

ITERATION, BISIMULATION, AUTOMATA

COINDUCTIVE DEFINITION. A **monoidal stream** from $X = X_0, X_1, X_2, \dots$ to $Y = Y_0, Y_1, Y_2, \dots$ is a dinatural equivalence class of a morphism $X_0 \rightarrow Y_0 \otimes M$ and a monoidal stream from $X_+ = M \otimes X_1, X_2, \dots$ to $Y_+ = Y_1, Y_2, \dots$.

THEOREM. Monoidal streams in $\text{KL}(D)$ are controlled stochastic processes.
Uniform notions of automata, trace equivalence, coinductive descriptions...

 Di Lore, de Felice, Román. Monoidal Streams for Dataflow Programming. LiCS'22.

 Di Lore, Gianda, Román, Sabadini, Sobocinski. Span(Graph): A Canonical Algebra. SOSYM.

```
walk() = do rec
  c ← flip Coin()
  pos ← 0 FBY c + pos
  return pos
```



github.com/mroman42/arrow-streams