1. Develop a LaTeX script to create a simple document that consists of 2 sections [Section1, Section2], and a paragraph with dummy text in each section. And also include header [title of document] and footer [institute name, page number] in the document.

```
\documentclass{article}

\usepackage{authoraftertitle}

\usepackage{fancyhdr}

\fancyhead{}

\fancyhead[L]{left header}

\fancyhead[R]{right header \quad \thepage}

\fancyfoot{}

\fancypagestyle{plain}{

\fancyhead{}

\fancyhead[C]{Trust Modeling for Recommendation}

\fancyfoot{}

\fancyfoot[C]{MSEC, Bangalore}

\fancyfoot[R]{\thepage}

}

\pagestyle{fancy}

\title{Explicit and Implicit Trust Modeling for Recommendation}

\begin{document}

\maketitle

\section{Introduction}

Recommendation has become an indispensable part of software systems, particularly e-commerce and online streaming applications such as Spotify (spotify.com) and Netflix (netflix.com), alleviating the load of search for users in a vast item collection and positively affecting the perception of the users about the applications through improved user experience.

\section{Literature Review}

Trust-aware recommendation is a challenging research problem and there is a variety of solutions that focus on the use of the trust information to improve the accuracy of recommendations, particularly alleviating cold start and rating data sparsity problems.


\end{document}
```

Explicit and Implicit Trust Modeling for Recommendation

April 19, 2025

1 Introduction

Recommendation has become an indispensable part of software systems, particularly e-commerce and online streaming applications such as Spotify (spotify.com) and Netflix (netflix.com), alleviating the load of search for users in a vast item collection and positively affecting the perception of the users about the applications through improved user experience.

2 Literature Review

Trust-aware recommendation is a challenging research problem and there is a variety of solutions that focus on the use of the trust information to improve the accuracy of recommendations, particularly alleviating cold start and rating data sparsity problems.

2. Develop a LaTeX script to create a document that displays the sample Abstract/Summary

```
\documentclass{article}
\usepackage{ragged2e}
\title{\textbf{Abstract}}
\vspace{-8ex}
\date{}
\begin{document}
\maketitle
\thispagestyle{empty}
\justify{Whenever multi-sense or non-domain specificity
arises in a query it is difficult to deliver exact or approximate
results to users for that query in considerable time limit. Modern
search engines fetch enough similar results for a query over
a data tree or a corpus by applying query approximation
algorithms. The proposed approximate query answering model
called Query Answering with Pointed Graphs (QAPG) achieves
query approximation by evaluating the user concerned queries
on proper semantic paths on an Accessible Pointed Graph (APG)
relaxed with architectural clues.}
\vspace{1mm}
\justify{The proposed model formulates semantically
inferred path algebra for a query and performs the path mapping
with other set of path algebras of corresponding query keywords
or a closely matched fuzzy set of another corresponding query
keywords to find approximate queries. The concept of APG is
used for weaving the paths, subsumed with the given concerned
keyword set. Users are more concerned about their choice of
search context so each selected attribute of the query is weighted
according to the nature of data items either numerical or
categorical in type.}
\vspace{1mm}
\justify{The content similarity function is used to
associate the categorical values to weighted attributes to evaluate
overall content similarity. The overall similarity of the obtained paths is calculated
from the association of content similarity and twig level similarity. The approximation
function elegantly
combines structure with contents to answer approximate queries.
User preference on top-k answers are adjusted by an adjustment
coefficient. The approximation function can find out a range of
most relevant answers from a large number of XML data sources
by tuning the adjustment coefficient.}
\justify{\textbf{Keywords:} Path algebra, Twig, APG, Architectural clues, Content
similarity.}
\end{document}
```

Abstract

Whenever multi-sense or non-domain specificity arises in a query it is difficult to deliver exact or approximate results to users for that query in considerable time limit. Modern search engines fetch enough similar results for a query over a data tree or a corpus by applying query approximation algorithms. The proposed approximate query answering model called Query Answering with Pointed Graphs (QAPG) achieves query approximation by evaluating the user concerned queries on proper semantic paths on an Accessible Pointed Graph (APG) relaxed with architectural clues.

The proposed model formulates semantically inferred path algebra for a query and performs the path mapping with other set of path algebras of corresponding query keywords or a closely matched fuzzy set of another corresponding query keywords to find approximate queries. The concept of APG is used for weaving the paths, subsumed with the given concerned keyword set. Users are more concerned about their choice of search context so each selected attribute of the query is weighted according to the nature of data items either numerical or categorical in type.

The content similarity function is used to associate the categorical values to weighted attributes to evaluate overall content similarity. The overall similarity of the obtained paths is calculated from the association of content similarity and twig level similarity. The approximation function elegantly combines structure with contents to answer approximate queries. User preference on top-k answers are adjusted by an adjustment coefficient. The approximation function can find out a range of most relevant answers from a large number of XML data sources by tuning the adjustment coefficient.

Keywords: Path algebra, Twig, APG, Architectural clues, Content similarity.

Program-03: Develop a LaTeX script to create a simple title page of the VTU project Report [Use suitable Logos and text formatting]

```
\documentclass[a4paper, 12pt]{report}

\usepackage{graphicx}
\usepackage{xcolor}
\begin{document}
\thispagestyle{empty}
\pagenumbering{roman}
\setcounter{page}{1}
\begin{center}
\textbf{\large Social Internet of Things}
\end{center}
\vspace{18mm}
\begin{center}
\begin{small}
A Project Report\\
Submitted for the Award of the Degree\\
of\\
Bachelor of Engineering\\
in\\
Information Science and Engineering\\
by\\
\vspace{.5cm}
\textbf{Komalavalli P}\\
IV SEM\\
\vspace{.3cm}
Under the guidance of\\
\vspace{.5cm}
\textbf{Mr. Rahul}\\
Associate Professor\\
MS Engineering College, Bangaluru\\
Visvesvaraya Technological University, Belgavi.\\
\end{small}
\vspace{10mm}
\centerline{\includegraphics[scale=.2]{vtul.png}}
\vspace{10mm}
Department of Information Science and Engineering\\
MS Engineering College, Bangaluru,\\Visvesvaraya Technological University, Belgavi.\\
\color{white}jg\color{black}\\
February 2025\\
\end{center}
\end{document}
```

Social Internet of Things

A Project Report
Submitted for the Award of the Degree
of
Bachelor of Engineering
in
Information Science and Engineering
by

Komalavalli P
IV SEM

Under the guidance of

Mr. Rahul
Associate Professor
MS Engineering College, Bangaluru
Visvesvaraya Technological University, Belgavi.

Department of Information Science and Engineering
MS Engineering College, Bangaluru,
Visvesvaraya Technological University, Belgavi.

February 2025

Program-04: Develop a LaTeX script to create the Certificate Page of the Report [Use suitable commands to leave the blank spaces for user entry]

```
\documentclass[a4paper, 12pt]{report}

\usepackage{graphicx}
\usepackage{ragged2e}
\usepackage{xcolor}
\begin{document}


\thispagestyle{empty}
\pagenumbering{roman}
\setcounter{page}{1}
\begin{center}
\textbf{\large Visvesvarya Technological University}\newline
\textbf{\small JnanaSangama BELAGAVI - 590018}
\newline
\newline
\centerline{\includegraphics[scale=.1]{vtul.png}}
\newline
\newline
\textbf{\small DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING}
\newline
\newline
\textbf{\large CERTIFICATE}
\end{center}
\vspace{5mm}
\justify{This is to certify that Mr. Basvaraju K N bearing USN:1ME23IS008 is a
bonafide student of Bachelor of Engineering course of the Department of information
Science and Engineering, VTU, Belgavi, affiliated to Visvesvaray Technological
University, Belagavi. Project report on "Context-based Diversication of Search
Engines" is prepared by him under the guidance of Dr. Haneefa Shafi in partial
fulfillment of the requirements for the award of the degree of Bachelor of Engineering
of Visvesvaray Technological University, Belagavi, Karnataka.}
\newline
\newline
\newline
..... \hspace{16mm} .....\hspace{16mm}.....
\newline
\newline
Dr. Haneefa Shafi \hspace{16mm} Dr. Sangeetha P \hspace{14mm} Dr. Kuriyan M
A
\newline
\newline
Signature of Guide \hspace{13mm} Signature of HoD \hspace{11mm} Signature of
Principal
```

\begin{center}
\vspace{10mm}
\textbf{\small EXTERNAL EXAMINER}
\end{center}
\vspace{5mm}
Name of Examiners \hspace{60mm} Signature with date
\newline
\newline
1.
\newline
\newline
2.
\end{document}

Visvesvarya Technological University

JnanaSangama BELAGAVI - 590018

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that Mr. Basvaraju K N bearing USN:1ME23IS008 is a bonafide student of Bachelor of Engineering course of the Department of information Science and Engineering, VTU, Belgavi, affiliated to Visvesvaray Technological University, Belagavi. Project report on "Context-based Diversication of Search Engines" is prepared by him under the guidance of Dr. Haneefa Shafi in partial fulfillment of the requirements for the award of the degree of Bachelor of Engineering of Visvesvaray Technological University, Belagavi, Karnataka.

.....	.....	.....
Dr. Haneefa Shafi	Dr. Sangeetha P	Dr. Kuriyan M A
Signature of Guide	Signature of HoD	Signature of Principal

EXTERNAL EXAMINER

Name of Examiners	Signature with date
1.	
2.	

5. Develop a LaTeX script to create a document that contains the following table with proper labels.

S.No	USN	Student Name	Marks		
			Subject1	Subject2	Subject3
1	4XX22XX001	Name 1	89	60	90
2	4XX22XX002	Name 2	78	45	98
3	4XX22XX003	Name 3	67	55	59

Program:

```
\documentclass{article}
\usepackage{array, booktabs, multicol, multirow} % Load necessary packages
\renewcommand{\arraystretch}{1.2} % Adjust vertical spacing in tables

\begin{document}
	\centering
	\textbf{\Large{Student Details and Marks}} % Title
	\vspace{0.1in}

	\begin{table}[h]
		\centering
		\begin{tabular}{|c|c|c|c|c|c|} % Define table with 6 columns, all centered
			\hline
			\multirow{2}{*}{\textbf{S.No}} & \multirow{2}{*}{\textbf{USN}} & \
multirow{2}{*}{\textbf{Student Name}} & \multicolumn{3}{c|}{\textbf{Marks}} \\ % Multirow
for headers spanning 2 rows, Multicolumn for header "Marks" spanning 3 columns
			\cline{4-6} % Horizontal line from column 4 to 6
			& & & \textbf{Subject1} & \textbf{Subject2} & \textbf{Subject3} \\ % Sub-
headers for marks
			\hline
			\multicolumn{1}{|c|}{1} & \multicolumn{1}{c|}{4XX22XX01} & \
multicolumn{1}{c|}{Name 1} & 89 & 60 & 90 \\ % Data rows
			\hline
			\multicolumn{1}{|c|}{2} & \multicolumn{1}{c|}{4XX22XX02} & \
multicolumn{1}{c|}{Name 2} & 78 & 45 & 98 \\
			\hline
			\multicolumn{1}{|c|}{3} & \multicolumn{1}{c|}{4XX22XX03} & \
multicolumn{1}{c|}{Name 3} & 67 & 55 & 59 \\
			\hline
		\end{tabular}
	\end{table}

\end{document}
```

Student Details and Marks

S.No	USN	Student Name	Marks		
			Subject1	Subject2	Subject3
1	4XX22XX01	Name 1	89	60	90
2	4XX22XX02	Name 2	78	45	98
3	4XX22XX03	Name 3	67	55	59

6. Develop a LaTeX script to include the side-by-side graphics/pictures/figures in the document by using the subgraph concept.

Program:

```
\documentclass{article}

\usepackage{graphicx}  % Required for including images

\usepackage{subcaption}  % Required for subfigures


\begin{document}


    \begin{figure}
        \centering
        \begin{subfigure}{0.46\linewidth}  % Subfigure environment for the first image
            \includegraphics[width=\linewidth]{image1.jpg}  % Include image1.jpg
            \caption{Caption for image 1}  % Caption for the first image
            \label{fig:subfig1}  % Label for referencing the first image
        \end{subfigure}
        \hfill  % Add horizontal space between subfigures
        \begin{subfigure}{0.44\linewidth}  % Subfigure environment for the second image
            \includegraphics[width=\linewidth]{image2.png}  % Include image2.png
            \caption{Caption for image 2}  % Caption for the second image
            \label{fig:subfig2}  % Label for referencing the second image
        \end{subfigure}
        \caption{Combined caption for both images}  % Overall caption for the figure
        \label{fig:subfigures}  % Label for referencing the entire figure
    \end{figure}


\end{document}
```

(a) Caption for image 1

(b) Caption for image 2

Figure 1: Combined caption for both images

7. Develop a LaTeX script to create a document that consists of the following two mathematical equations.

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$= \frac{-2 \pm \sqrt{2^2-4*(1)*(-8)}}{2*1}$$

$$= \frac{-2 \pm \sqrt{4+32}}{2}$$

$$\varphi_\sigma^\lambda A_t = \sum_{\pi \in C_t} \operatorname{sgn}(\pi) \varphi_\sigma^\lambda \varphi_\pi^\lambda$$

$$= \sum_{\tau \in C_{\sigma t}} \operatorname{sgn}(\sigma^{-1}\tau\sigma) \varphi_\sigma^\lambda \varphi_{\sigma^{-1}\tau\sigma}^\lambda$$

$$= A_{\sigma t} \varphi_\sigma^\lambda$$

Program:

```
\documentclass{article}

\usepackage{amsmath} % Required for mathematical environments and commands


\begin{document}


    \section*{Equations Set 1} % Section header for the first set of equations


    \begin{align} % Begin the align environment for multiple equations

        x &= -b \pm \sqrt{\sqrt[4]{b^2 - 4ac}} \notag \\ % First equation with \notag to suppress numbering

        x &= \frac{-b \pm \sqrt{22 - 4 \cdot 1 \cdot (-8)}}{2 \cdot 1} = \frac{-b \pm \sqrt{\sqrt{4 + 32}}}{2} = \frac{-b \pm \sqrt{2}}{2} \notag % Second equation with \notag to suppress numbering

    \end{align} % End the align environment


    \section*{Equations Set 2} % Section header for the second set of equations


    \begin{align} % Begin the align environment for multiple equations

        \varphi_{\sigma}^{\lambda} \cdot A_{t} &= \sum_{\pi \in C_{t}} \text{sgn}(\pi) \cdot \varphi_{\sigma}^{\lambda} \cdot \varphi_{\pi}^{\lambda} \notag \\ % First equation with \notag to suppress numbering

        &= \sum_{\tau \in C_{\sigma}^{t}} \text{sgn}(\sigma^{-1} \tau \sigma) \varphi_{\sigma}^{\lambda} \varphi_{\sigma^{-1} \tau \sigma}^{\lambda} \notag \\ % Second equation with \notag to suppress numbering
```

```
                &= A_{\sigma}^{t} \varphi_{\sigma}^{\lambda} \notag % Third equation with \
notag to suppress numbering

        \end{align} % End the align environment


\end{document}
```

Equations Set 1

$$x = -b \pm \sqrt{\sqrt[4]{b^2 - 4ac}}$$

$$x = \frac{-b \pm \sqrt{22 - 4 \cdot 1 \cdot (-8)}}{2 \cdot 1} = \frac{-b \pm \sqrt{\sqrt{4 + 32}}}{2} = \frac{-b \pm \sqrt{2}}{2}$$

Equations Set 2

$$\begin{aligned} \varphi_\sigma^\lambda \cdot A_t &= \sum_{\pi \in C_t} \operatorname{sgn}(\pi) \cdot \varphi_\sigma^\lambda \cdot \varphi_\pi^\lambda \\ &= \sum_{\tau \in C_\sigma^t} \operatorname{sgn}(\sigma^{-1}\tau\sigma) \varphi_\sigma^\lambda \varphi_{\sigma^{-1}\tau\sigma}^\lambda \\ &= A_\sigma^t \varphi_\sigma^\lambda \end{aligned}$$

8. Develop a LaTeX script to demonstrate the presentation of Numbered theorems, definitions, corollaries, and lemmas in the document.

Program:

```
\documentclass{article}

\usepackage{amsthm}


% Define theorem-like environments
\newtheorem{theorem}{Theorem}[section] % Theorems numbered within sections
\newtheorem{definition}[theorem]{Definition} % Definitions share numbering with theorems
\newtheorem{corollary}[theorem]{Corollary} % Corollaries share numbering with theorems
\newtheorem{lemma}[theorem]{Lemma} % Lemmas share numbering with theorems


\begin{document}
\section{Introduction}
\begin{theorem}
This is a theorem.
\end{theorem}
\begin{definition}
This is a definition.
\end{definition}
\begin{corollary}
This is a corollary.
\end{corollary}
\begin{lemma}
This is a lemma.
\end{lemma}
\section{Another Section}
\begin{theorem}
Another theorem.
\end{theorem}
\end{document}
```

1 Introduction

Theorem 1.1. *This is a theorem.*

Definition 1.2. *This is a definition.*

Corollary 1.3. *This is a corollary.*

Lemma 1.4. *This is a lemma.*

2 Another Section

Theorem 2.1. *Another theorem.*

(9) Develop a LaTeX script to create a document that consists of two paragraphs with a minimum of 10 citations in it and display the reference in the section.

```
\documentclass{article}
\usepackage{cite}


\begin{document}
\title{A Social Relationships Based Service Recommendation System For SIoT Devices}
\author{}
\date{}
\maketitle
\section{Introduction}
\par The Internet of Things or IoT is a network of interconnected heterogeneous devices, objects, and machines that are uniquely identifiable which provide data transferability without the need for human-to-computer or human-to-human interaction. Based on the recent statistics released by Gartner \cite{omale2018gartner} shows that the number of connected devices in use in 2019 is 14.2 billion, and this number is expected to increase to 25 billion by 2025. IoT devices became a vital part of our daily lives. The applications of IoT have expanded to many areas such as consumer, commercial and industrial domains \cite{vongsingthong2014internet}. With this expansion, IoT applications in the consumer side have effectively settled on smart home, smart health care, and wearable devices scenarios. However, the IoT is foreseen to be more scaling in which the needs of network navigability become more crucial. The IoT devices will consume and use services among each other, which cause the navigability to be limited and the selection and searching of suitable service will be a major challenge \cite{ning2011future}. Services composition and discovery depends to the network navigability, which is considered a major issue when the network is composed of billions of connected devices. Establishing extensive social relationships among devices will effectively enhance the lookup service and resources discovery \
cite{nitti2014network}. Social network of intelligent objects, known by Social Internet of things, is a mapping between social network of humans and cyberspace \cite{atzori2012social}. This mapping architecture mainly resolves the IoT future problems that are related to service discovery and composition, based on the users' trustworthiness by maintaining social relationships between objects and allowing devices to interact just as human beings do. In SIoT, objects have the ability to interact and behave in a social manner. They request and provide services in a reliable and efficient way, sharing resources and services.


\par The social structure of SIoT is inspired by Fiske's theory \cite{fiske1992four} which presents the social relationships between humans. Fiske studied the nature of human relationships and established a relational model of social interactions. This model describes four types of relationships between individuals: Equality matching relationships, authority ranking relationships, market-pricing relationships and communal sharing relationships. This model can be mapped to objects' relationships in terms of communication between objects, sharing resources, authority classification of objects and mutual benefits of collaboration between devices. Based on the aforementioned model, some works \cite{zhu2019architecture} proposed objects relationships classification which describes how devices are connected to each other. In the SIoT environment, each device can act as a service/information provider as well as requester. The huge number of
```

exchanged services between devices represents a challenge for choosing the suitable services where the need for service recommendation systems appeared. In the other hand, social relationships between humans gained a great interest of researchers to build sophisticated recommendation systems that put in use the trust within the same social circle. People tend to share resources with their social circle members and could rely on the received recommendation from persons they trust, especially if they share the same interests \cite{gou2019collaborative}. Different studies regarding the recommendation system of social network trust were conducted based on this latter theory \cite{guo2019collaborative}. However, these works apply the service recommendation on non-classified social circles of users as they are considered the major target for recommendation. In our approach, we use the social relationships defined in the SIoT to establish service recommendations between devices and enhance the service discovery and composition \cite{duan2019novel}.

\bibliographystyle{ieeetr}
\bibliography{references.bib}
\end{document}

A Social Relationships Based Service Recommendation System For SIoT Devices

1 Introduction

The Internet of Things or IoT is a network of interconnected heterogeneous devices, objects, and machines that are uniquely identifiable which provide data transferability without the need for human-to-computer or human-to-human interaction. Based on the recent statis- tics released by Gartner [1] shows that the number of connected devices in use in 2019 is 14.2 billion, and this number is expected to increase to 25 billion by 2025. IoT devices became a vital part of our daily lives. The applications of IoT have expanded to many areas such as consumer, commercial and industrial domains [2]. With this expansion, IoT applications in the consumer side have effectively settled on smart home, smart health care, and wearable devices scenarios. However, the IoT is foreseen to be more scaling in which the needs of network navigability become more crucial. The IoT devices will consume and use services among each other, which cause the navigabil- ity to be limited and the selection and searching of suitable service will be a major challenge [3]. Services composition and discovery depends to the network navigability, which is considered a major issue when the network is composed of billions of connected devices. Establishing extensive social relationships among devices will effectively enhance the lookup service and resources discovery [4]. Social network of intelligent objects, known by Social Internet of things, is a mapping between social network of humans and cyberspace [5]. This mapping architec- ture mainly resolves the IoT future problems that are related to service discovery and composition, based on the users' trustworthiness by maintaining social relationships between objects and allowing devices to interact just as human beings do. In SIoT, objects have the ability to interact and behave in a social manner. They request and provide services in a reliable and efficient way, sharing resources and services.

The social structure of SIoT is inspired by Fiske's theory [6] which presents the social relationships between hu- mans. Fiske studied the nature of human relationships and established a relational model of social interactions. This model describes four types of relationships between indi- viduals: Equality matching relationships, authority rank- ing relationships, market-pricing relationships and com- munal sharing relationships. This model can be mapped to objects' relationships in terms of communication be- tween objects, sharing resources,

authority classification of objects and mutual benefits of collaboration between devices. Based on the aforementioned model, some works [7] proposed objects relationships classification which de- scribes how devices are connected to each other. In the SIoT environment, each device can act as a service/information provider as well as requester. The huge number of exchanged services between devices repre- sents a challenge for choosing the suitable services where the need for service recommendation systems appeared. In the other hand, social relationships between humans gained a great interest of researchers to build sophisticated recommendation systems that put in use the trust within the same social circle. People tend to share resources with their social circle members and could rely on the received recommendation from persons they trust, especially if they share the same interests [8]. Different studies regarding the the recommendation system of social network trust were conducted based on this latter theory [9]. However, these works apply the service recommendation on non- classified social circles of users as they are considered the major target for recommendation. In our approach, we use the social relationships defined in the SIoT to establish service recommendations between devices and enhance the service discovery and composition [10].

References

[1] G. Omale, "Gartner identifies top 10 strategic iot technologies and trends," *Gartner website*, 2018.

[2] S. Vongsingthong and S. Smanchat, "Internet of things: a review of applications and technologies," *Suranaree Journal of Science and Technology*, vol. 21, no. 4, pp. 359–374, 2014.

[3] H. Ning and Z. Wang, "Future internet of things architecture: like mankind neural system or social organization framework?," *IEEE Communications Letters*, vol. 15, no. 4, pp. 461–463, 2011.

[4] M. Nitti, L. Atzori, and I. P. Cvijikj, "Network navigability in the social internet of things," in *2014 IEEE world forum on internet of things (WF-IoT)*, pp. 405–410, IEEE, 2014.

[5] L. Atzori, A. Iera, G. Morabito, and M. Nitti, "The social internet of things (siot)–when social networks meet the internet of things: Concept, architecture and network characterization," *Computer networks*, vol. 56, no. 16, pp. 3594–3608, 2012.

[6] A. P. Fiske, "The four elementary forms of sociality: framework for a unified theory of social relations.," *Psychological review*, vol. 99, no. 4, p. 689, 1992.

[7] T. Zhu, S. Dhelim, Z. Zhou, S. Yang, and H. Ning, "An architecture for aggregating information from distributed data nodes for industrial internet of things," in *Cyber-Enabled Intelligence*, pp. 17–35, Taylor & Francis, 2019.

[8] J. Gou, J. Guo, L. Zhang, and C. Wang, "Collaborative filtering recommendation system based on trust-aware and domain experts," *Intelligent Data Analysis*, vol. 23, no. 1_suppl, pp. 133–151, 2019.

[9] L. Guo, J. Liang, Y. Zhu, Y. Luo, L. Sun, and X. Zheng, "Collaborative filtering recommendation based on trust and emotion," *Journal of Intelligent Information Systems*, vol. 53, pp. 113–135, 2019.

[10] L. Duan, H. Tian, and K. Liu, "A novel approach for web service recommendation based on advanced trust relationships," *Information*, vol. 10, no. 7, p. 233, 2019.

10. Develop a LaTeX script to design a simple tree diagram or hierarchical structure in the document with appropriate labels using the Tikz library.

Program:

```
\documentclass{article}
\usepackage{tikz}

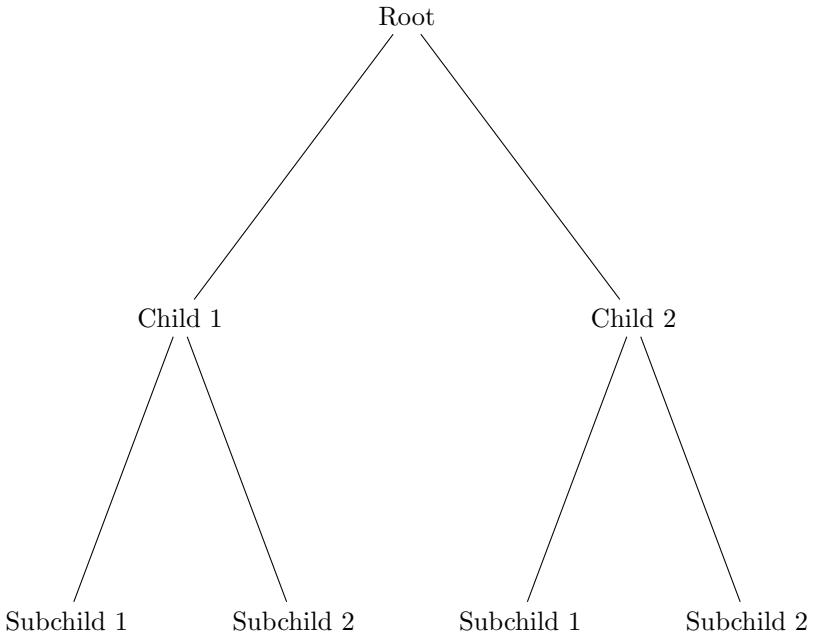
\begin{document}
    \centering

    % Define styles for nodes
    \tikzstyle{level 1}=[level distance=4cm, sibling distance=6cm]
    \tikzstyle{level 2}=[level distance=4cm, sibling distance=3cm]

    % Begin TikZ picture
    \begin{tikzpicture}[grow=down, sloped]
        % Root node
        \node {Root}
        % First child
        child {
            node {Child 1} % First child node
            child {
                node {Subchild 1} % Subchild node
            }
            child {
                node {Subchild 2} % Subchild node
            }
        }
        % Second child
        child {
            node {Child 2} % Second child node
            child {
                node {Subchild 1} % Subchild node
```

```
                }
                child {
                        node {Subchild 2} % Subchild node
                }
        };
    \end{tikzpicture}

\end{document}
```


Root
Child 1
Child 2
Subchild 1
Subchild 2
Subchild 1
Subchild 2

11. Develop a LaTeX script to present an algorithm in the document using algorithm/ algorithmic/ algorithm2e Library.

Program:

```
\documentclass{article}

\usepackage{algorithm}
\usepackage{algpseudocode}


\begin{document}
\begin{algorithm}
\caption{Bubble Sort}
\begin{algorithmic}[1]
\Procedure{BubbleSort}{$A, n$}
\For{$i \gets 0$ to $n-1$}
\For{$j \gets 0$ to $n-1-i$}
\If{$A[j] > A[j+1]$}
\State Swap $A[j]$ and $A[j+1]$
\EndIf
\EndFor
\EndFor
\EndProcedure
\end{algorithmic}
\end{algorithm}
\end{document}
```

Algorithm 1 Bubble Sort

```
1: procedure BubbleSort(A, n)
2:     for i ← 0 to n − 1 do
3:         for j ← 0 to n − 1 − i do
4:             if A[j] > A[j + 1] then
5:                 Swap A[j] and A[j + 1]
6:             end if
7:         end for
8:     end for
9: end procedure
```

12. Develop a LaTeX script to create a simple report and article by using suitable commands and formats of user choice.

Program:

```
\documentclass{report}\title{Simple Report}

\author{}

\date{}\begin{document}

\maketitle

\tableofcontents

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Simple Report

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