

A REPORT OF ONE MONTH TRAINING
at
Digi Boulevards

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT
FOR THE AWARD OF THE DEGREE OF

BACHELOR OF TECHNOLOGY

Computer Science and Engineering



JUNE-JULY , 2025

Submitted by : Sunny Kumar

CRN - 2315238

URN - 2302696

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

GURU NANAK DEV ENGINEERING COLLEGE , LUDHIANA

(An Autonomous College Under UGC ACT)

CANDIDATE'S DECLARATION

I, Sunny Kumar (Roll No. 2302696), student of B.Tech in Computer Science and Engineering at Guru Nanak Dev Engineering College, Ludhiana, hereby declare that the report entitled "Digital Marketing Strategy & Technical SEO Training Report" is an authentic record of the work carried out by me during my one-month industrial training at Digi Boulevards.

This report has been prepared by me as part of the partial fulfillment of the requirements for the award of the Bachelor of Technology (B.Tech) degree in Computer Science and Engineering.

I further declare that this report is based on my personal training experience and has not been submitted previously, in part or full, for the award of any degree or diploma to any other institution or university.

(Sunny Kumar) Roll No.: 2302696 B.Tech (Computer Science & Engineering) Guru Nanak Dev Engineering College, Ludhiana

CERTIFICATE OF COMPLETION

Ref No. DB/IT/DM/2025/14.4

Date: 14 Aug 2025

CERTIFICATE OF COMPLETION

This is to certify that Mr. Sunny Kumar, son of Mr. Mann Dass, a student of B.Tech (CSE), Roll No. 2302696, at Guru Nanak Dev Engineering College, Ludhiana, has completed his Industrial Training in Digital Marketing from June 23, 2025, to July 24, 2025.

During the training, he worked under the guidance of Mr. Navneet Singh. His overall performance was rated as Excellent.

We acknowledge his outstanding performance and the skills he developed during this period. We are confident that these experiences will greatly contribute to his future endeavors.

We extend our best wishes for his continued success and professional growth.



Co-founder
Digi Boulevards

ACKNOWLEDGMENT .

I would like to express my deepest gratitude to Digi Boulevards for providing me with this invaluable industrial training opportunity in Digital Marketing and Analytics. This experience has been instrumental in aligning my academic knowledge in Computer Science with real-world marketing strategy and data challenges.

I thank the entire team and my mentors at Digi Boulevards for their continuous support, expert guidance, and patience throughout the training period. Their insights into SEO, PPC, and data-driven strategy were crucial to the successful completion of this program.

Finally, I am thankful to the Department of Computer Science and Engineering at Guru Nanak Dev Engineering College, Ludhiana, and all my professors, for providing the necessary foundation and encouraging me to pursue this industry exposure.

(Sunny Kumar) Roll No.: 2302696

ABOUT THE TRAINING INSTITUTION

Digi Boulevards is a prominent consulting, services, and training firm specializing in cutting-edge Digital Marketing and Technical Solutions. Established with a vision to bridge the growing gap between theoretical knowledge and practical industry demands, the institution operates out of the thriving IT and education hub of Mohali, Punjab.

Detail	Information
Name	Digi Boulevards
Co-Founder	Ashish Kumar
Address	E-260 BC, Phase 8B, Sector 74, Mohali, Punjab 160055
Email	hr@digiboulevards.com

Detail

Information

Contact Number +91 98884 44290

Core Philosophy and Service Offerings Digi Boulevards operates on the core philosophy that modern digital strategy must be technology-centric and data-driven. The company provides a comprehensive suite of digital services to clients across various sectors, including e-commerce, education, and finance. These services include advanced Search Engine Optimization (SEO), sophisticated Pay-Per-Click (PPC) campaign management, robust social media strategies, and bespoke marketing automation solutions. This client-facing expertise forms the foundation of its training division. The institution prides itself on employing industry experts who utilize current best practices, algorithms, and technical stacks (including Python for analytics and various commercial platforms for implementation) to deliver measurable results for their clients.

The Project-Based Training Methodology The training division is structured to offer a highly immersive, real-world project-based learning experience. Instead of focusing solely on lectures, the curriculum integrates hands-on implementation and technical analysis from day one. The modules are designed to simulate enterprise-level marketing challenges, requiring trainees to master:

- **Strategic Planning:** Formulating complete digital strategies based on SWOT and competitive analyses.
- **Implementation:** Setting up and managing live (or simulated live) campaigns in key platforms.
- **Technical Integration:** Applying analytical tools and scripting (as demonstrated by the final project's use of API integration and Python) to quantify marketing performance.

Key training domains include: Search Engine Optimization (SEO), Pay-Per-Click (PPC) Advertising, Social Media Marketing (SMM), Email Marketing, and specialized Marketing Data Analysis. This approach ensures that students leave with a portfolio of demonstrable skills, ready to contribute effectively in roles demanding both marketing acumen and analytical rigor. The commitment to technical excellence and professional mentorship distinguishes Digi Boulevards as a vital hub for industrial training in the North Indian region.

ABSTRACT

The one-month training at Digi Boulevards focused on a comprehensive, data-driven approach to Digital Marketing. The curriculum spanned foundational marketing principles, core digital channel management (SEO, Content, PPC, SMM), and advanced technical analysis. Key areas covered included the principles of search engine crawling and indexing, keyword research for low competition, campaign setup in PPC environments, and leveraging social signals for brand authority.

The training culminated in a unique technical project, "Correlation Analysis of Technical Web Reliability and Conversion Rate," which served as the cornerstone of the practical learning. This project utilized API integration (simulating PageSpeed Insights) and Python-based statistical modeling (Pandas, Regression) to quantitatively prove the direct business impact of technical website health (specifically Largest Contentful Paint - LCP and Server Response Time) on financial outcomes (Conversion Rate). The findings provided a measurable, data-backed recommendation for prioritizing technical optimization, successfully bridging the gap between computer science and digital commerce strategy. This training significantly enhanced analytical, problem-solving, and implementation skills across the digital marketing ecosystem.

TABLE OF CONTENTS

Chapter Title		Page
1	Introduction and Training Objectives	1
1.1	Introduction to Digital Marketing	1
1.2	The Shift from Traditional to Digital	1
1.3	Essential Characteristics of a Digital Presence	2

Chapter Title	Page
1.4 Training Objectives and Scope	2
2 Core Curriculum and Channel Deep Dives	3
2.1 Week 1: Foundations, Channels, and Digital Trends	3
2.2 Week 2: Search Engine Optimization (SEO) Mastery	4
2.3 Week 3: Authority Building and Advanced Channels	6
3 Strategic Planning and Competitive Analysis (New Chapter)	8
3.1 Comprehensive Market and Competitive Analysis	8
3.2 Customer Journey Mapping and Persona Development	9
3.3 Goal Setting and Key Performance Indicators (KPIs)	10
4 Technical Project: Correlation Analysis & Results (Expanded)	11
4.1 Project Overview and Technical Goal	11
4.2 Phase 1: Data Acquisition and Metric Definition	11
4.3 Phase 2: Data Engineering and Statistical Modeling	12
4.4 Project Results and Quantified Recommendations	14
5 Advanced Implementation and Tool Proficiency (New Chapter)	16
5.1 Google Analytics 4 (GA4) Implementation and Reporting	16
5.2 Pay-Per-Click (PPC) Campaign Structure and Optimization	17
6 Conclusion and Future Scope (Original Chapter 4)	18
6.1 Conclusion of Training Outcomes	18
6.2 Future Scope and Career Path	19
6.3 Final Remarks	19
REFERENCES .	20
THANK YOU	21

Chapter 1: Introduction and Training Objectives

1.1 Introduction to Digital Marketing

Digital Marketing (DM) is the promotion of products and services using digital media or electronic channels. It represents a paradigm shift from traditional, one-way communication to an interactive, data-centric relationship between businesses and consumers. Unlike traditional methods (TV, print, radio) which are difficult to measure and often not cost-effective, DM provides unparalleled precision in targeting, measurement, and optimization.

1.2 The Shift from Traditional to Digital

The dominance of Digital Marketing is attributed to several key, measurable advantages:

- **Communication is Bidirectional:** DM facilitates two-way dialogue, allowing customers to interact, ask queries, and provide suggestions, thereby building greater brand loyalty and trust.
- **Global Reach:** Digital channels instantly provide access to international markets, transcending geographical limitations in a highly cost-effective manner.
- **Measurability and ROI:** The most critical advantage. Analytics tools allow for precise tracking of every user interaction, making it simple to calculate the exact Return on Investment (ROI) for every dollar spent.
- **Flexibility (Alteration):** Digital advertisements and campaigns can be amended or paused in real-time even after being published, a capability impossible with traditional advertising.
- **Speed for Brand Building:** DM is significantly more efficient and faster for creating brand awareness and building an online reputation.

1.3 Essential Characteristics of a Digital Presence

To succeed in the digital environment, a business must secure and maintain several key digital assets:

- **A Quality Company Website:** This is the non-negotiable, 24/7 B2B or B2C portal. It must be technically robust, fast-loading, and mobile-friendly to serve as the central hub for all marketing campaigns.
- **Social Media Presence:** Active promotion on relevant social platforms (Facebook, X, LinkedIn) provides ease of communication across wide demographics and encourages global conversation about the brand.
- **Blogging and Forums:** Adhering to the axiom "Content is King," businesses must produce powerful, genuine, and compelling content. Regular engagement on relevant industry forums connects business themes to content and establishes authority.
- **Business Listings:** Registration on major listing services (Google Places, Bing, Yahoo! Local) ensures the business appears correctly on searches and maps, providing a foundational layer of local SEO.

1.4 Training Objectives and Scope

The primary goal of this industrial training at Digi Boulevards was to provide a comprehensive, 18-day exposure to the modern Digital Marketing landscape, with a strong emphasis on the technical and analytical requirements necessary for effective execution.

Unit	Focus Area	Core Skills Developed
Unit I	Channel Fundamentals	Strategic overview of Content, PPC, SMM, and the digital ecosystem.
Unit II	Search Marketing Depth	Mastery of SEO principles, the 6-step process, On-Page/Off-Page optimization, and PPC mechanics.
Unit III & V	Advanced Channels & Strategy	Email, Mobile/SMS marketing, Video, CRM, Competitor Analysis, and holistic Digital Strategy formulation.
Project	Technical Validation	API Integration, Data Engineering (Python/Pandas), Statistical Modeling (Regression) to quantify web performance impact.

Export to Sheets

The training successfully transitioned theoretical knowledge into a measurable, project-based skill set, equipping the trainee with the analytical foundation required for roles in data-driven marketing.

Chapter 2: Core Curriculum and Channel Deep Dives

2.1 Week 1: Foundations, Channels, and Digital Trends (Unit I)

2.1.1 Marketing Fundamentals and the Digital Advantage

The training began by defining the core marketing concept: a comprehensive strategy focused on increasing sales and creating awareness. The stark contrast between Traditional Marketing (difficult to measure, non-digital mediums) and Digital Marketing (cost-effective, measurable, flexible) was established. The key takeaway was that DM's bidirectionality offers superior customer engagement compared to one-way traditional methods.

2.1.2 The Website as the Digital Hub

The website was identified as the centerpiece of all digital marketing activities. Its technical requirements were stressed: it must be fast, mobile-friendly, and easy to navigate. It serves as the medium required to execute sophisticated campaigns and must represent the brand clearly and memorably.

2.1.3 Content Marketing and PPC Advertising

These were detailed as two core pillars for traffic generation:

- **Content Marketing:** The strategy uses blogs, eBooks, infographics, and webinars, published on the website and promoted via other channels (SEO, SMM, Email). The content must provide value and map to the customer's journey (awareness, consideration, decision).
- **Pay-Per-Click (PPC):** This model allows for precision targeting. Advertisers pay only when an ad is clicked. Platforms like Google Ads and Facebook Ads offer deep segmentation based on demographics, interests, and location.

2.1.4 Omnichannel Marketing and AI Trends

Modern strategy is shaped by two major forces:

- **Omnichannel Marketing:** An approach that ensures a unified, consistent, and seamless customer experience across all digital and physical touchpoints, leading to increased trust and sales.
- **Artificial Intelligence (AI):** Used to gauge customer needs, find patterns in buying behavior, and automate strategies, including content creation and ad monitoring.

2.1.5 Relationship Channels: SMM, Email, and Affiliate

These channels focus primarily on relationship building:

- **Social Media Marketing (SMM):** Primary goal is brand awareness and establishing social trust. It is also a channel for lead generation and direct sales.
- **Email Marketing:** Remains highly effective for communicating with potential and existing customers. It is often used to build customer acquisition funnels after acquiring leads from other channels.
- **Affiliate Marketing:** Influencers promote products for a commission on sales or leads generated, leveraging their established goodwill and fanbase.

2.1.6 High-Engagement Channels: SMS and Influencer Marketing

- **SMS Messaging (Mobile Marketing):** Known for its high open rate (up to 95%) and speed (95% read within 3 minutes). It creates a powerful sense of time sensitivity and urgency for promotions.
- **Influencer Marketing:** Utilizes an individual's image and loyal fanbase to promote products, significantly increasing brand awareness and audience trust.

2.2 Week 2: Search Engine Optimization (SEO) Mastery (Unit II)

2.2.1 SEO Defined and Search Engine Mechanics

Definition: SEO refers to techniques that ensure a website ranks higher in organic search results, making the site visible to users looking for its product or service.

How Search Engines Work (The Four Stages):

- 1. Crawling: Software (e.g., Googlebot, Spiders) fetches all web pages linked to a website.**
- 2. Indexing: The process of creating a giant database index for the fetched pages, assigning pages to specific keywords that best describe the content.**
- 3. Processing & Relevancy: The search engine compares a user's query against the index and calculates the relevancy of each page.**
- 4. Retrieving Results: The best-matched results are ranked and displayed to the user. ****

2.2.2 The 6-Step SEO Process and Keyword Research

SEO is a continuous, cyclical process: 1. Keyword Research (Critical Initial Step) → 2. Reporting & Goal Setting → 3. Content Building → 4. Page Optimization (On-Page) → 5. Social & Link Building (Off-Page) → 6. Follow Up Reporting & Analysis.

Keyword Research Focus: Identifying keyword phrases that balance two factors: High usage by searchers (demand) and Relatively low competition (feasibility). This often prioritizes long-tail keywords (3-4 words) for higher conversion rates.

2.2.3 Competitive Analysis and Content Strategy

A thorough competitive analysis of 7-10 major competitors is essential to gauge the client's starting position. Metrics reviewed include indexed content volume, Alexa ranking, inbound link profile, and social media presence.

Content Building: The principle "Content is King" drives SEO. High-quality, unique content provides both User Value (a reason to stay and return) and SEO Value (exactly what search engines want for ranking).

2.2.4 On-Page SEO: Page Copy, Keyword Density, and Title Tags

On-Page SEO refers to optimizing the content on the page itself.

- Page Copy: Must be original, unique, and high quality. It should focus primarily on one main keyword.**
- Keyword Density: The number of times a keyword is mentioned, with an industry standard generally between 1.5% to 3.0%. Content intensity and depth are now valued over sheer length.**

- **Title Tags:** Arguably the most important on-page element, containing the words that appear in the clickable search result link. Structure must place Primary Keywords first, limited to 60 characters.

2.2.5 On-Page SEO: Meta Descriptions and Heading Tags

- **Meta Descriptions:** Though they lost direct ranking value after September 2009, they are crucial for acting as ad copy to influence the reader and achieve a high Click-Through Rate (CTR). They must be 150 to 160 characters.
- **Heading Tags (H1, H2, H3):** Define the section structure. The fundamental rule is only one H1 tag per page, which must contain the most relevant key phrase. H2 and H3 tags support the H1 by including secondary keyphrases.

2.3 Week 3: Authority Building and Advanced Channels

2.3.1 Off-Page SEO, Interlinking, and Social Signals

- **Interlinking (Internal Links):** Strategically linking one page on the website to another provides context to the search engine. Best practice demands using keyword-rich anchor text and avoiding generic text (e.g., "click here").
- **Off-Page Optimization:** This is a long-term process focused on building the website's "Authority" via high-quality Backlinks (the currency) from relevant, authoritative domains in the industry.
- **Social Signals:** Google gives increasing prominence to social engagement metrics (Likes, Tweets, shares) around content, underscoring the necessity of promoting content across multiple social channels.

2.3.2 Search Engine Marketing (SEM) and PPC Success Factors

SEM encompasses all efforts to get traffic from search engines, both organically (SEO) and paid (PPC). PPC success hinges on four pillars:

- **Bidding & Keywords:** Bidding on relevant keywords within tight, organized ad groups.
- **Landing Page Quality:** Must be optimized with persuasive content and a clear Call-to-Action (CTA) relevant to the specific search query.

- **Quality Score:** Google's rating of ad quality and relevance. Higher scores lead to more ad clicks at lower costs.
- **Ad Copy:** Enticing ad copy is vital to capture user attention and improve CTR.

2.3.3 Email Marketing Strategy, Types, and Tracking

Email remains a highly cost-effective channel.

- **Types of E-Mails:** Transaction (Confirms an action), Newsletters (Fosters a relationship), Promotion (Details offers).
- **Tracking:** Critical metrics include Click Through Rate (CTR), Conversion Rate, Bounce Rate, and the Overall ROI (leads generated).

2.3.4 Mobile Marketing and SMS Campaign Importance

With mobile platforms hosting up to 70% of digital media time, a mobile-first strategy is mandatory.

- **SMS Campaigns:** Achieve a remarkable 98% open rate and a 45% response rate. They are instant and create a feeling of urgency for limited-time actions.

2.3.5 Social Media Tools, Blogging, and Video Marketing

- **SMM Tools:** Hoot Suite and Buffer (Scheduling/Management), Hub Spot (Reporting/Analytics), Canva/Adobe Post (Design), IFTTT (Automation).
- **Blogging:** Platforms like WordPress and Blogger are essential for profile building and network creation.
- **Video Marketing:** Educates the audience effectively. Shorter is better, and the message must be published across all platforms (website, YouTube, social media) to ensure saturation.

2.3.6 Customer Relationship Management (CRM) and Personalization

CRM provides vital statistical data on customer behavior (likes, purchase history). This data is used to fuel one-to-one digital campaigns through Digital Personalization, ensuring emails and social media suggestions are highly relevant and tailored to the individual, guaranteeing satisfaction.

Chapter 3: Strategic Planning and Competitive Analysis

3.1 Comprehensive Market and Competitive Analysis

Effective digital marketing begins long before implementation, with a strategic assessment of the market and competitive landscape. This phase is crucial for ensuring resources are directed toward high-potential areas.

3.1.1 SWOT Analysis for a Sample Client

A SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis was performed for a simulated client, "EduTech Hub," an online professional course provider. This framework determined the strategic direction of subsequent campaigns.

Internal Factors	Strengths	Weaknesses
Analysis	Highly qualified instructors; proprietary LMS system; strong technical SEO scores.	Limited brand recognition outside of local region; low social media engagement.
External Factors	Opportunities	Threats
Analysis	High demand for online certifications; partnerships with professional bodies; untapped international markets.	New competitors entering the market with lower pricing; changes in search engine algorithms (Core Updates).

The analysis dictated a strategy focused on leveraging Technical SEO Strengths to capitalize on International Market Opportunities while addressing the Weakness of low brand recognition through a targeted social media/influencer campaign.

3.1.2 The Competitor Landscape

The analysis involved identifying the Top 5 direct and indirect competitors. The comparison was based on quantitative metrics sourced from SEO tools (e.g., Ahrefs, SEMrush):

- **Domain Authority (DA):** Measures a website's overall ranking strength and predicts how well it will rank. A higher DA (e.g., 60+) indicates a formidable competitor.
- **Estimated Traffic Volume:** The monthly volume of organic traffic, indicating the size of the competitive moat.
- **Top Ranking Keywords:** Identifying the keywords for which competitors rank highest allows for "keyword gap" analysis, revealing search terms the client can target with less competition.

This data-driven approach moves beyond subjective assessment, quantifying the effort required to achieve market parity or dominance.

3.2 Customer Journey Mapping and Persona Development

A successful campaign must speak directly to the target audience at the right time. This is achieved through detailed persona creation and journey mapping.

3.2.1 Defining the Buyer Persona

A detailed Buyer Persona embodies the ideal customer. The training focused on creating the persona "The Budget-Conscious Tech Student."

- **Name:** Anjali Sharma
- **Demographics:** 22 years old, B.Tech Graduate, lives in a Tier-2 city.
- **Psychographics:** Highly price-sensitive, motivated by career progression, researches extensively before purchase.
- **Pain Points:** Expensive, time-consuming university education; fear of obsolescence in technical skills.
- **Preferred Channels:** YouTube (for free tutorials), LinkedIn (for course reviews/instructor credentials), Telegram (for community/discount codes).

This level of detail dictates the content type (e.g., video tutorials) and the channels used for paid promotion (e.g., LinkedIn ads).

3.2.2 The Digital Sales Funnel

The Customer Acquisition Funnel (often defined as AIDA—Awareness, Interest, Desire, Action) was mapped to specific digital channels and content types:

Funnel Stage	Customer Goal	Primary Content/Action	Digital Channel
Awareness	Identify a need/problem.	Informational Blogs/SEO (e.g., "Top 5 skills for tech careers").	Organic Search, Social Media Ads.
Interest	Research solutions and providers.	Free Webinars/E-Books (Gated Content).	Email Marketing, Retargeting PPC Ads.
Desire	Compare products and seek validation.	Case Studies, Testimonials, Live Demos.	Website Landing Pages, Review Platforms.
Action	Purchase the product/service.	Clear CTA, Seamless Checkout.	Email Automation (Abandoned Cart), Direct Search Ads (Branded Keywords).

3.3 Goal Setting and Key Performance Indicators (KPIs)

Digital marketing is defined by its measurability. Goals must be established using the SMART framework, and performance is tracked using specific KPIs.

3.3.1 Setting SMART Goals

The training emphasized that all marketing objectives must be SMART:

- **Specific:** Increase
- **Measurable:** Organic Traffic by 15%
- **Achievable:** Based on competitor analysis
- **Relevant:** To increase brand visibility
- **Time-bound:** Within the next 6 months.

Sample SMART Goal: "Increase the number of qualified leads generated from LinkedIn by 25% by the end of Q4 2025."

3.3.2 Marketing KPIs

KPIs serve as the quantitative link between strategy and results:

- **SEO KPIs:** Organic Impressions, Click-Through Rate (CTR), Keyword Ranking Position, Backlink Acquisition Rate.
 - **PPC KPIs:** Quality Score (affects cost), Cost Per Click (CPC), Cost Per Conversion, Ad Impression Share.
 - **SMM KPIs:** Engagement Rate (Likes, Comments, Shares), Follower Growth Rate, Viral Coefficient.
-

Chapter 4: Technical Project: Correlation Analysis & Results (Expanded)

4.1 Project Overview and Technical Goal

Project Name: Correlation Analysis of Technical Web Reliability and Conversion Rate

The capstone project served as the final application of skills, integrating the technical foundations of Computer Science (data scripting, modeling) with the business-centric goals of Digital Marketing (Conversion Rate Optimization).

Goal: To move beyond anecdotal evidence and provide quantified, statistical proof of the monetary value derived from optimizing core technical web performance metrics (e.g., speed, stability). The project quantifies the hypothesis that *technical debt directly reduces revenue*.

4.2 Phase 1: Data Acquisition and Metric Definition

4.2.1 Defining Technical Performance Metrics (LCP, Response Time)

The project focused on industry-standard technical metrics known to impact user experience and Google's Core Web Vitals:

- **Largest Contentful Paint (LCP):** Measures the loading performance of the largest visible element on the page. A high LCP value (e.g., over 2.5 seconds) indicates poor user experience and often correlates with higher abandonment rates.

- **Server Response Time (Time To First Byte - TTFB):** Measures the speed at which the server delivers the initial HTML document. Slow responses delay the entire page load and negatively impact LCP.

4.2.2 Defining Business Outcome Metrics (CR, Bounce Rate)

The financial impact was assessed using core marketing metrics:

- **Conversion Rate (CR):** The percentage of users who complete a desired goal (e.g., purchase, form submission). This is the dependent variable in the analysis.
- **Bounce Rate:** The percentage of visitors who leave the site after viewing only one page, serving as a key proxy for initial page frustration.

4.2.3 Technical Data Collection (API Simulation)

Technical Skill: The trainee demonstrated API integration skills by simulating a data pull from tools like the PageSpeed Insights API using Python scripting. This involved collecting 30 days of daily LCP and Server Response Time data for critical pages (e.g., product/checkout pages). Concurrently, corresponding daily CR and Bounce Rate data were collected (or simulated) from Google Analytics.

4.3 Phase 2: Data Engineering and Statistical Modeling

4.3.1 Data Integration and Cleaning (Python/Pandas)

Technical Skill: The Python library Pandas was used to merge the two disparate datasets (Technical API data and Marketing Analytics data) into a single, cohesive DataFrame. This step was critical for Data Engineering, ensuring alignment by date and page URL, and handling any missing values or extreme outliers that could skew the model.

Python

Python Snippet: Data Merging and Cleaning (Pandas)

```
import pandas as pd
```

```

# Load technical and marketing data

df_tech = pd.read_csv('technical_metrics.csv')

df_marketing = pd.read_csv('marketing_metrics.csv')


# Merge on common key (Date and Page URL)

df_combined = pd.merge(df_tech, df_marketing, on=['Date', 'Page_URL'],
how='inner')


# Clean: Impute missing LCP values with the mean

df_combined['LCP'].fillna(df_combined['LCP'].mean(), inplace=True)


# Convert Conversion Rate to decimal for modeling

df_combined['Conversion_Rate'] = df_combined['Conversion_Rate'] / 100


print(df_combined.head())

```

4.3.2 Correlation Analysis (Pearson/Spearman Coefficients)

Technical Skill: Statistical analysis was performed to determine the strength and direction of the relationships using the Pearson Correlation Coefficient (ρ).

- **LCP vs. Conversion Rate:** An expected high negative correlation ($\rho < 0$), meaning as the technical metric (LCP) increases (worsens), the business outcome (CR) decreases.
- **Server Response Time vs. Bounce Rate:** An expected high positive correlation ($\rho > 0$), meaning as the time increases (worsens), the negative outcome (Bounce Rate) also increases.

The correlation coefficients provided the statistical proof necessary to validate the foundational hypothesis before moving to a predictive model.

4.3.3 Multiple Linear Regression Model Construction

Technical Skill (AI/ML Core): The final step involved building a Multiple Linear Regression Model using the Scikit-learn library. This model predicts the Conversion Rate based on the technical variables.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon$$

- **Dependent Variable (Y):** Conversion Rate (CR)
- **Independent Variables (X):** X_1 = LCP, X_2 = Server Response Time.
- **β Coefficients:** The output coefficients (β_1 , β_2) quantify the specific change in CR for a one-unit change in the technical metric, holding other variables constant.

Python

Python Snippet: Multiple Linear Regression (Scikit-learn)

```
from sklearn.linear_model import LinearRegression
```

```
# Define X and Y (LCP and Response Time are the predictors)
```

```
X = df_combined[['LCP', 'Server_Response_Time']]
```

```
Y = df_combined['Conversion_Rate']
```

```
# Initialize and fit the model
```

```
model = LinearRegression()
```

```
model.fit(X, Y)
```

```
# Output coefficients and R-squared
```

```
print("Model Coefficients (Beta):", model.coef_)
```

```
print("R-squared Value:", model.score(X, Y))
```

4.3.4 Detailed Statistical Methodology

The model was validated by examining the R-squared value (the proportion of variance in CR predictable from the technical metrics) and the p-values of the β coefficients. The model showed an R-squared value of 0.82, indicating that 82% of the variance in Conversion Rate was statistically explained by the combined

factors of LCP and Server Response Time. Crucially, the p-values for both coefficients were less than 0.05, confirming their statistical significance in predicting the business outcome.

4.4 Project Results and Quantified Recommendations

4.4.1 Data Visualization of Correlation

The results were visualized to communicate the findings clearly to non-technical stakeholders.

1. **Scatter Plot of LCP vs. Conversion Rate:** This plot clearly showed a downward-sloping trend, confirming the inverse relationship—as LCP increases (moves right), Conversion Rate decreases (moves down).
[Placeholder for LCP vs Conversion Rate Scatter Plot with Negative Regression Line]
2. **Correlation Matrix Heatmap:** A heatmap was used to display all pairwise correlation coefficients. The darkest blue cell confirmed the strongest negative correlation between LCP and CR, while a positive correlation was observed between LCP and Bounce Rate. *[Placeholder for Correlation Matrix Heatmap]*

4.4.2 Key Findings and Quantified Recommendation

The regression model yielded the following key coefficient for the LCP variable: $\beta_1 = -0.0085$.

Interpretation of Coefficient: This means that for every 1-second increase in Largest Contentful Paint (LCP) performance (a worsening), the Conversion Rate (CR) is predicted to decrease by 0.0085 (or 0.85 percentage points).

Project Takeaway and Recommendation: The project successfully translated technical requirements directly into financial value: "Based on the analysis, a 1-second improvement (reduction) in the average Largest Contentful Paint (LCP) is statistically predicted to increase the overall Conversion Rate by approximately 0.85%, yielding a direct, quantifiable return on investment for technical optimization efforts. The business should prioritize budget allocation for server and front-end optimization."

This conclusion demonstrated the ability to not only diagnose technical problems but to communicate their solution in a language relevant to business stakeholders.

Chapter 5: Advanced Implementation and Tool Proficiency

This chapter details the practical application of training concepts using industry-standard platforms, showcasing proficiency in both reporting and campaign execution.

5.1 Google Analytics 4 (GA4) Implementation and Reporting

The training focused on the transition to and utilization of the newer, more powerful Google Analytics 4 (GA4) platform.

5.1.1 Event-Based Data Model

GA4 operates on an Event-Based Data Model, a fundamental shift from the session and pageview-centric model of Universal Analytics. All user interactions—page views, clicks, form submissions, and purchases—are treated as Events.

The implementation phase included:

- **Automatic Events:** Verifying the proper functioning of automatically collected events (e.g., `scroll`, `session_start`).
- **Enhanced Measurement:** Configuring events such as `file_download` and `video_start` to understand content consumption.
- **Custom Event Setup:** Using Google Tag Manager (GTM) to define a custom event, such as `lead_form_submitted`, which is crucial for tracking specific marketing goals not captured by default.

5.1.2 Custom Reports and Explorations

GA4's Explorations feature was used to move beyond standard reports, providing greater flexibility for analytical deep dives. The training covered building a Path Exploration Report:

1. **Starting Point:** Setting the first step to a traffic source (e.g., "Organic Search").
2. **Sequential Steps:** Mapping the user's journey through content pages (e.g., `/blog` → `/product`).

3. Ending Point: Defining the final step as the target Conversion Event (purchase or lead_form_submitted).

This method allows for visualization of drop-off points in the funnel, enabling marketers to identify pages with poor user experience or missing CTAs.

5.2 Pay-Per-Click (PPC) Campaign Structure and Optimization

Practical training involved the setup and theoretical optimization of campaigns within the Google Ads interface.

5.2.1 The Ideal Ad Group Structure

PPC success is heavily dependent on a high Quality Score (QS), which Google uses to determine ad rank and cost. High QS is achieved by maximizing keyword-ad copy-landing page relevance.

The recommended structure focused on Highly Thematic Ad Groups (HTAGs):

- Each Ad Group contains a very small, tightly clustered set of keywords (often 5-10) with the same user intent.
- The Ad Copy within that group is written to mention those exact keywords in the headlines.
- The Landing Page is highly specific to that narrow theme.

This structure drives the QS up, leading to lower Cost Per Click (CPC) and better ad positions.

5.2.2 Ad Optimization Strategy

The optimization strategy centered on leveraging newer ad formats and continuous testing:

- **Responsive Search Ads (RSAs):** Training involved constructing RSAs by providing up to 15 headlines and 4 descriptions. The Google Ads system then automatically tests thousands of combinations in real-time to display the most effective ad variation to each user.
- **A/B Testing:** A structured approach to A/B testing was implemented by pausing the lowest-performing headline (based on Impression Share and CTR) and replacing it with a new, stronger variant every two weeks, ensuring perpetual improvement of the ad copy.

- **Negative Keyword Management:** A crucial optimization step involved constantly reviewing the Search Terms Report to identify and add irrelevant search queries as Negative Keywords, preventing wasted ad spend.
-

Chapter 6: Conclusion and Future Scope

6.1 Conclusion of Training Outcomes

The one-month training at Digi Boulevards was successfully completed, providing a robust, dual-focused skill set that spans Digital Marketing strategy and technical data science application. I am proficient in the cyclical nature of the SEO process, the setup and optimization of PPC campaigns, and the strategic use of high-engagement channels like Email and SMS.

Most significantly, the technical project demonstrated mastery in:

- **Data Sourcing and Engineering:** Utilizing and manipulating large datasets (API data, analytics data) using Python/Pandas.
- **Statistical Modeling:** Applying correlation and regression analysis to predict marketing outcomes with quantified certainty.
- **Business Translation:** Quantifying technical performance into direct monetary/business impact (e.g., the CR-LCP coefficient).

This experience has fundamentally strengthened my analytical, problem-solving, and coding abilities, preparing me for a successful career in the intersection of Computer Science and Digital Business.

6.2 Future Scope and Career Path

The skills acquired lay a solid foundation for advanced specialization in high-demand areas:

- **Predictive Marketing Analytics:** Moving beyond correlation to building predictive models for customer churn, lifetime value (CLV), and budget allocation using advanced machine learning techniques.
- **Technical SEO Specialization:** Deepening expertise in Core Web Vitals, advanced server-side rendering (SSR), and JavaScript SEO implementation to solve complex indexing challenges.

- **Machine Learning in Advertising:** Exploring how AI/ML models are used for real-time bidding, dynamic creative optimization, and sophisticated audience segmentation within ad platforms.

Potential career paths include Digital Marketing Strategist, Technical SEO Specialist, PPC Professional, and Marketing Data Analyst, all of which demand the hybrid skill set developed during this training.

6.3 Final Remarks

I extend my sincere gratitude to Digi Boulevards for providing this valuable training platform. The guidance and hands-on exposure were instrumental in achieving the objectives outlined. I am confident that the knowledge and project experience gained, particularly the ability to quantify technical solutions, will be a cornerstone of my professional development.

(Sunny Kumar)

Roll No.: 2302696

B.Tech (Computer Science & Engineering)

REFERENCES .

(This section will contain the formal citation list for all external tools, APIs, and literature used during the training and project implementation, such as Google Analytics documentation, Python libraries (Pandas, Scikit-learn), and industry best-practice guides.)

THANK YOU

I would like to express my sincere gratitude to everyone who supported me during the completion of this one-month industrial training and the preparation of this report.

A special thanks to Digi Boulevards for providing a practical platform to learn and apply digital marketing concepts.

I am also thankful to Guru Nanak Dev Engineering College, Ludhiana, my project guide, faculty members, and peers for their guidance, encouragement, and continuous support.

This experience has been invaluable in enhancing my knowledge, skills, and confidence in the field of Digital Marketing and Technical Analytics.

(Sunny Kumar)

Roll No.: 2302696

B.Tech (Computer Science & Engineering)