ÍNDICE

- SOME of the Available FST Operations (OpenFST Library)
  - http://www.openfst.org

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FST Transducers

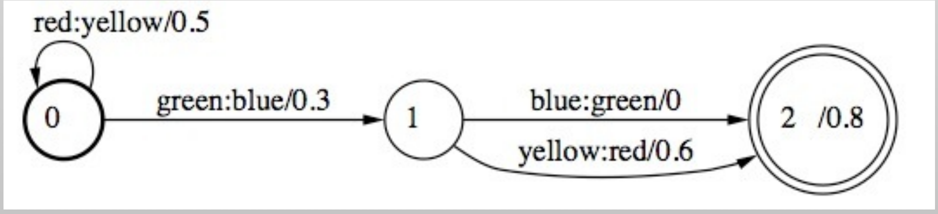
- *Definition of the symbols* (syms.txt)

```
red        1
green      2
blue       3
yellow     4
```

- *Definition of a transducer* (t.txt)

```
0   0   red     yellow     .5
0   1   green   blue       .3
1   2   blue    green
1   2   yellow  red        .6
2   .8
```

- *Graphical representation* (t.ps)



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FST Transducers

- *Definition of the symbols* (syms.txt)

```
red       1
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```

- *Definition of a transducer* (t.txt)

```
0   0   red     yellow     .5
0   1   green   blue       .3
1   2   blue    green
1   2   yellow  red        .6
2   .8
```

- *Geração da versão binária*
  - **fstcompile** --isymbols=syms.txt --osymbols=syms.txt **t.txt | fstarcsort > t.fst**
- *Geração da versão gráfica*
  - **fstdraw** --portrait --isymbols=syms.txt --osymbols=syms.txt **t.f | dot -Tpdf > t.pdf**

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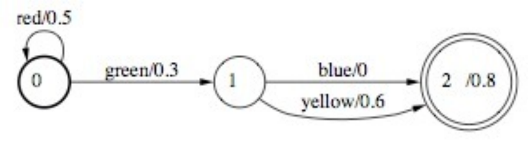
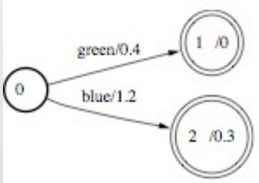
UNION OF TRANSDUCERS

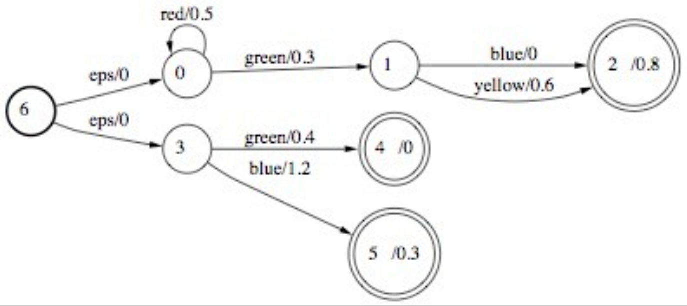
```
fstunion A.fst B.fst > C.fst
```



A.fst



B.fst



C.fst

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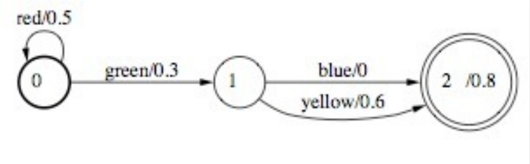
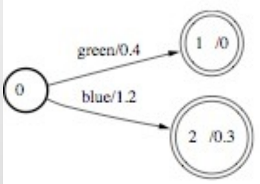
CONCATENATION OF TRANSDUCERS

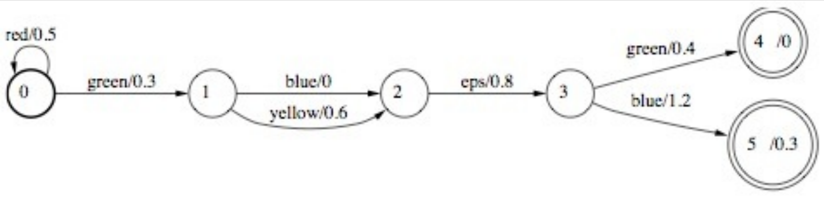
```
fstconcat A.fsm B.fsm > C.fsm
```



A.fst



B.fst



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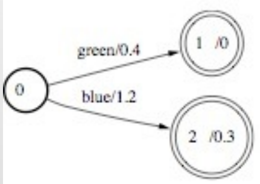
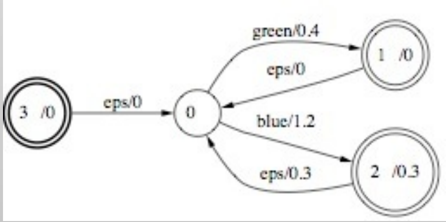
CLOSURE OF TRANSDUCERS

```
fstclosure B.fst > C.fst
```



B.fst



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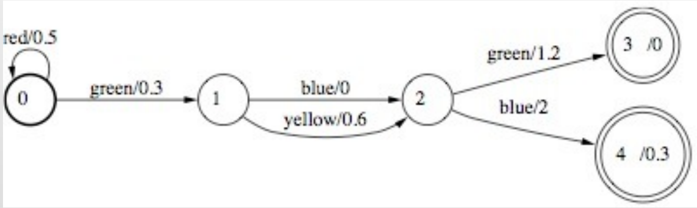
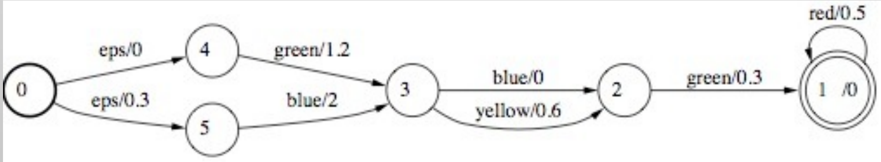
“REVERSAL” OF TRANSDUCERS

```
fstreverse A.fst > C.fst
```



A.fst



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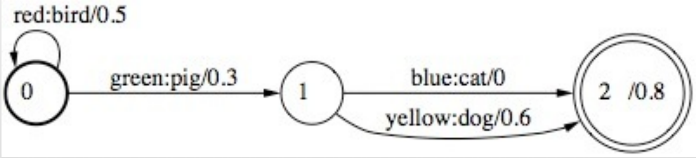
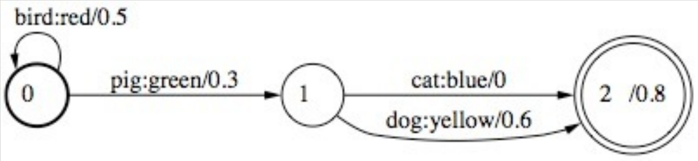
INVERSION OF TRANSDUCERS

```
fstinvert A.fst > C.fst
```



A.fst



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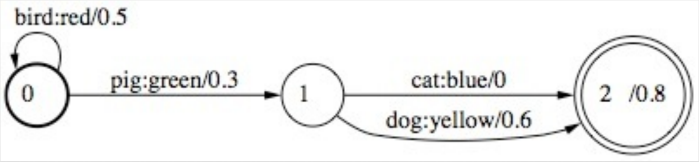
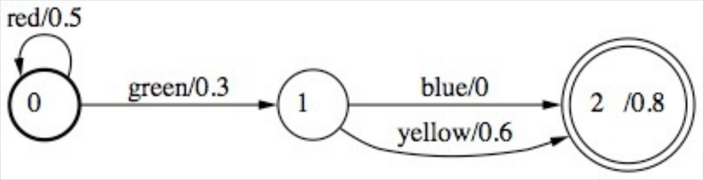
PROJECTION OF TRANSDUCERS

```
fstproject –project_output=true  A.fst > C.fst
```



A.fst



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COMPOSITION OF TRANSDUCERS

To obtain the composition of two transducers:

- Creates a new state (x,y) for all the possible pairs $x \epsilon Q_1$ and $y \epsilon Q_2$
- The transition function of the composition is defines by

$$\delta((x,y),i{:}o)=(v,z)$$

if

$$\delta_1(x,i{:}c) = v \quad \text{and} \quad \delta_2(y,c{:}o) = z$$

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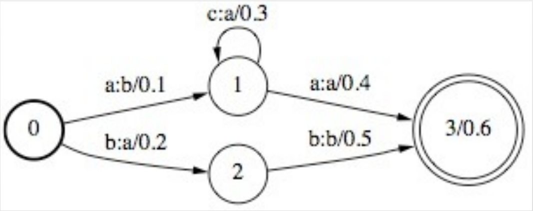
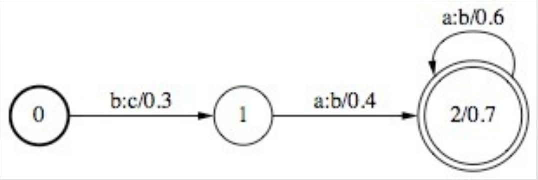
COMPOSITION OF TRANSDUCERS

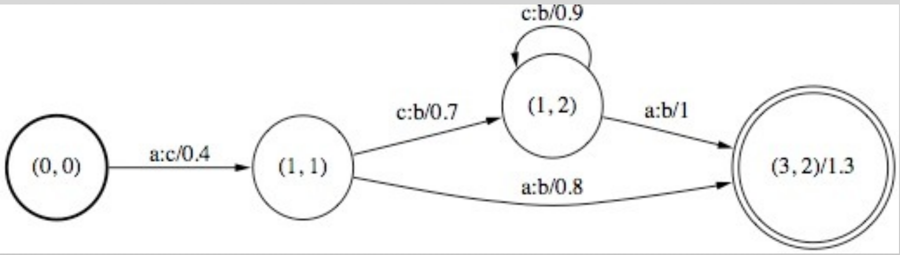
```
fstcompose A.fsm B.fsm > C.fsm
```



A.fst



B.fst



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INTERSECTION OF TRANSDUCERS

- ***The intersection algorithm only considers the cartesian product of the states***
  - For each state q_i of the first transducer, and state q_j of the second transducer, build a new state q_{ij}
  - For the input symbol a, if the first transducer has a transition to the state q_n and the second transducer has a transition to state q_m the new transducer has a transition to state q_{nm}

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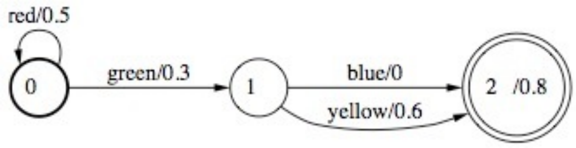
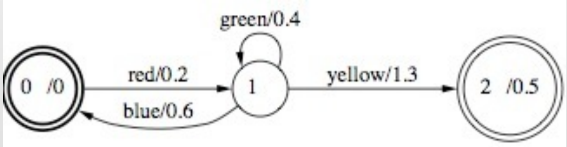
INTERSECTION OF TRANSDUCERS

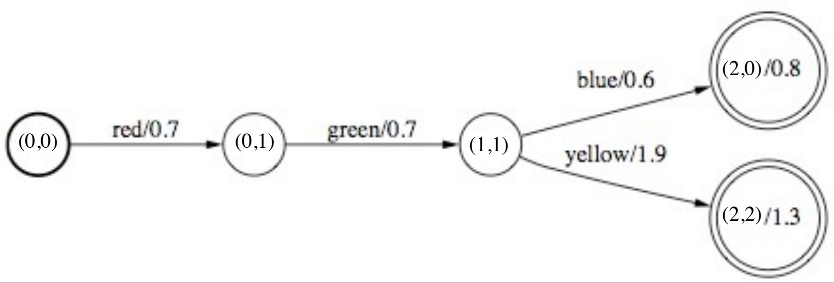
```
fstintersect A.fst B.fst > C.fst
```



A.fst



B.fst



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DIFFERENCE OF TRANSDUCERS

- *Difference(A,B) = Intersection(A,Complement(B))*

- *Complement(B) = all the sentences not belonging to B*

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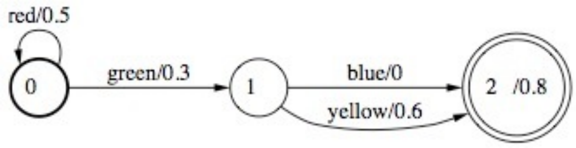
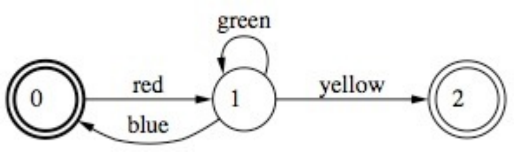
DIFFERENCE OF TRANSDUCERS

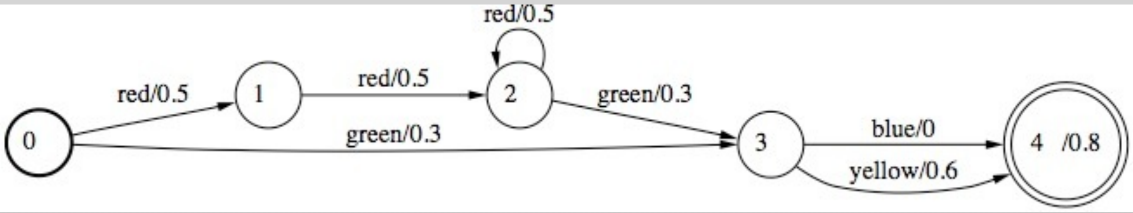
```
fsmdifference A.fsm B.fsm > C.fsm
```



A.fsm



B.fsm



C.fsm

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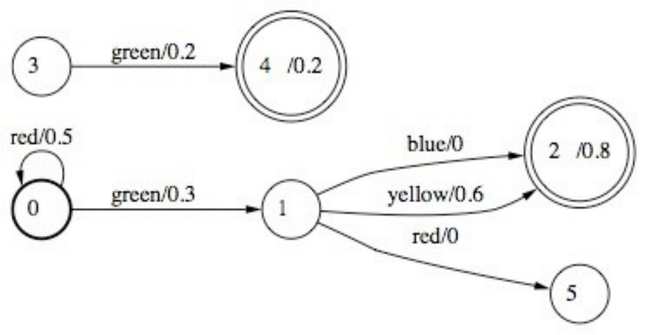
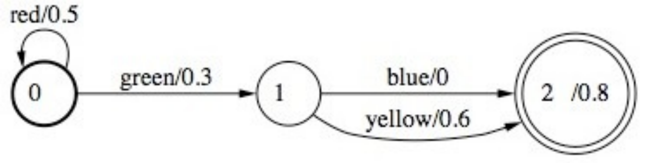
REMOVAL OF INACCESSIBLE STATES

- com a opção -t, devolve (exit status) 1 se a saída não tiver estados, útil para testar se a saída é vazia ...

```
fstconnect A.fst > C.fst
```



A.fst



C.fst

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