matrix_expand

May 17, 2023

[1]:

```python
from casadi import *
from casadi.tools import *
```

Let's revisit briefly the difference between SX and MX

[2]:

```python
a = MX.sym("a",2,2)
b = MX.sym("b",2,2)
c = MX.sym("c",2,2)
```

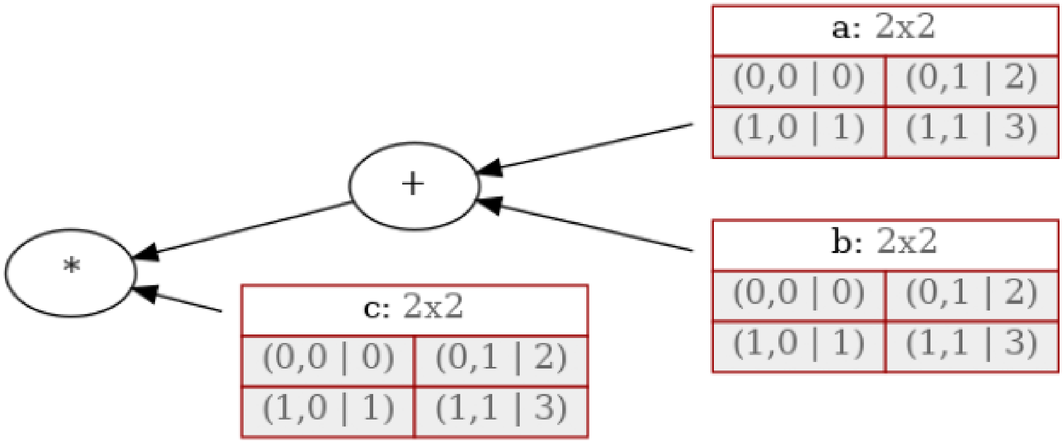
[3]:

```python
d = a+b
e = d*c
```

The element-wise addition and multiplication operators appear just as a single node in the MX expression graph

[4]:

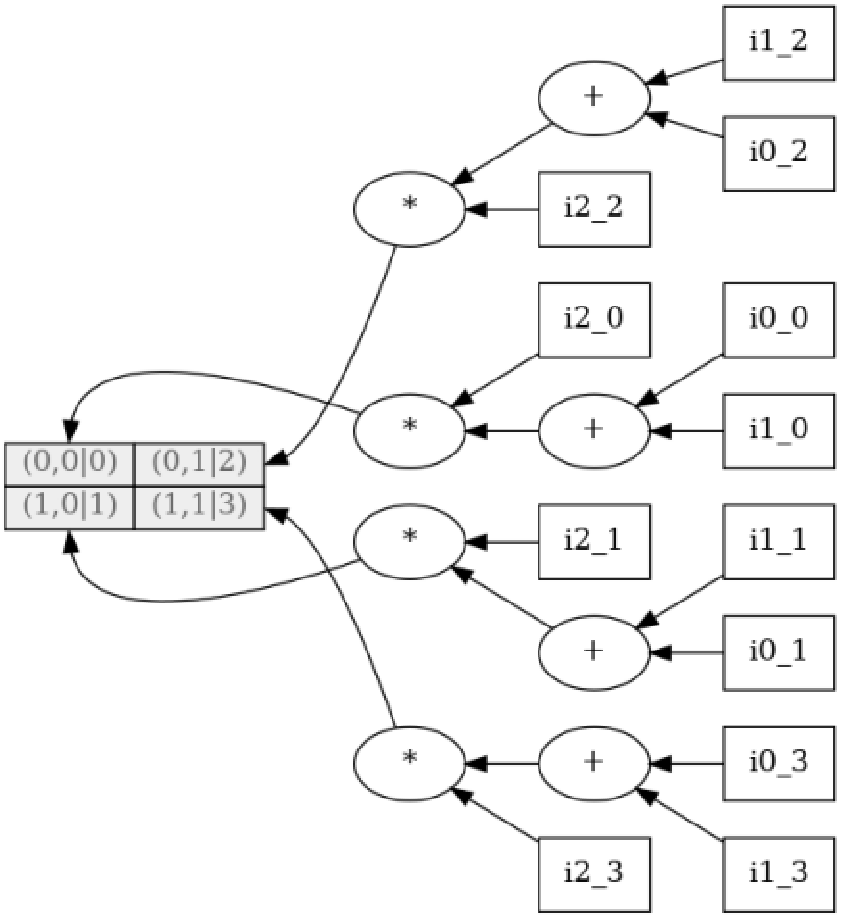
```python
dotdraw(e)
```



We can use expand to expand into subexpressions

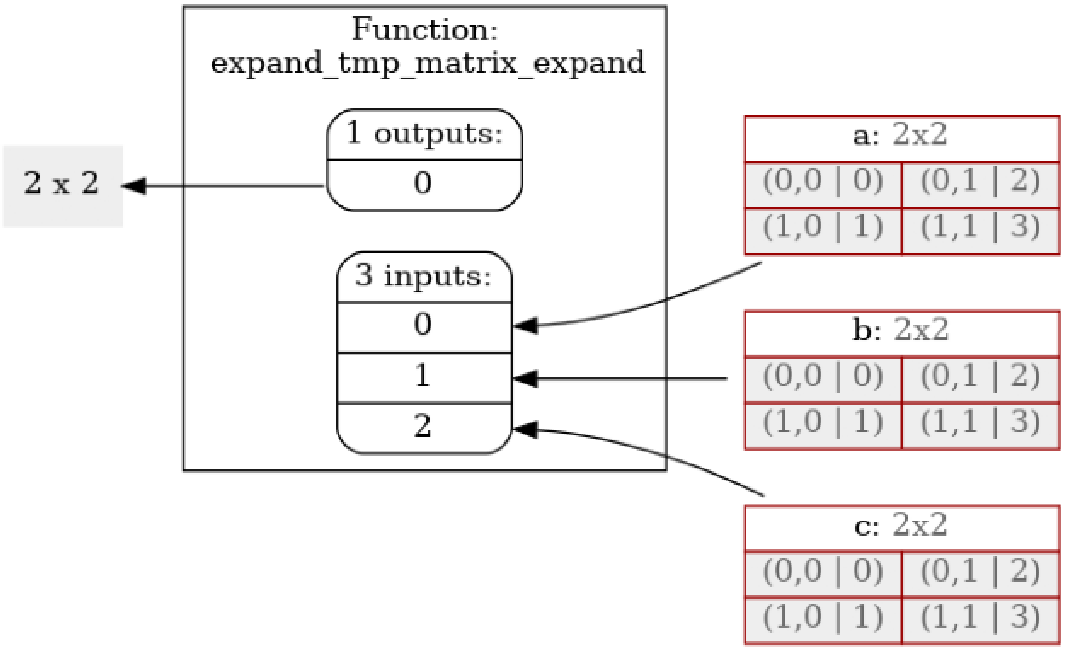
[5]:

```
f = Function("f", [a,b,c],[e])
g = f.expand('g')
dotdraw(g(*g.sx_in()))
```



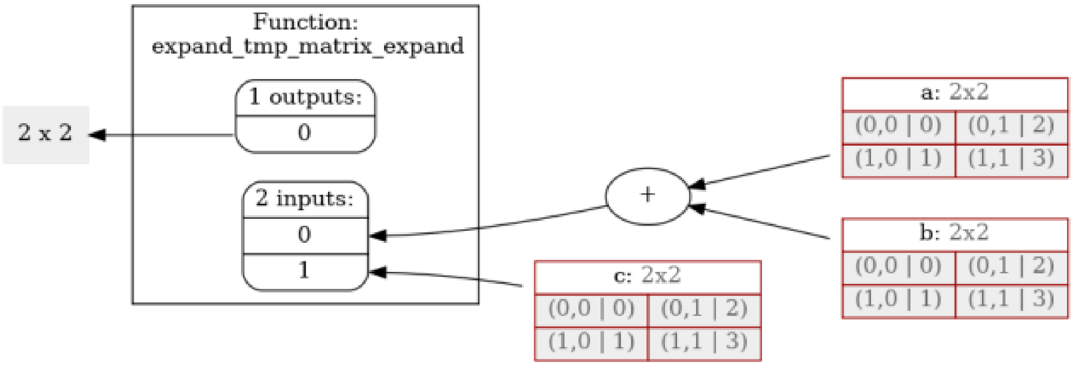
There is also a variant to perform expansion immediately on the MX graph The expanded SX graph is hidden inside an SX graph call

[6]:
```
dotdraw(matrix_expand(e))
```



An additional features of this variant is that one can choose which expressions remin outside of the expansion scope. In the following we list ‘a+b=d’ as a node on the boundary of expansion:

[7]:
```
dotdraw(matrix_expand(e,[d]))
```



Note how the additions is not expanded, while the multiplication ended up in the expression