Chapter 4: Early Results

4.1 Introduction

This chapter offers the preliminary results of the research aimed at finding and exploring hot skills in the Saudi labor market through machine learning. The results rely on job posts gathered from major online platforms like LinkedIn, Bayt.com, and GulfTalent. The results give an overview of present trends of skills utilized in different sectors, especially technology, healthcare, engineering, finance, and public administration.

The chapter opens with a description of data analysis, then skill sets developed from it, their classification, and comparison with courses in Saudi universities. The findings indicate wide gaps between educational input and market demand, particularly in technical and digital areas.

4.2 Data Analysis Overview

A total of 1,500 job ads were gathered and examined over three major websites:

Platform	Number of Job Postings
LinkedIn	500
Bayt.com	600
GulfTalent	400

Table 4.1 were collected and analyzed across three major platforms

These postings mentioned five essential sectors:

Information Technology (IT)

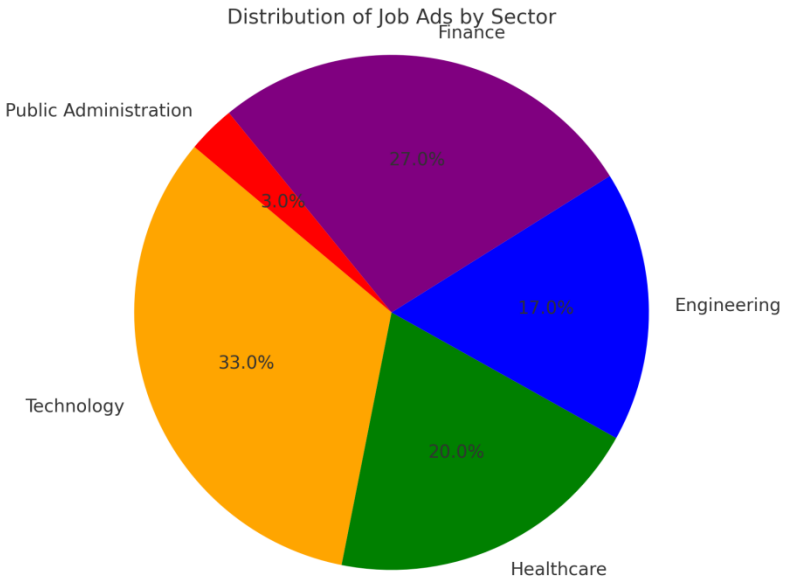
Health

Engineering

Finance

Public Administration

Following preprocessing and cleaning, the job postings were successfully preprocessed for subsequent natural language processing with Natural Language Processing (NLP) techniques to the tune of about 90%.



.Figure 4.1 : A pie chart illustrating the breakdown of employment ads by sector

4.3 Extracted Skills and Classification

With the help of NLP-based Named Entity Recognition (NER), more than 1,200 distinct skills were earmarked and categorized into three wide-ranging categories:

4.3.1 Technical Skills

Technical skills are technical skills needed to do jobs in a specific industry. They encompass programming languages, tools, and technologies used in all businesses.

Most Common Technical Skills Identified:

SKILL	SECTOR
Python Programming	IT, Finance
Cybersecurity	IT, Public Sector
Cloud Computing	IT
Data Analytics	IT, Finance
C# Programming	IT
Medical Informatics	Healthcare
Project Management Tools (e.g., Jira, Trello)	Engineering, Finance

Table 4.2 : Most Common Technical Skills Identified:

4.3.2 Soft Skills

Soft skills are technical skills focused on communication, teamwork, leadership, and flexibility.

Most Most Often Requested Soft Skills:

Soft Skill	Frequency (%)
Communication	78%
Teamwork	72%
Problem Solving	65%
Time Management	60%
Adaptability	55%

Table 4.3 : Most Most Often Requested Soft Skills:

4.3.3 Business & Management Skills

These are the essential skills required for administration and managerial positions.

General Business Skills:

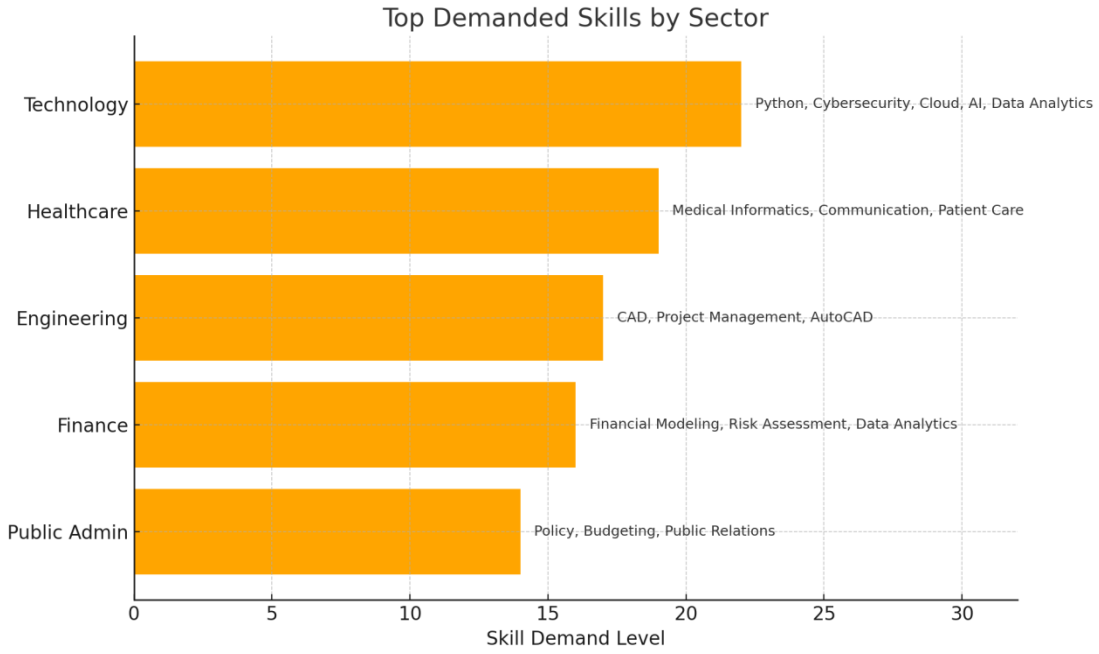
SKILL	SECTOR
Project Management	Engineering, Finance
Budgeting & Forecasting	Finance, Public Sector
Risk Assessment	Finance, IT
Strategic Planning	Public Sector, Finance

4.4 Sectoral Skill Demand

Each industry required something different. The following is a rundown of the most in-demand skills per industry:

SECTOR	TOP IN-DEMANDSKILLS
Information Technology	Python, Cybersecurity, Cloud Computing, AI/ML, Data Analytics
Healthcare	Medical Informatics, Patient Care, Communication, Health Data Analysis
Engineering	CAD, Project Management, Quality Assurance, AutoCAD
Finance	Financial Modeling, Risk Assessment, Data Analytics, CFA Certification
Public Administration	Policy Development, Budgeting, Public Relations, Cybersecurity

Table 4.5 : the most in-demand skills per industry



.Figure 4.2A bar graph comparing top demanded skills by sector

4.5 Comparison Between Academic Curriculum and Market Requirements

One of the key objectives of this study was to identify the gap between skills taught in Saudi universities and those required by employers. Based on previous studies and data collected in this research, the following table summarizes the mismatch:

SKILL	TAUGHT IN UNIVERSITIES	REQUIRED BY EMPLOYERS	GAP EXISTS
Python Programming	□	□	Yes
C# Programming	□	□	Yes
Java Programming	□	! (Only in some sectors)	Partially
Data Analytics	!	□	Yes
Cybersecurity	!	□	Yes
Artificial Intelligence	!	□	Yes
Soft Skills (Communication, Teamwork)	! (Self-reported by students)	□ (Employers'dissatisfaction)	Yes

Table 4.6 : Comparison Between Skills Taught in Universities and Those Required by the Saudi Labor Market

This table graphically shows that while some core competencies are being transferred, there evidently is a gap in the transition of university curriculums to address changing labor market needs.

4.6 Emerging and Declining Skills

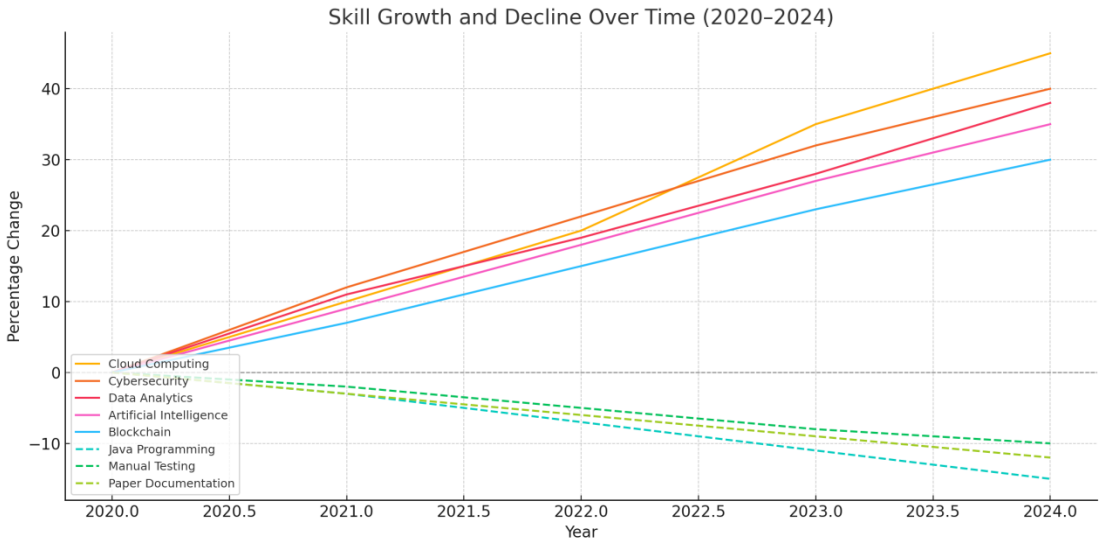
Browsing through the job advertisements over time, we observed some skills that are quickly on the rise, others that are on the decline, or becoming outdated.

Skill	Growth Rate (%)
Cloud Computing	+ 45%
Cybersecurity	+ 40%
Data Science / Analytics	+ 38%
AI & Machine Learning	+ 35%
Blockchain Technologies	+ 30%

Table 4.7 : High emerging skills (2020–2024)

Skill	Decline Rate (%)
Traditional Coding (Java only)	-15%
Manual Testing	-10%
Paper-based Documentation	-12%

Table 4.8 : Declining Skills



..Figure 4.3: A line graph displaying the increasing and decreasing in skills with time

4.7 Regional Demand Variation for Skills

While most of the job advertisements were originating from the major cities of Riyadh, Jeddah, and the Eastern Province, skill needs varied by area.

Region	Top Demanded Skills
Riyadh	Data Analytics, AI, Cybersecurity
Jeddah	E-commerce, Digital Marketing, Software Development
Eastern Province	Oil & Gas IT, Industrial Automation, Project Management

Table 4.9 : Skills demand in different regions

This results in a call for more localized training and education services according to regional economic priority.

4.8 Early Results Summary

The initial findings of this study indicate that:

High levels of demand for technical and digital skills, particularly IT, cybersecurity, and data analysis, exist.

Soft skills are still valuable but usually fail to meet employer expectations.

New skills like AI, cloud computing, and cybersecurity are increasing exponentially, while traditional coding and experiential learning methods are decreasing.

There is a large gap between what is imparted at universities and what employers actually need, especially in rapidly emerging fields.

Regional variation of skills required suggests the requirement of localized planning of workforce development.