DIGITAL ASSIGNMENT - 1

CSE 3013 - Artificial Intelligence

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[DEFENCE]

BAYESIAN NETWORK ANALYSIS ON SAFETY OF MILITARY & CIVIL AVIATION WITH RESPECT TO FLIGHT DELAYS

INTRODUCTION :-

↳ Flight postponements and security are the important logical inconsistencies in the improvement of common aeronautics

↳ Flight delays frequently come up and prompt common aviation dangers all the while. In light of this, the arbitory qualities of common aeronautics dangers are investigated.

↳ Flight delays have been esteemed to a potential security panel.

↳ The change of guidelines and attributes of common avionics danger in light of flight delay have been analyzed using Bayesian Networks.

↳ Bayesian Networks (BN) have been utilized to construct the aeronautics activity well being evaluation display in light of flight delay

↳ The structure and parameters learning of the model have been taken into consideration. The network analysis comes about demonstrating the flight delay, which builds the danger of common flying can be viewed as an incremental danger.

↳ The diagram for the above analysis is shown as follows is :—

Characteristics of aviation safety risk evaluation based on a flight delays

The composition of aviation safety risk based on flight delays

Method Selection

The risk Composition of aviation safety based a flight delays.

Aviation safety risk evaluation based on flight delay using Bayesian Network (BN)

The risk mechanism of aviation safety based a flight delays

BN structure of aviation safety risk evaluation based on flight delays

Data collection and expert information extraction

BN structure learning

BN parameters learning

↓

Bn influence for aviation operation safety risk based on flight delays

↓

Awation operation safety evaluation based on flight delays.

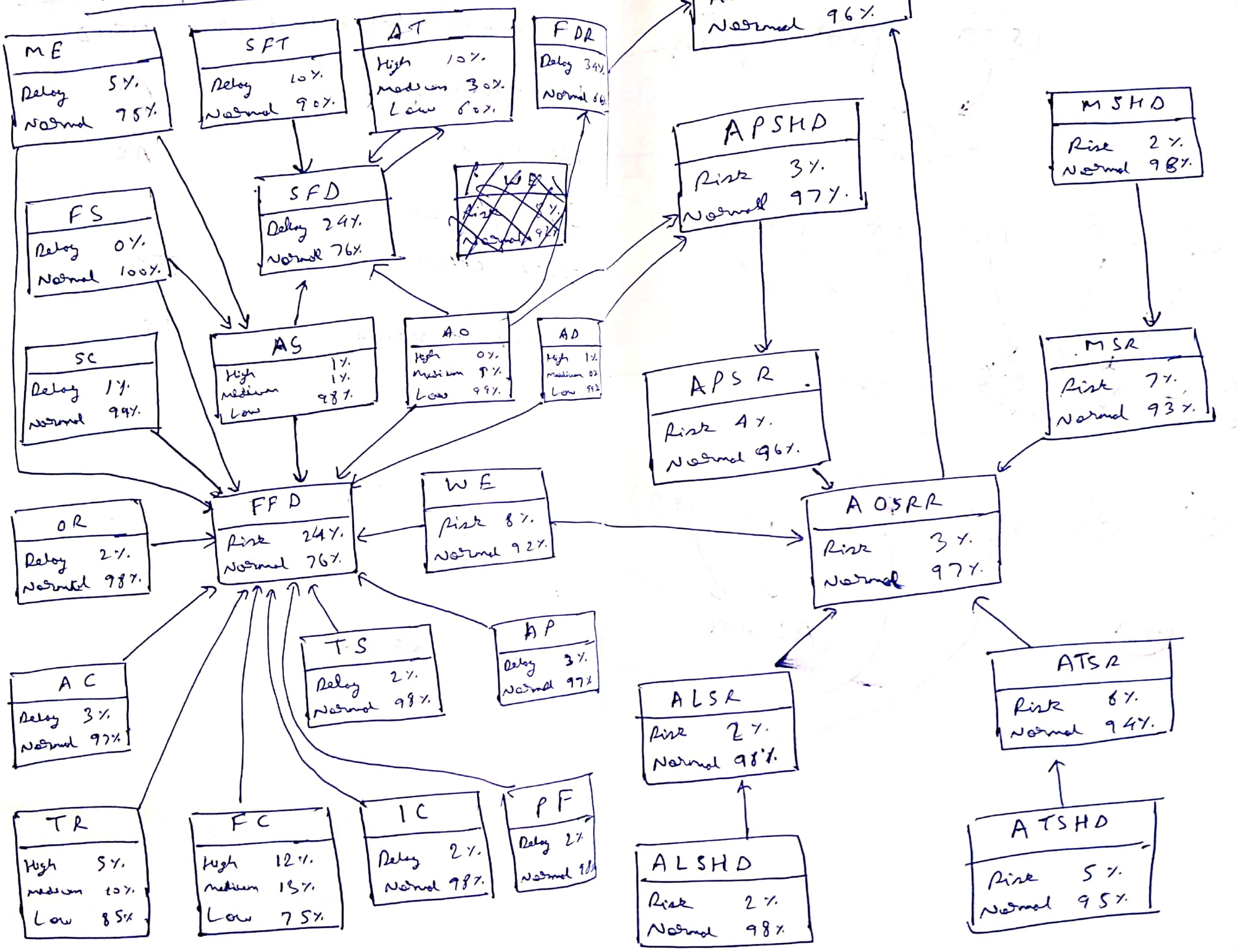
The description of node characteristics is given as follows:-

NODE - MEANING	ABBREVIATION
Flow - control	FC
Weather	WE
Airplane plan	AP
Maintenance & Engineering	ME
Airplane Design	AD
Airplane Order	AO
Scheduled Flight Time	SFT
ATC Safety Risk	A.TSR
AIRLine Safety Risk	ALSR

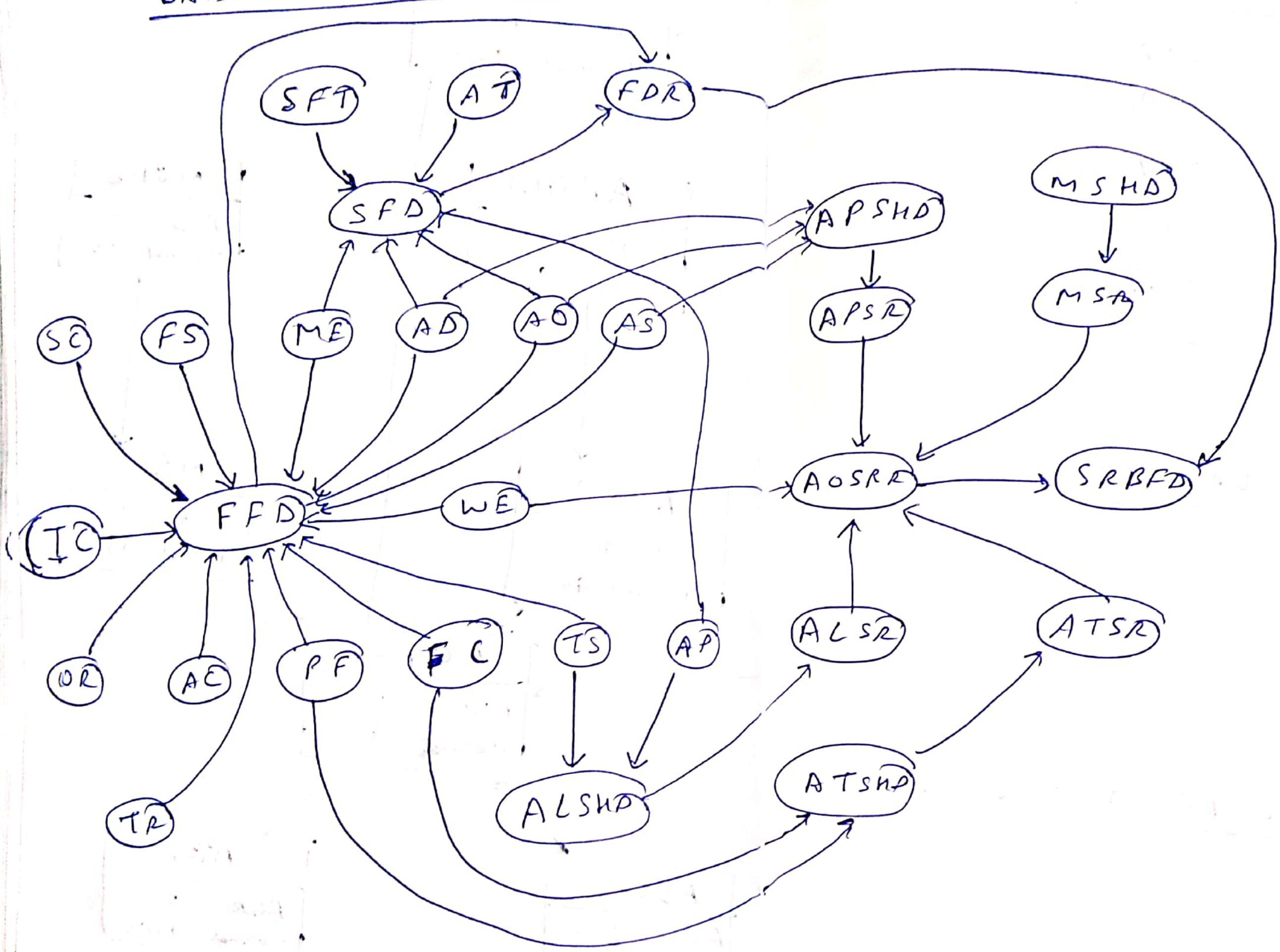
NODE - MEANING	ABBREVIATION
Airport Safety Risk	APSR
Maintainance safety Risk	MSR
Airport size	AS
Food Supply	FS
Other Reason	OR
Traveler	TR
Aircraft type	AT
Flight delay	FD
Station Flight Delay	SFD
Flight delay rate	FDR
Risk rate of aviation operation safety	AOSRR
Safety operation risk based on a flight delay	SRBFD
ATC safety hidden danger	ATSHD
Airline Safety hidden danger	ARSHD
Airport Safety hidden danger	APSHD

NODE- MEANING	ABBREVIATION
Maintenance safety hidden danger	MSHD
Prohibited fly	PF
Air crew	AC
Security check	SC
Joit check	JC
Transport Service	TS

PROBABILITY DISTRIBUTION OF EACH NODE



BAYESIAN-NETWORK STRUCTURE



INDEPENDENT - VARIABLE

↳ SC
↳ FS
↳ ME
↳ AD
↳ AO
↳ AS
↳ IC
↳ AS
↳ PF
↳ FC
↳ TS
↳ AP
↳ TR

DEPENDENT VARIABLE

↳ FFD
↳ SFD
↳ AOSRR
↳ SRBFD

CONDITIONAL DEPENDENT VARIABLES

↳ ACSHP
↳ ATSHP
↳ FDR
↳ MSHP
↳ APSR
↳ MSR

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JUSTIFICATION

↳ The probability of the target node is influenced only by its Markov Blanket (MB).

↳ MB is defined as the set of input features because all the other features are probabilistically independent of target features.

↳ In a Bayesian network, MB of a node X_i is the set of nodes which is composed of its parent nodes, its child nodes, and parent nodes of its child nodes.

↳ ∴ MB is the property of node X_i which makes X_i independent in the network.

Here, $P(AOSRR \mid MB(AOSRR))$

$= P(AOSRR \mid SFD, WE, FFD, ALSR, APSR, ARBR, MSR)$

$= \dfrac{P(AOSRR, SFD, WE, FFD, ALSR, APSR, ARBR, MSR)}{P(SFD, WE, FFD, ALSR, APSR, ARBR, MSR)}$

$$= \frac{\prod_{x_i \in \{SFD, WE, FFD, ALSR, APSR, ARBR, MSR\}} P(x_i \mid \pi(x_i))}{P(SFD, WE, FFD, ALSR, APSR, ARBR, MSR)}$$

$$= P(AOSRR \mid \pi(AOSRR)) \prod_{x_i \in \text{children}(AOSRR)} P(x_i \mid \pi(x_i))$$

$$\prod_{x_j \notin AOSRR \wedge x_j \notin \text{children}(AOSRR)} P(x_j \mid \pi(x_j))$$

$\propto P(P(SFD, WE, FFD, ALSR, APSR, ARI, MSR$

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