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Exp-1

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Aim: Design and Implement a Hidden Markov Models for outcome prediction

Theory:

Hidden Markov Models (HMM) are powerful probabilistic models used to describe sequences of observables events, where the underlying processes generating these events is assumed to be governed by a set of hidden states.

Components of HMM:

1) Hidden State (s)
It represent unobservable or latent factors that drive the observed sequence of events.
Hidden states form a finite set $S = \{S_1, S_2, \ldots S_N\}$

2) Observations (O)
This are measurable outcomes or emissions associated with each hidden state.
$O = \{O_1, O_2, \ldots O_M\}$

3) State Transition Probabilities (A)
It define the likelihood of transitioning from one hidden state to another.

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4) Emission Probability (B)
It describes the probability of observing a particular event given the current hidden state

5) Initial State Distribution (π):
The initial state distribution π specifies the probabilities of starting in each hidden state

Markov Property
HMMs assume the Markov property, which states with that the future states depends only on the current state and not on the sequence of previous states. Mathematically this can be written as

$$P(S_{t+1} | S_1, S_2 \dots S_t) = P(S_{t+1} | S_t)$$

Conclusion:
= The experiment involving the design and implementation of a HMM for outcome prediction provides valuable insights into the application of probabilistic models in predective analysis.