OUTREACHY 2024 PROJECT PROPOSAL

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Introduction

My name is Navya Verma, and I am currently pursuing a Bachelor of Technology degree in Artificial Intelligence and Machine Learning from Indira Gandhi Delhi Technical University for Women in Delhi, India. I have a profound interest in data science, which stems from its ability to facilitate research, exploration across various fields, and engagement in practical applications. Over the past two years, I have immersed myself in subjects related to data science as part of my degree program. My educational journey has equipped me with a solid foundation in topics such as Linear Algebra, Abstract Algebra, Probability and Statistics, Optimization Techniques, Python, Java, Data Structures and Algorithms, as well as Artificial Intelligence.

I am passionate about delving into new information, staying updated with the latest advancements in the field through technical podcasts, and continually expanding my understanding of the world around me. This passion has fueled my commitment to excel in the realm of data science, driving me to seek opportunities where I can leverage my skills and knowledge to make meaningful contributions.

Past Experiences

- **Internship as an ML Intern:**
    - Served as a Machine Learning Intern under the AI Club of IGDTUW, where I focused on developing machine learning models to predict health risks associated with air pollution in Delhi, India.
    - Conducted extensive research and curated datasets to capture diverse environmental parameters and their correlation with health conditions in Delhi.
    - Drafted a research paper outlining the methodology, findings, and implications of the study, aimed at empowering individuals and government entities to make informed decisions to mitigate health risks associated with air pollution.

- **Mentorship Experience in UI/UX:**
    - Acted as a mentor in the field of UI/UX under the Google Developer Student Club at my university.
    - Led a cohort of over 30 individuals, providing guidance and instruction on various aspects of design, including user interface and user experience principles.
    - Facilitated hands-on learning experiences, workshops, and collaborative projects to enhance participants' skills and knowledge in UI/UX design.

Previous Projects

ML Based Air Quality and Health Risk Prediction in Delhi | GitHub

- Duration: August 2023
- Tools & Technologies Used: Python, Machine Learning, NumPy, Pandas
- Description: Developed a machine learning model focused on Delhi to predict air quality and associated health risks. The model incorporated data on particulate levels, weather conditions, and historical health data to provide accurate predictions. By leveraging Python and various machine learning techniques, this project aimed to address the pressing issue of air pollution in Delhi, providing valuable insights for public health initiatives and policy making.

Centsible | Project

- Duration: October 2023
- Tools & Technologies Used: Figma, User Research, User Interface
- Description: Led the design process for an innovative financial management app called Centsible. Utilizing tools like Figma and conducting thorough user research, I crafted a user-friendly prototype empowering individuals with features for income management, debt navigation, investment exploration, and crypto education. This project aimed to enhance financial literacy and promote responsible financial practices among users.

HealthHub Connect | Project

- Duration: April 2023

- Tools & Technologies Used: Figma, User Research, User Interface
- Description: Developed prototypes for two healthcare-focused apps after conducting extensive user research. These prototypes were designed to address various healthcare economics challenges faced by different user groups in India. By employing Figma and incorporating user-centric design principles, these prototypes aimed to offer practical solutions and improve access to healthcare services for diverse demographics.

Earthlytica | GitHub

- Duration: November 2023 - Present
- Tools & Technologies Used: HTML, CSS, JavaScript, Git
- Description: Contributed to the creation of an impactful environmental website, Earthlytica, dedicated to educating and engaging users in environmental conservation efforts. The website offers features like a carbon tracker and fosters a community committed to sustainable living. By leveraging HTML, CSS, JavaScript, and Git, this project aims to raise awareness about environmental issues and encourage individuals to take meaningful actions towards preserving the planet.

Why do I wish to take part in Outreachy 2024?

I am deeply passionate about my journey in data science, machine learning, and artificial intelligence, which I have pursued with great enthusiasm and curiosity over the past two years. The prospect of machines learning and making decisions autonomously by analyzing vast amounts of data has always fascinated me. To satiate my thirst for knowledge, I have actively sought out various online courses, workshops, and hands-on projects to build a robust foundation in this field.

Through these endeavors, I have honed my skills in Python, data visualization, data science, and other essential technologies. However, my quest for deeper understanding and growth drives me to continually seek new challenges and opportunities. Participating in Outreachy presents an exciting prospect for me to delve deeper into the realm of open source.

Open source platforms offer invaluable opportunities for learning and collaboration. Contributing to projects within the Outreachy community not only allows me to apply my skills and knowledge but also provides a platform for me to share my expertise and learn from the experiences of others. As someone who comes from an underrepresented group in many aspects, particularly in the context of India, I am keen to contribute to initiatives that promote diversity and inclusivity.

Moreover, Outreachy's focus on providing representation to underrepresented groups resonates deeply with me. I see this as an opportunity not only to make a positive impact on the world but also to gain exposure to the world of open source, something that I have long been deprived of. By participating in Outreachy, I hope to bridge this gap and leverage my skills and knowledge to create innovative solutions that address societal challenges.

Ultimately, my goal is to use my expertise in data science and artificial intelligence to contribute meaningfully to projects that have a tangible, positive impact on society.

Outreachy represents a stepping stone towards achieving this goal, and I am eager to seize this opportunity to grow, learn, and make a difference.

Why moja global?

I am drawn to Moja Global due to its mission of supporting ambitious climate actions through the development of pioneering open-source software, including the groundbreaking Flint software. Moja Global's commitment to providing accurate and affordable estimates of greenhouse gas emissions and removals from forestry, agriculture, and other land uses strongly aligns with my personal beliefs, aspirations, and future goals.

Having focused my projects on greenhouse gas emissions and pollution in India and globally, I deeply resonate with Moja Global's dedication to addressing environmental challenges. As an engineering student with a keen interest in environmental issues, I am impressed by the impact Moja Global's work has on society. Their emphasis on providing affordable solutions for estimating greenhouse gas emissions is particularly noteworthy, as it can significantly aid organizations and policymakers in making informed decisions to mitigate climate change.

I am eager to further expand my knowledge of new technologies and environmental concepts through collaboration with Moja Global. The opportunity to work with a team dedicated to advancing environmental sustainability excites me. I am enthusiastic about contributing to Moja Global's mission and playing a part in shaping a better future for our planet.

Why me?

My passion for environmental conservation, climate action, and software development is evident through the projects I have undertaken. These projects reflect my deep interest in leveraging cutting-edge technology to address pressing environmental challenges. The mission of Moja Global to support climate action aligns perfectly with my values and aspirations.

Having previously developed solutions to climatic problems, I bring a wealth of experience to the table. My past projects demonstrate my ability to conceptualize and implement innovative solutions to environmental issues, showcasing my proficiency in both technical and environmental domains.

Moreover, my dedication to continuous learning and exploration of new technologies equips me with the skills and mindset necessary to contribute effectively to Moja Global's endeavors. I am committed to staying abreast of the latest advancements in both machine learning and environmental science, ensuring that my contributions remain relevant and impactful.

In summary, my blend of technical expertise, passion for environmental sustainability, and proven track record of delivering impactful projects make me a strong candidate to contribute meaningfully to Moja Global's mission. I am eager to bring my skills and enthusiasm to the team and play a role in advancing climate action through innovative software solutions.

Proposal Description

Overview:

The primary aim of this project proposal is to contribute to Moja Global by working on two key projects: packaging Flint for cross-platform usage and developing a pipeline for high-throughput visualization on Google Earth Engine.

PROPOSED TIMELINE AND WORK:

Packaging Flint for cross-platform usage (Project #3)

Week	Tasks	Dates
Week 1-2	- Study FLINT's architecture, features, and dependencies.	May 27 - June 9

	- Follow FLINT Developer Tutorial to familiarize with the development process.	
	- Set up a Development Environment according to FLINT's requirements.	
Week 3	- Review Requirements for cross-platform packaging.	June 10 - June 16
Week 4-5	- Implement platform-specific adjustments or configurations.	June 17 - June 30
	- Ensure compatibility across Windows, macOS, Linux.	
	- Test configurations thoroughly for compatibility issues.	
Week 6	- Review development environment setup for any missing dependencies or configurations.	July 1 - July 7
Week 7	- Validate configurations and adjustments made for cross-platform packaging.	July 8 - July 14

Week 8-9	- Conduct extensive testing on different operating systems.	July 15 - July 28
	- Perform unit tests, integration tests, and system tests.	
Week 10	- Begin drafting comprehensive documentation covering the packaging process.	July 29 - August 4
Week 11	- Finalize documentation ensuring clarity and accuracy.	August 5 - August 11
	- Conduct final review of release process plan, configurations, and testing results.	
Week 12	- Establish versioning and release schedule for packaged FLINT.	August 12 - August 18
	- Package FLINT for cross-platform usage in preparation for deployment.	

Week 13	- Officially release packaged version of FLINT for cross-platform usage.	August 19 - August 23
	- Deploy FLINT package to appropriate repositories or platforms.	
	- Monitor feedback and address any post-release issues.	

Develop pipeline for high-throughput visualization on Google Earth Engine (Project#2)

Week	Tasks	Dates
Weeks 1-2	- Familiarize with Google Earth Engine (GEE) platform.	May 27 - June 9
	- Learn about GEE's capabilities, APIs (Python and JavaScript), and available datasets.	

	- Complete introductory tutorials and documentation provided by Google Earth Engine.	
Weeks 3-4	- Meet with supervisors to understand project requirements and goals.	June 10 - June 23
	- Identify spatial data needed for visualization and analysis.	
	- Determine specific tasks and objectives for the internship.	
Weeks 5-6	- Gather required spatial data (e.g., satellite imagery, shapefiles).	June 24 - July 7
	- Preprocess data for compatibility with Google Earth Engine.	
	- Explore techniques for optimizing data for efficient uploading and processing on GEE.	
Weeks 7-8	- Upload prepared spatial data to Google Earth Engine using Python or JavaScript API.	July 8 - July 21
	- Organize uploaded data into appropriate structures within GEE.	
	- Verify data upload and accessibility within GEE for further processing.	

Weeks 9-10	- Develop algorithms for visualization and analysis using GEE's APIs.	July 22 - August 4
	- Implement high-throughput processing techniques for efficient handling of large datasets.	
	- Test and debug algorithms using sample datasets to ensure functionality and accuracy.	
Weeks 11-12	- Utilize GEE's visualization capabilities to create interactive maps and visualizations.	August 5 - August 18
	- Generate time-series animations, charts, or other visual representations as needed.	
	- Perform spatial analysis using GEE's functions to derive insights from the data.	
Week 13	- Document the entire pipeline, including data sources, preprocessing steps, algorithms used, and visualization techniques.	August 19 - August 23
	- Create user guides and documentation for future use of the pipeline.	

	- Present project findings and results to supervisors and stakeholders.	
	- Make necessary refinements or improvements based on feedback received during the presentation.	

Thus concludes my proposed work and timeline for the projects outlined under moja global.

Contributions I made for Outreachy 2024

During the Outreachy 2024 contribution period, I made significant contributions to the Moja Global project. Here is a summary of my contributions:

Packaging Flint for Cross-Platform Usage (project #3) :

1)Project Proposal: I took the initiative to propose packaging Flint for cross-platform usage. This involved drafting the objectives, expected deliverables, and a timeline for the project. By outlining a structured plan, I aimed to ensure the smooth execution of the project and achieve its goals efficiently.

3)Documentation Review and Improvement: I conducted a comprehensive review of the existing Flint documentation. Carefully analyzing the Flint installation process, I documented the steps in Markdown format, highlighting areas for improvement. This endeavor aimed to enhance the clarity and accessibility of the documentation for users.

4)Pull Request for Dockerfile Enhancement: I submitted a pull request that focused on enhancing the Dockerfile used in the project. Specifically, I modified the Dockerfile to utilize a JFrog-based URL for downloading Boost libraries, which resolved issues encountered during the building of the base Ubuntu 18.04 container in Docker. This optimization contributed to a smoother development process and improved container stability.

5)Analysis and Improvement Plans for Flint Handbook: I thoroughly analyzed the entire Flint handbook and drafted improvement plans chapter-wise. By identifying areas for enhancement and proposing specific improvements, I aimed to enhance the usability and effectiveness of the handbook, empowering users to maximize their utilization of Flint.

Pipeline Development for High-Throughput Visualization on Google Earth Engine (project #4):

1)Proposed an example algorithm for summarizing spatio-temporal time series data, highlighting its time and memory complexity.

2)Outlined the steps for data preparation, algorithm development, and documentation and sharing, ensuring clarity and reproducibility.

3)Demonstrated temporal summarization of NDVI (Normalized Difference Vegetation Index) time series through a sample code written in Python using the Google Earth Engine API.

These contributions reflect my dedication to advancing the Moja Global project and my commitment to improving the accessibility, functionality, and usability of the Flint software. Through my efforts, I aimed to contribute to the project's success and further its mission of supporting climate actions through innovative software solutions.

MY CONTRIBUTIONS TIMELINE

March 8 - March 12:

- Visited various organizations participating in the Outreachy program.
- Engaged in discussions with representatives, reviewed their projects, and established connections to understand ongoing activities.
- Explored project scopes and objectives to identify alignment with personal interests and skills.

March 13 - March 22:

- After careful consideration, I decided to focus efforts on Moja Global due to alignment with personal interests and goals.
- Spent the next 10 days analyzing Moja Global's project and familiarizing myself with its objectives and requirements.
- Installed Flint locally on my system and experimented with its functionalities.
- Conducted extensive research on Moja Global, including reading relevant documentation, exploring datasets, and understanding the project's context.
- Invested time in studying the Moja Global handbook and other provided resources to gain a comprehensive understanding of the project's scope and requirements.

March 23 - March 31:

- Commenced active contributions to Moja Global's project.
- Utilized acquired knowledge and insights to draft a detailed plan outlining proposed contributions and milestones.
- Collaborated with the project team to discuss and refine the proposed plan, ensuring alignment with project objectives and expectations.
- Initiated specific tasks outlined in the contribution plan, such as documentation review and improvement, Dockerfile enhancement, and roadmap development.
- Communicated progress updates with the project mentors and sought feedback to ensure the quality and effectiveness of contributions.

- Continued to engage with the Moja Global community, actively participating in discussions and seeking guidance when needed.
- My contributions: https://github.com/Navya-Verma11/Outreachy_MG_M24

Availability

My end semester exams for the 4th semester are scheduled to conclude by May 22, 2024. Following this, I will have a summer break extending for approximately 2 months. **I will have 42 consecutive days free from school and exams during the internship period.** During this period, I do not have any other commitments, allowing me to dedicate a substantial amount of time, around 30 to 40 hours per week, for the project.

I assure you that I am fully committed to the project and will prioritize it during my summer break. In the event of any sudden engagements, I will ensure to manage my time effectively and make up for any missed hours by working diligently during preceding and succeeding weeks.

Furthermore, even when my college resumes from August 1st, 2024, I am confident in my ability to manage my time efficiently to fulfill the project requirements. This project is something I am incredibly passionate about, and I am fully committed to completing the proposed work within the given timeline. Rest assured, I will strive to accomplish the tasks with utmost dedication and diligence.

POST OUTREACHY

Post-Outreachy, my enthusiasm for deep learning, machine learning, and environmental conservation continues to drive my commitment to contributing to Moja Global. The alignment between my interests and skills and the organization's mission makes it a perfect fit for my continued involvement.

I am eager to remain an active contributor to Moja Global's projects, dedicating 20 to 25 hours per week to ensure consistent progress. Moreover, I am excited about the prospect of mentoring other Outreachy interns or becoming a maintainer of the project. Assisting new contributors and sharing my experiences will not only benefit the community but also fulfill my desire to give back and support others in their journey.

Being a part of Moja Global's innovative community fills me with pride, and I envision a long-term commitment to the organization beyond the Outreachy program. I am keen to explore new and more advanced techniques through research and implementation, continually enhancing the effectiveness and impact of my contributions.

Furthermore, I am committed to maintaining regular communication and participation in Moja Global's activities, ensuring continuous collaboration and progress. I look forward to the opportunity to contribute my expertise and insights to the organization's growth and success in the future.

ENDING NOTE

In closing, I am immensely grateful for the opportunity to share my journey, aspirations, and contributions with you. Participating in Outreachy 2024 and collaborating with Moja Global has been a transformative experience, igniting my passion for technology and environmental conservation. As I continue on this path, I am committed to making a positive impact, both within the Moja Global community and beyond. Thank you for your support and encouragement. Together, let us strive towards a brighter, greener future for all.