DIGITOMIZE: A Unified Platform for Competitive Programming, Contest Discovery and Portfolio Management

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A B S T R A C T

This project aims to enhance the experience of competitive programmers by developing a feature within Digitomize that simplifies the discovery of upcoming coding contests and enables the creation of dynamic, real-time portfolios. By aggregating data from major competitive programming platforms such as Codeforces, LeetCode, and HackerRank, the system provides users with a centralized tool to explore and filter contests based on platform, difficulty level, and timing. In parallel, the project introduces a portfolio management system that integrates users' coding profiles across platforms, automatically fetching real-time data such as ratings, badges, and contest participation history. Through efficient data aggregation, filtering mechanisms, and seamless profile integration, the feature supports programmers in staying engaged with relevant contests while showcasing their progress and achievements in a structured, shareable format. This dual-functionality tool aims to facilitate greater visibility, organization, and participation within the competitive programming community.

Keywords: Competitive Programming, Contest Aggregation, Real-Time Portfolio, Coding Platforms Integration, Skill-Based Filtering, User Profile Analytics, Programming Achievements, Data-Driven Career Showcase.

1. Introduction

In today's fast-paced world of competitive programming, staying updated with upcoming coding contests and showcasing one's achievements effectively has become increasingly important. With the rise of global platforms such as Codeforces, LeetCode, AtCoder, and HackerRank, programmers now have more opportunities than ever to challenge themselves and grow—but this also brings the challenge of keeping track of contest schedules and progress across multiple sites. Aspiring and seasoned coders alike often struggle to stay informed about contests that align with their skill levels and availability.

To address this need, our project introduces a smart system designed to simplify the discovery of upcoming coding contests and enable the creation of real-time, dynamic portfolios. By aggregating contest data from various platforms and allowing users to filter based on parameters like difficulty, platform, and timing, the system ensures that users never miss a contest that matters to them. Simultaneously, the platform integrates coding profiles and achievements, pulling real-time data such as ratings, badges, and contest histories to build comprehensive and customizable programmer portfolios.

This initiative aims to empower the global coding community—students, professionals, and enthusiasts alike—by providing a centralized platform to organize, track, and showcase their competitive programming journey. By combining intelligent contest discovery with rich profile visualization, this project bridges a crucial gap between participation and personal branding in the digital tech ecosystem.

2. Literature Review

W. Pohl, "Competitive Programming Platforms and Their Impact on Learning"[1], explores the educational benefits of using online competitive programming platforms such as Codeforces, LeetCode, and HackerRank. The study highlights how these platforms improve problem-solving abilities, algorithmic thinking, and coding efficiency among learners. It emphasizes the role of continuous practice, exposure to diverse problems, and the motivation provided by leaderboards and community interactions in reinforcing learning. The paper concludes that competitive programming enhances computational thinking and recommends integrating it into curricula with adaptive, data-driven learning pathways.

I.S. Zinovieva, V. O. Artemchuk, Anna V. Iatsyshyn, et al., "The Use of Online Coding Platforms as Additional Distance Tools in Programming Education"[2], investigate the effectiveness of online coding platforms in enhancing programming education, particularly in remote learning settings. The study analyzes how platforms such as Codeforces and LeetCode help students practice independently, receive instant feedback, and engage in self-

paced learning. It also emphasizes the platforms' role in promoting motivation, skill reinforcement, and assessment beyond the traditional classroom environment. The paper concludes that online coding platforms enhance distance education and suggests future work on LMS integration, progress tracking through analytics, and personalized learning paths.

M. Ibáñez, Á. Di-Serio, D. Villarán, and C. Delgado-Kloos, "The Impact of Gamification on Students' Learning, Engagement, and Behavior Based on Personality Traits in a Web-Based Programming Environment"[3], explore how gamification elements affect student learning outcomes and motivation in programming education. The study examines various gamified components—such as points, badges, and leaderboards—and analyzes their impact in relation to different personality traits. It finds that gamification can significantly boost engagement, persistence, and learning effectiveness, particularly among students with specific personality profiles. The study concludes that gamification boosts engagement and performance, recommending future research on adaptive strategies, AI integration, and real-time analytics for personalized web-based programming education.

Daniel Fokum, "Facilitating Course Assessment with a Competitive Programming Platform"[4], this paper describes the use of competitive programming platforms as tools for evaluating students in academic courses. It provides examples of automated grading, performance tracking, and scalable testing solutions. The study concludes that competitive programming platforms support scalable assessment and independent learning, with future potential in custom educational content and instructor-focused analytics dashboards.

Georgios Lampropoulos and Antonis Sidiropoulos, "The Impact of Leaderboard Gamification in Online Formative Assessment"[5], this paper evaluates the impact of leaderboards on student behavior and performance during formative assessments in an online environment. It studies both the benefits and potential drawbacks. The study concludes that leaderboards can enhance motivation if designed thoughtfully, suggesting future research on personalized and adaptive competition models for balanced gamification.

Juho Hamari, Jonna Koivisto, and Harri Sarsa, "The Gamification of Learning: A Meta-analysis"[6], This meta-analysis reviews studies on the effectiveness of gamification in education. It quantifies the impact of different game mechanics on engagement, motivation, and learning outcomes. The study concludes that gamification improves learning when well-implemented and suggests developing customizable tools and exploring emerging technologies like AR/VR for future educational use.

S. P. et al., "JediCode: A Gamified Approach to Competitive Coding"[7], This paper introduces JediCode, a platform that reimagines coding competitions by integrating gamified elements such as real-time leaderboards, synchronized challenges, and random matchmaking. The study explores JediCode's innovative features and architecture, aiming to create an engaging and dynamic environment for competitive programming. It concludes as Gamification significantly enhances user engagement and motivation in competitive coding environments.

Zhongtang Luo, "Curriculum Design of Competitive Programming: A Contest-Based Approach"[8], This paper discusses the integration of competitive programming into computer science curricula, emphasizing a contest-based approach. It highlights the importance of simulating authentic competitive programming experiences to enhance students' algorithmic reasoning and problem-solving skills. It concludes as Contest-based learning effectively improves programming skills and mirrors real-world problem-solving challenges.

Chia-Hsiu Chen et al., "Design of an Online Programming Platform and a Study on Learners' Abilities and Learning Behavior"[9], The paper presents the development of Pytutor, an online programming platform that integrates software-testing concepts to assess learners' programming abilities and proficiency. It aims to enhance the learning experience by providing immediate feedback and tracking learning behaviors. It concludes as: Real-time feedback and learner behavior analysis enhance programming skills and course effectiveness.

3. Objective and Scope

Objectives:

1. To develop Digitomize as a unified platform for exploring coding contests, blogs, and portfolios for developers.

2. To aggregate coding contests from multiple platforms such as LeetCode, Codeforces, and HackerRank into a single interface for easy discovery.

3. To implement filtering features based on criteria such as difficulty, platform, date, and time to simplify contest exploration.

4. To add sections for blogs and company-specific coding questions to help developers prepare for interviews and stay updated with trends.

Scope:

This project focuses on building a unified platform that streamlines coding contest discovery and portfolio creation for competitive programmers. By aggregating contests from platforms like Codeforces, LeetCode, and HackerRank, it simplifies contest tracking with filtering and notification features. It also enables users to create dynamic portfolios by integrating real-time data such as ratings, rankings, and achievements. The platform is designed for students, professionals, and recruiters to enhance engagement, visibility, and skill development. Future scope includes expanding platform support (e.g., AtCoder, CodeChef), integrating AI-based recommendations, and adding community features like leaderboards and peer comparisons.
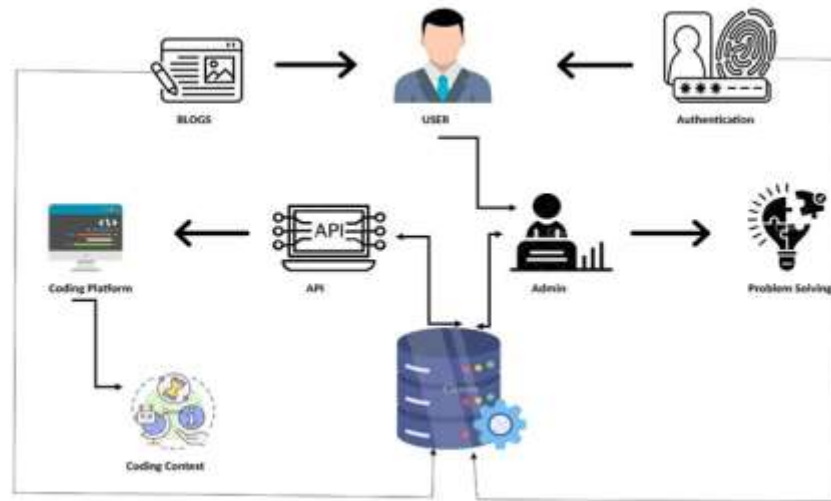
4. Proposed System Architecture

Fig. 4.1 Proposed System Architecture of Digitomize

In fig.1 The System Architecture for the Digitomize feature includes a User Interface (UI) for contest discovery and portfolio management. A Contest Aggregator Module fetches and processes contest data from platforms like Codeforces and LeetCode, while a Portfolio Builder Module retrieves real-time user stats to create customizable portfolios. The Backend Server handles user requests, authentication, and API integrations, supported by a Database for storing user and contest data. An API Layer ensures seamless interaction between the UI and backend for real-time updates.

5. Modules

5.1 **Authentication Module:** The Authentication Module in Digitomize ensures secure access for users by providing robust login and registration processes. It supports multiple authentication methods, such as email, social media, and OAuth, allowing users to securely access their profiles and data. This module also manages session control and ensures that only authorized users can access sensitive features, maintaining user privacy and security. It allows users to register, log in, and securely access their accounts. It supports various authentication methods, including email, social media logins, and OAuth. The module also includes session management and security features to protect user data, ensuring that only authorized users can interact with their profiles and other sensitive information.

5.2 **Profile Management:** The Profile Management feature in Digitomize lets users create and customize portfolios by integrating data from platforms like Codeforces, LeetCode, and HackerRank. It provides real-time updates, privacy controls, and personalized analytics, enabling users to track their progress, showcase achievements, and share their profiles with potential employers. It allows users to integrate data from coding platforms, create customizable portfolios, and manage their competitive programming profiles. It offers real-time updates, privacy controls, and detailed analytics, enabling users to track progress, set goals, and share their achievements with potential employers or peers.

5.3 **Blogs:** The Blogs feature in Digitomize offers a platform for users to read, write, and share articles related to competitive programming and technology. It provides a space for sharing knowledge, insights, and experiences within the community. Users can explore a variety of content, from coding tutorials and problem-solving strategies to industry trends and personal success stories, fostering a collaborative learning environment. It enables users to browse and read articles on diverse topics related to competitive programming and tech. Users can write and publish their own blogs, providing a platform for sharing insights and experiences. The feature includes categorization and tagging options to help users find relevant content easily. Readers can engage with articles through comments, likes, and shares, while writers can manage their posts and interact with their audience. Additionally, the feature supports search functionality and recommendations to highlight popular or relevant posts based on user interests.

5.4 **Coding Contest:** The Coding Contest feature in Digitomize simplifies the process of finding and participating in competitive programming events. By aggregating contests from popular platforms such as Codeforces, LeetCode, and HackerRank, it provides a centralized view where users can easily explore upcoming competitions. This feature ensures that programmers can stay up-to-date with relevant contests and participate in those that best match their skill levels and schedules. The feature aggregates and displays upcoming coding contests from various platforms in a single interface, allowing users to filter events based on criteria like difficulty, platform, and date. Real-time notifications and reminders keep users informed about approaching contests, ensuring they never miss an opportunity. Additionally, it offers performance analytics to track progress, helping users analyze their past results and improve their strategies for future contests.
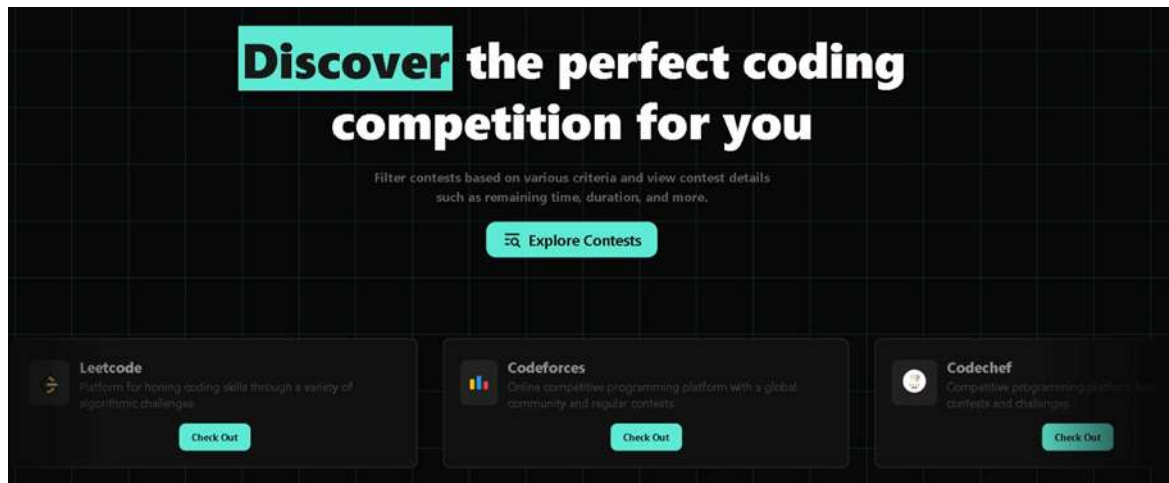
6. Experimental Details

Fig.6.1 Home page

DIGITOMIZE Home page includes appropriate four modules such as Company wise questions, Contests, Blog, Authentication modules design that user has interact with these four modules.

Fig.6.2 Login/sign up page

These Login Page describe User can create an account using email or Google Sign-In. After registration, an user can access the all modules.
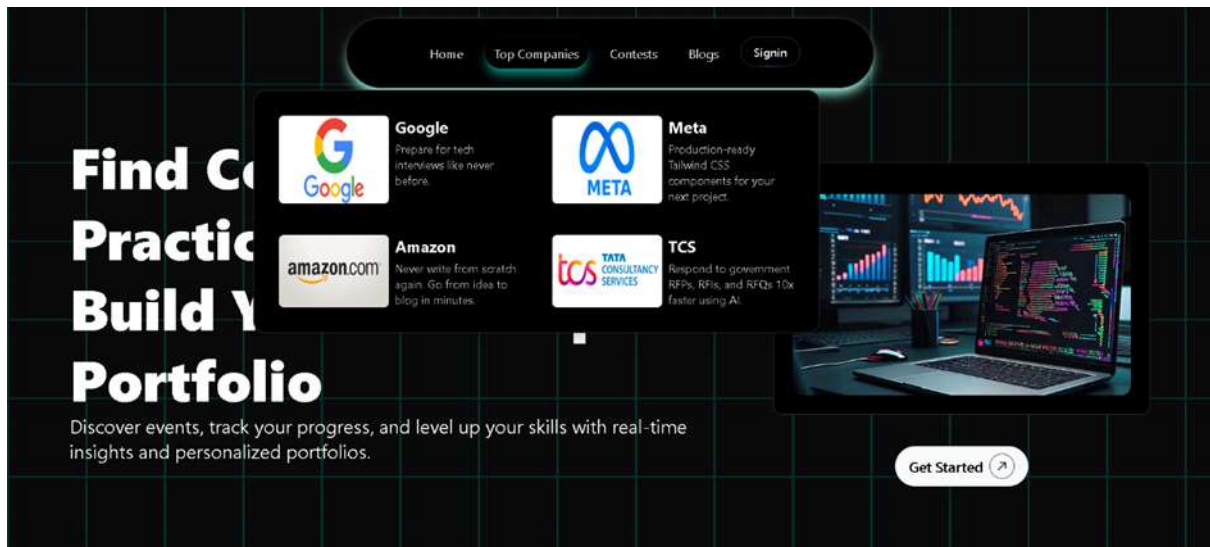
Fig.6.3 Company Profiles Page

Explore company-specific coding questions and prepare effectively for interviews with curated problems from top tech companies to enhance your skills and boost your chances of success.
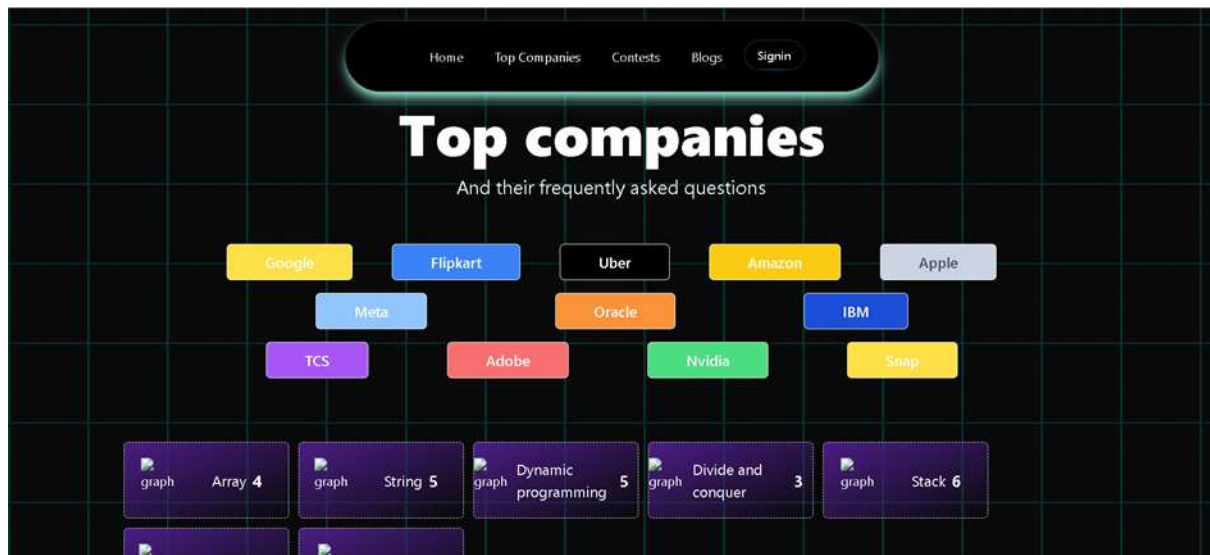

Fig.6.4 Company Specific Problem Page

Explore company-wise coding questions across various topics like data structures, algorithms, system design, and problem-solving to strengthen your preparation and tackle interviews with confidence.
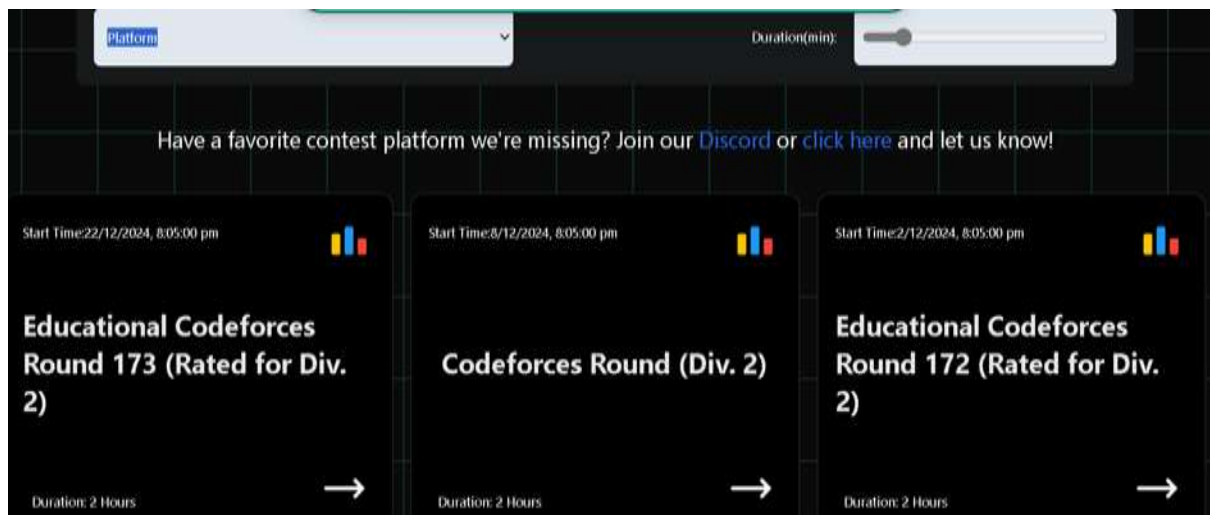
Fig. 6.5 Contest Page

Discover coding contests from top platforms, organized by company and topic, to challenge your skills and stay up-to-date with the latest competitive programming opportunities.

Fig. 6.6 Blog Page

The Blog Page offers insightful articles on competitive programming, coding practices, and algorithms to keep users informed and enhance their skills.

Fig. 6.7 Blog Page

The Blog Page allows users to explore and read blog posts shared by others, covering various topics related to competitive programming, coding techniques, and industry trends.

Fig. 6.8 Profile Page

The Profile Page allows users to view and update their personal information, including their bio, achievements, and coding history, providing a personalized experience that showcases their progress and accomplishments.

7. Conclusion and Future Scope

Digitomize is an all-in-one platform for competitive programmers that centralizes coding contest information across platforms, enabling users to filter events by difficulty, platform, and timing. It features a dynamic portfolio builder that showcases real-time achievements, coding history, and ratings, making it easier for users to present their skills to employers or peers. With tools like performance analytics, progress tracking, and real-time notifications, Digitomize supports continuous learning and engagement. Future enhancements could include integration with more platforms like AtCoder and CodeChef, AI-driven performance insights, personalized recommendations, social features such as leaderboards and peer comparisons, mobile support, real-time alerts, and job platform integration—positioning Digitomize as a complete ecosystem for learning, competing, and advancing in the programming world.

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