RNN Convolutional Code Decoder

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Overview

1. Background
   - Convolutional Codes
   - Finite State Machine
   - The Viterbi Decoder
2. Goal and Motivation
3. Tools
   - scikit-dsp-comm
4. Our Model
   - RNN (?)
5. Results
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Convolutional Codes

This encoder depicted in the figure below corresponds to the following **generator polynomials**:

$$\begin{aligned} g^{(1)} &= 1 + x^2 \qquad & g^{(2)} &= 1 + x + x^2 \\ g^{(1)} &= [1, 0, 1] \qquad & g^{(2)} &= [1, 1, 1] \end{aligned} \tag{1}$$

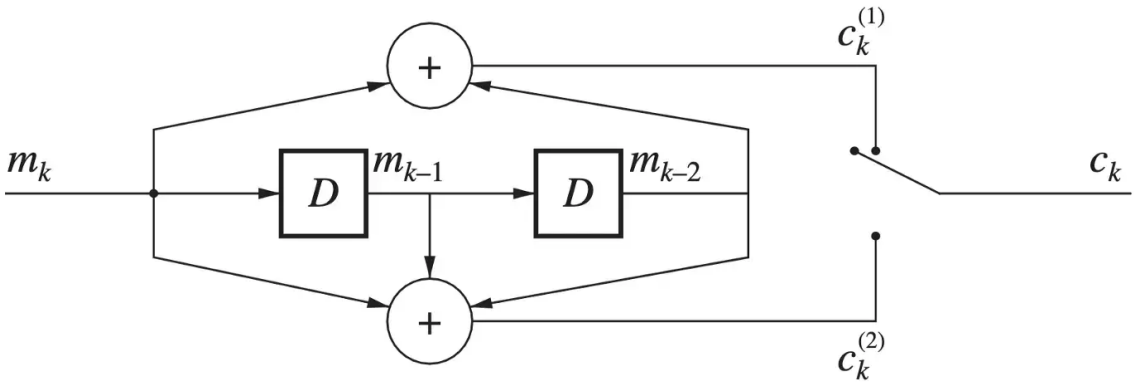


Figure: Convolutional encoder with rate $R = \frac{1}{2}$ and constraint length $K = 2$

Finite State Machine

Other representations of this encoder are a **finite state machine** and a **trellis**.

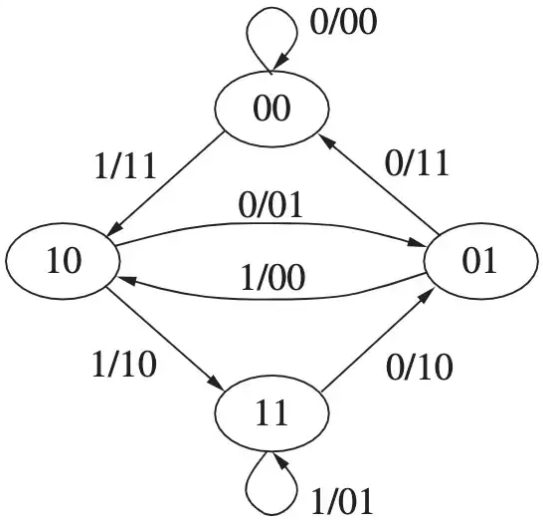


Figure: FSM representation

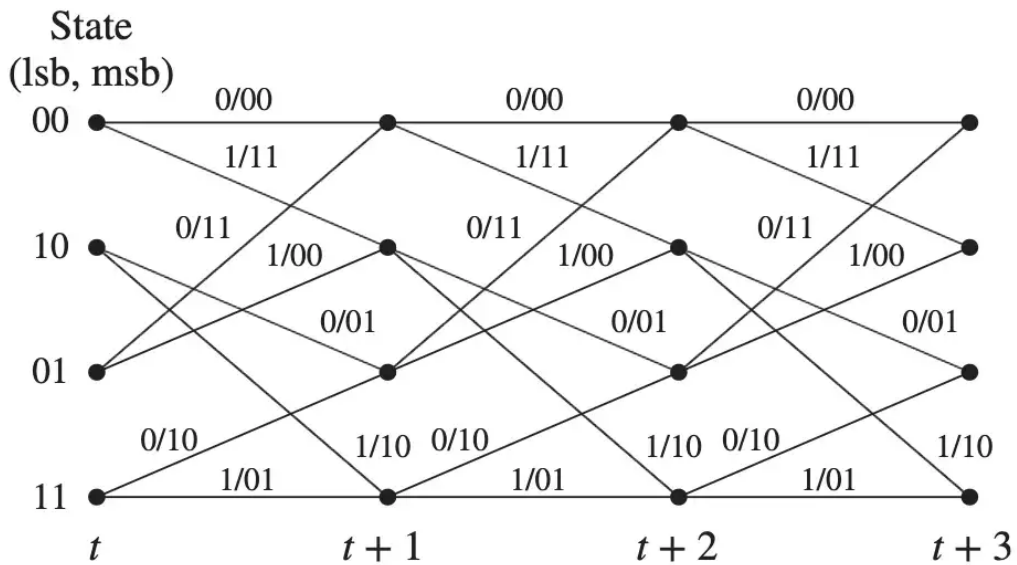


Figure: Trellis representation

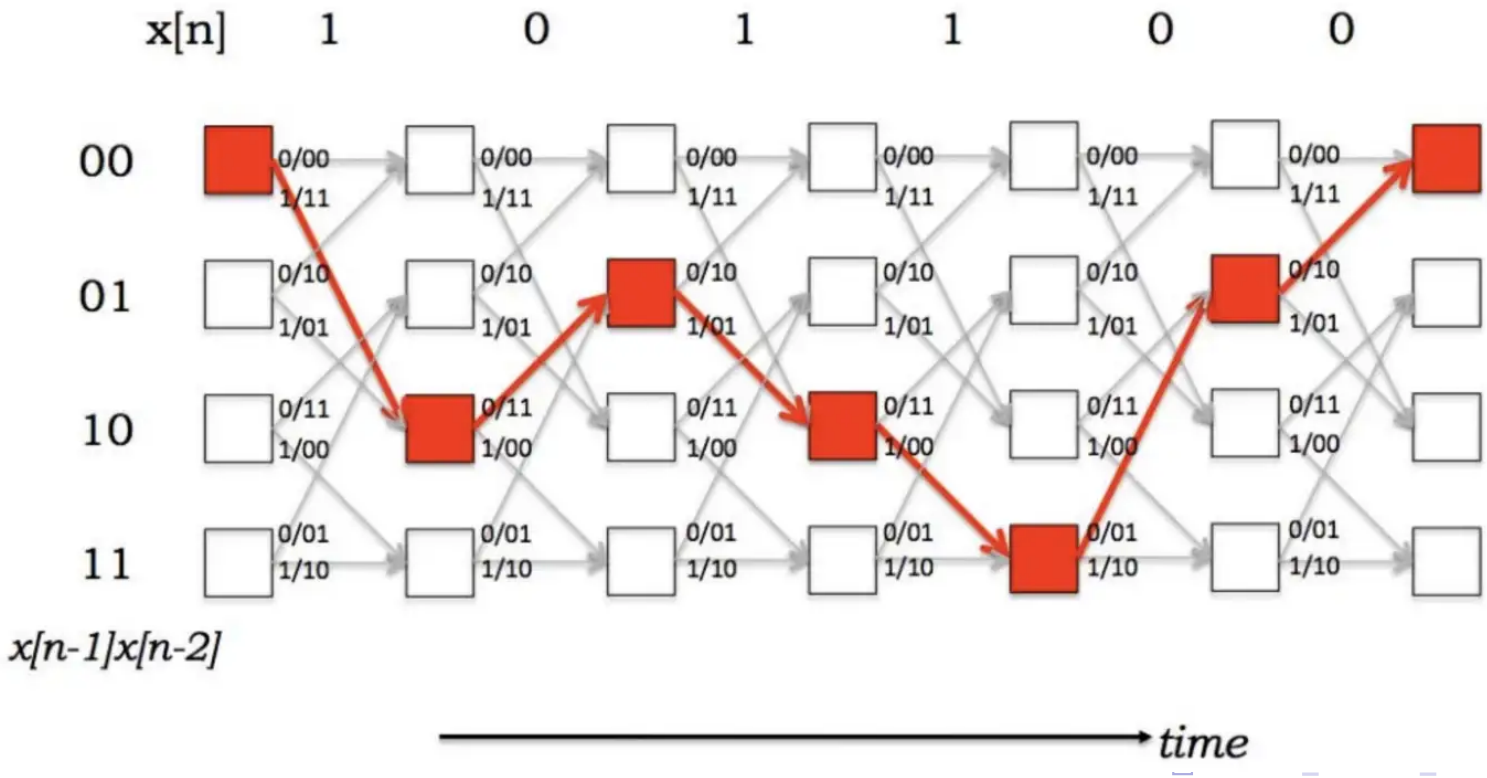
The single digit on each edge indicates the input bit and the two digits indicates the output according to the generator polynomials.

The Viterbi Decoder

Goal

Determine the **most likely** sequence of states that could have produced the given sequence of received bits

Using the trellis representation of the encoding process, the Viterbi decoder determines the **most likely path** along this trellis.



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Goal and Motivation

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scikit-dsp-comm

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Results

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Questions?