SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF BIOMEDICAL ENGINEERING

19BMB302 - BIOMEDICAL SIGNAL PROCESSING

III YEAR/ V SEMESTER

Unit V : DATA REDUCTION TECHNIQUES

- Turning point algorithm
- AZTEC algorithm
- CORTES algorithm
- Fan algorithm
- Huffman algorithm

FAN algorithm

- Originally used for ECG telemetry, the Fan algorithm draws lines between pairs of starting and ending points so that all intermediate samples are within some specified error tolerance
- Figure 1 illustrates the principles of the Fan algorithm.
- We start by accepting the first sample $X0$ as the nonredundant permanent point.
- It functions as the origin and is also called the originating point.
- We then take the second sample $X1$ and draw two slopes $\{U1, L1\}$.
- $U1$ passes through the point $(X0, X1 + \varepsilon)$, and $L1$ passes through the point $(X0, X1 - \varepsilon)$.
- If the third sample $X2$ falls within the area bounded by the two slopes, we generate two new slopes $\{U2, L2\}$ that pass through points $(X0, X2 + \varepsilon)$ and $(X0, X2 - \varepsilon)$.

FAN algorithm

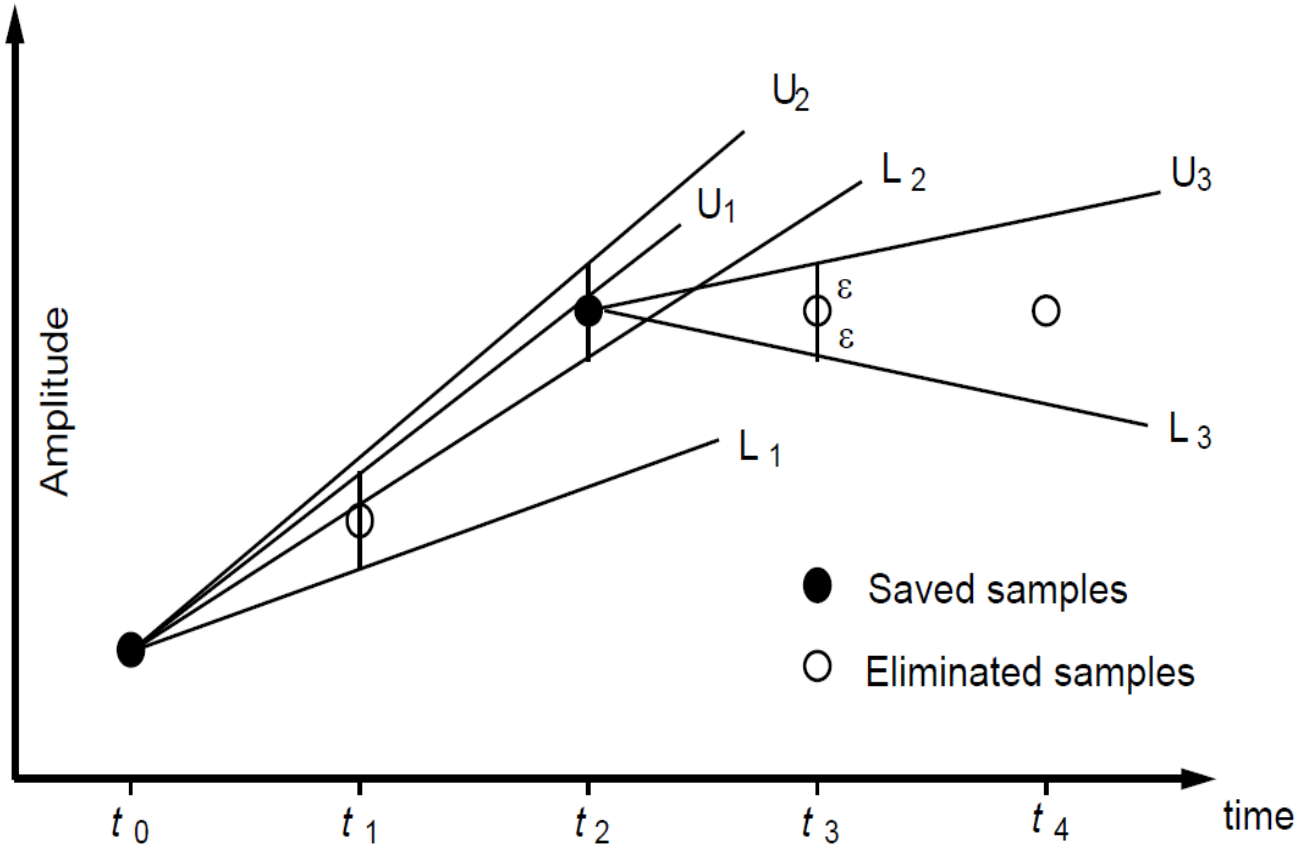
- We compare the two pairs of slopes and retain the most converging (restrictive) slopes (i.e., $\{U1, L2\}$ in our example).
- Next we assign the value of $X2$ to $X1$ and read the next sample into $X2$. As a result, $X2$ always holds the most recent sample and $X1$ holds the sample immediately preceding $X2$.
- We repeat the process by comparing $X2$ to the values of the most convergent slopes.
- If it falls outside this area, we save the length of the line T and its final amplitude $X1$ which then becomes the new originating point $X0$, and the process begins anew.
- The sketch of the slopes drawn from the originating sample to future samples forms a set of radial lines similar to a fan, giving this algorithm its name.

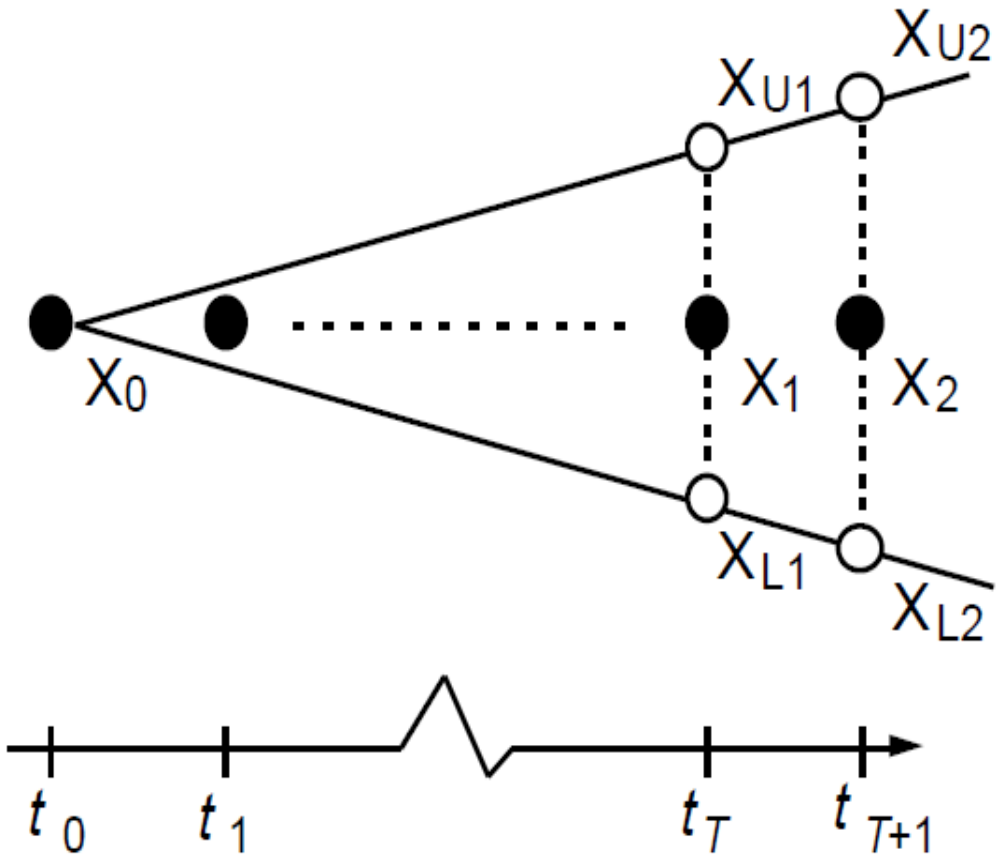
- When adapting the Fan algorithm to C-language implementation, we create the variables, $XU1$, $XL1$, $XU2$, and $XL2$, to determine the bounds of $X2$.
- From Figure we can show that

$$X_{U2} = \frac{X_{U1} - X_0}{T} + X_{U1}$$

$$X_{L2} = \frac{X_{L1} - X_0}{T} + X_{L1}$$

- $T = tT - t0$.


Amplitude
U_2
L_2
U_3
U_1
ε
ε
L_1
L_3
Saved samples
Eliminated samples
t_0
t_1
t_2
t_3
t_4
time


X_{U2}
X_{U1}
X_0
X_1
X_2
X_{L1}
X_{L2}
t_0
t_1
t_T
t_{T+1}

Thank You!