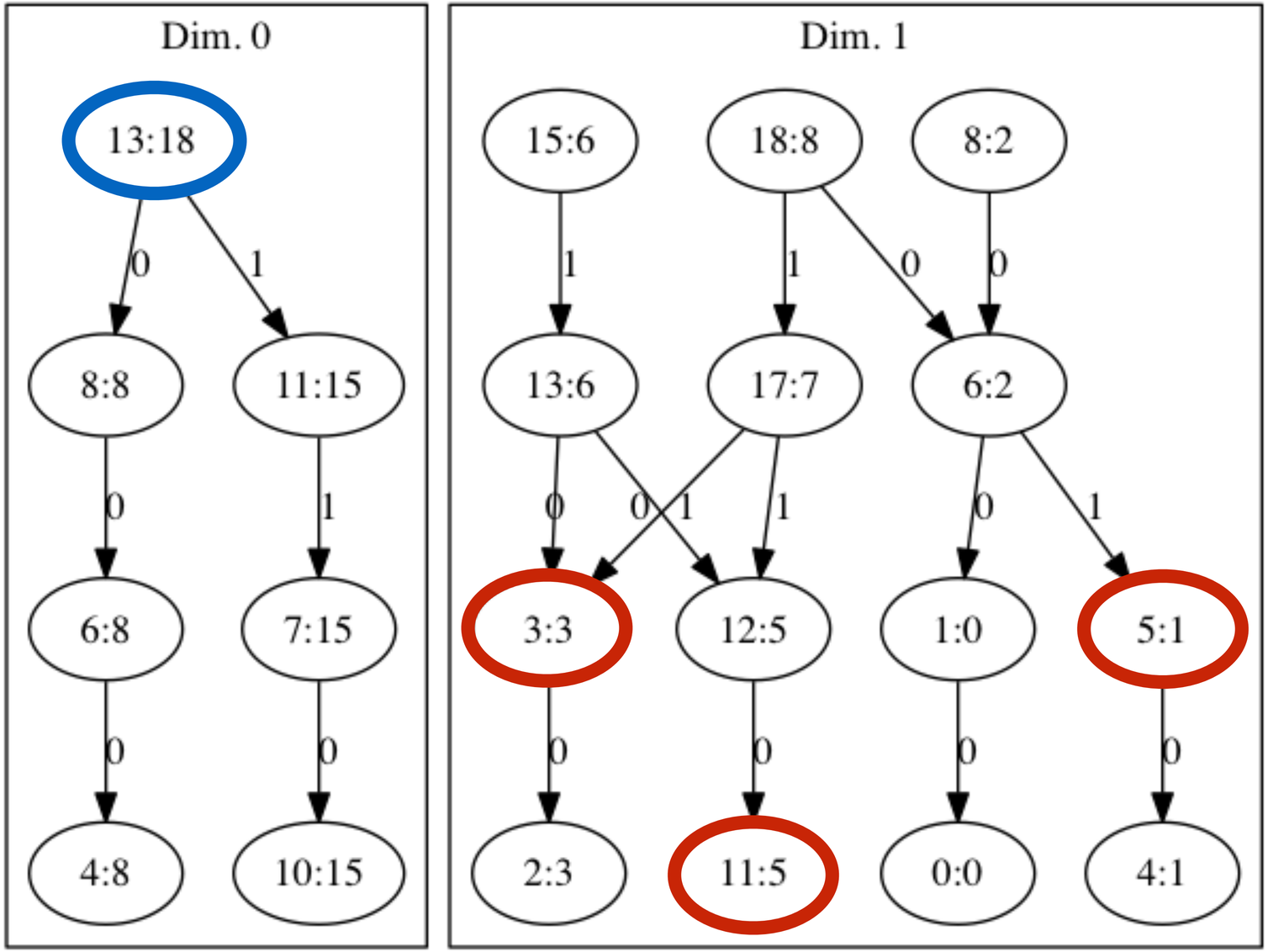
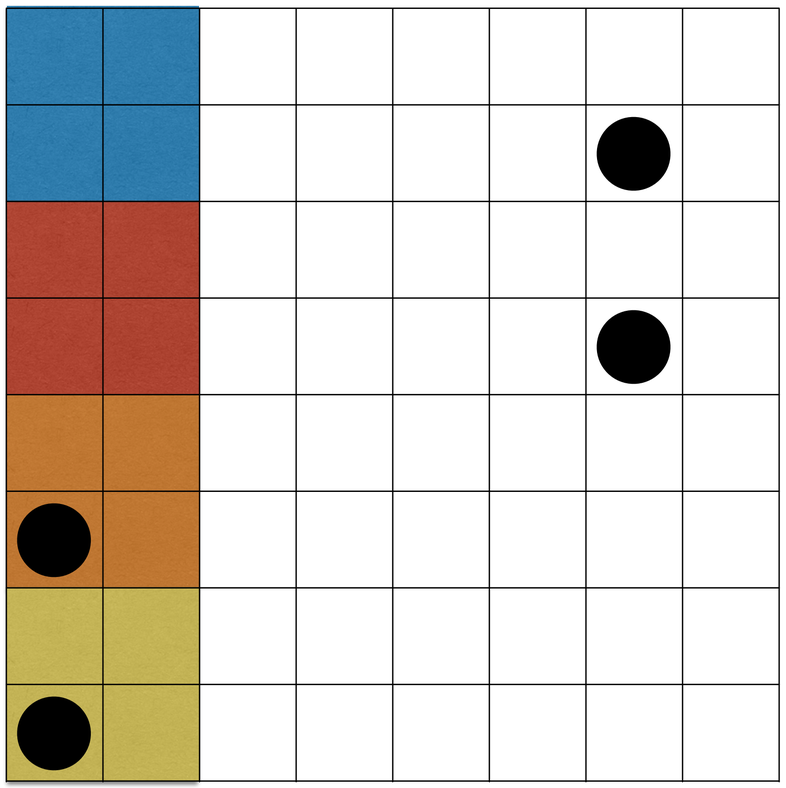


Example 4



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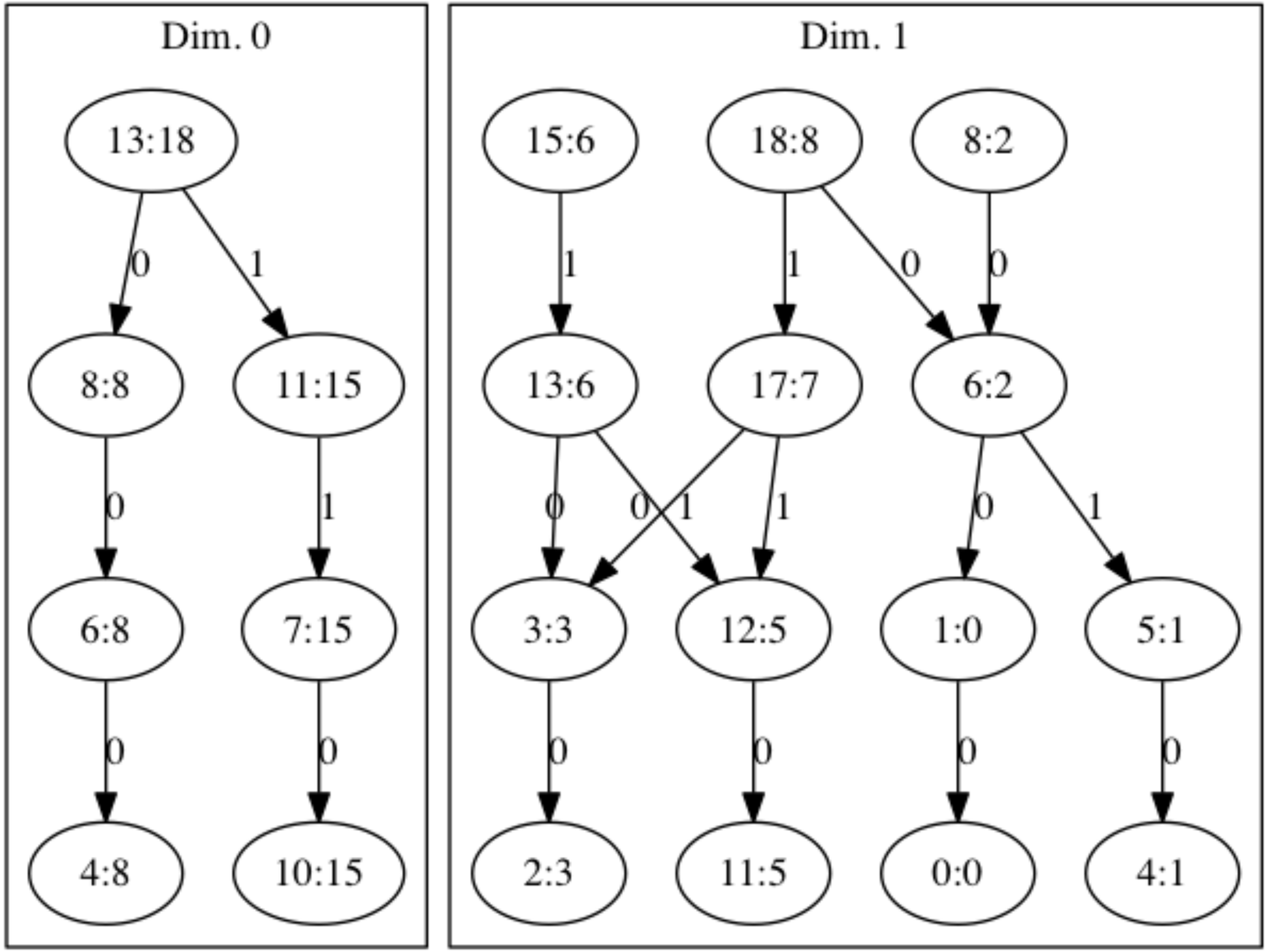
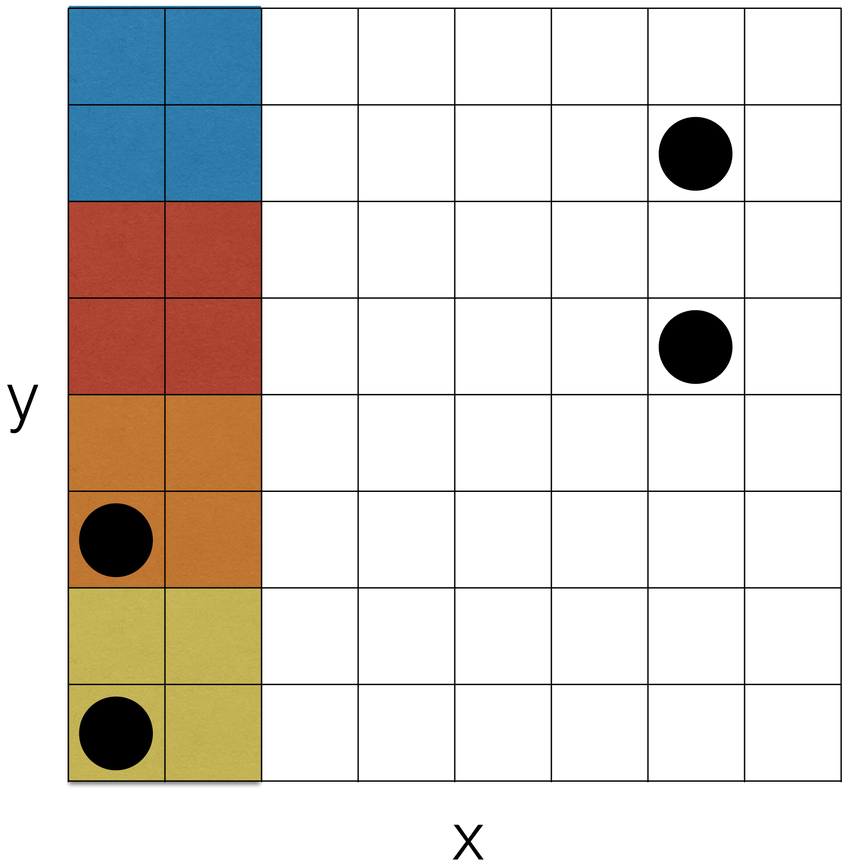
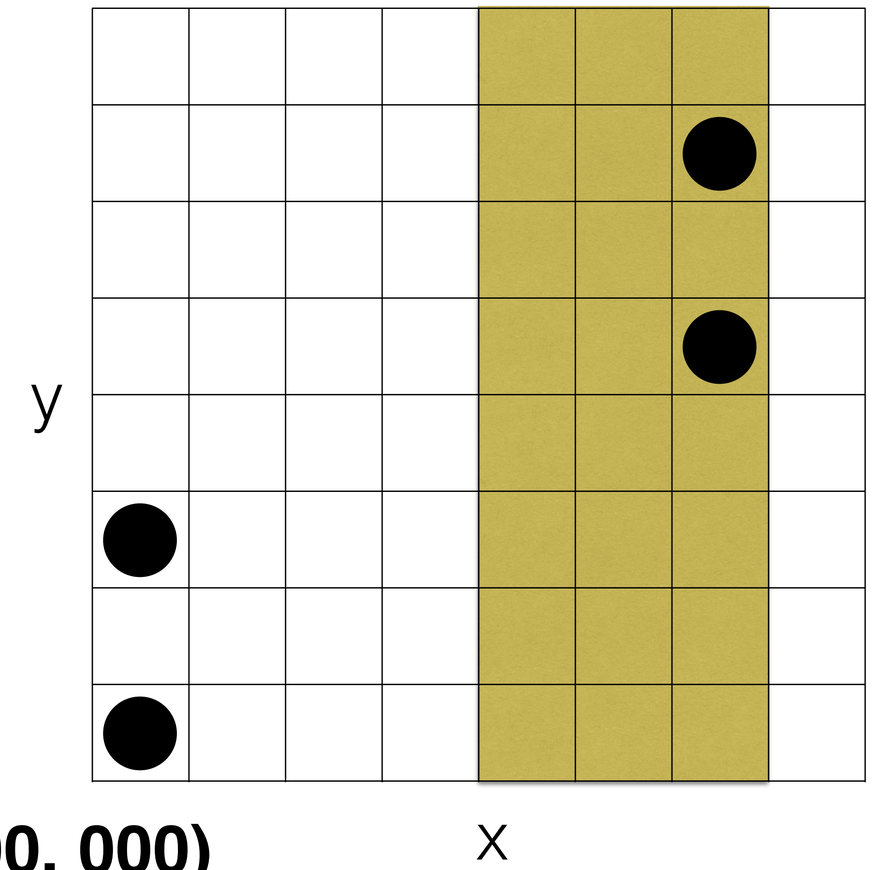


Example 4



What if we build a single dimension for both X and Y, like a quad-tree?

Example 5



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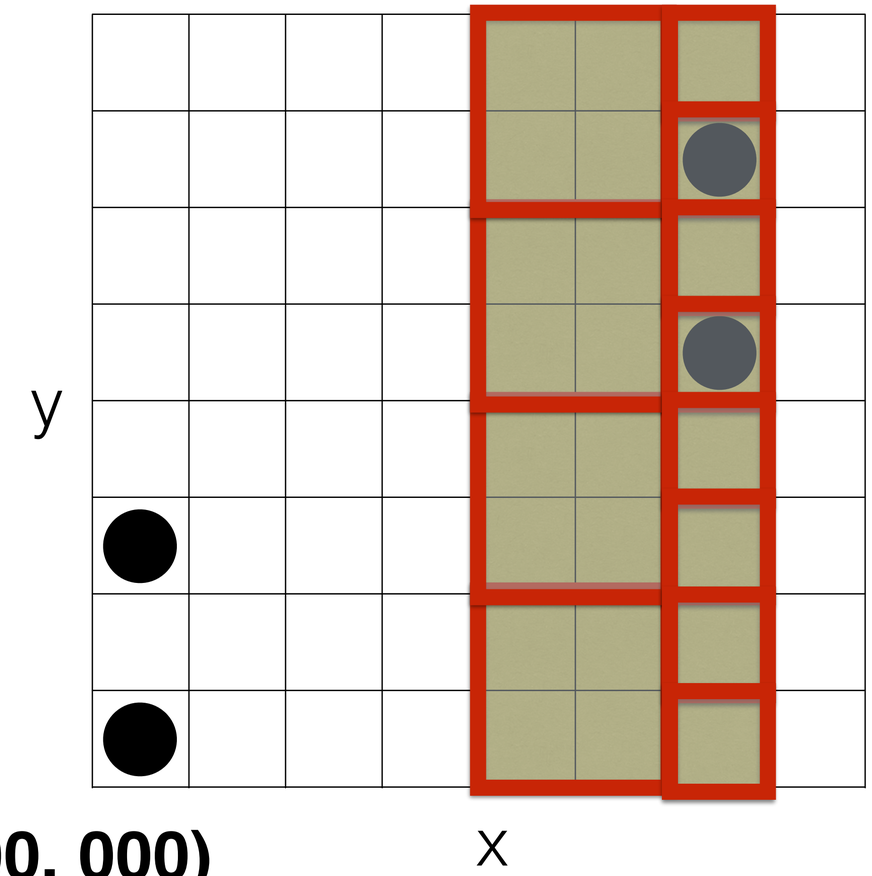
What if we build a single dimension for both X and Y, like a quad-tree?

Example 5



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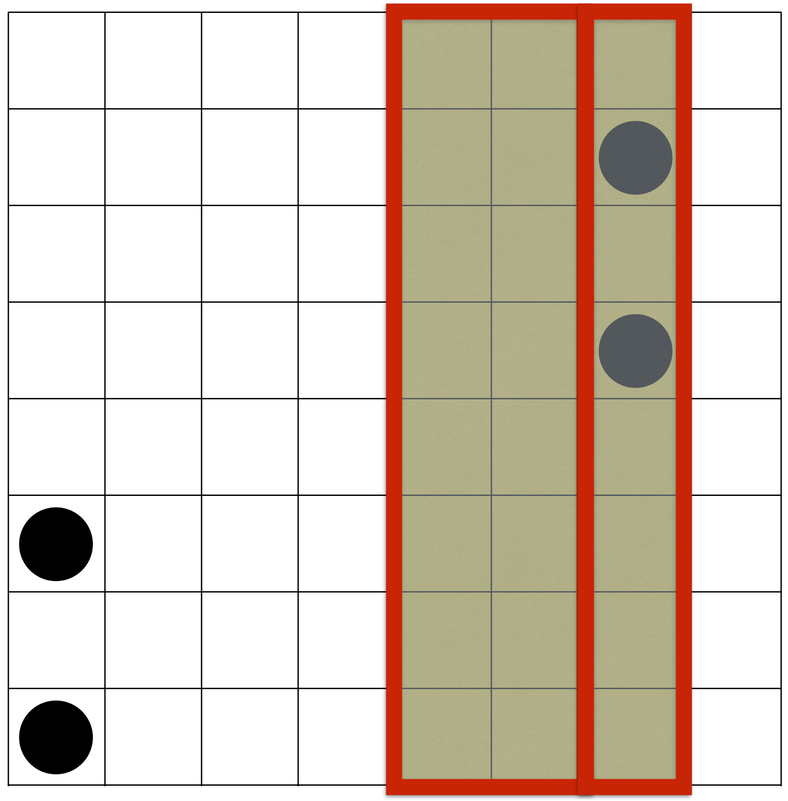
What if we build a single dimension for both X and Y, like a quad-tree?

Example 5b



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