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A MINOR PROJECT PROPOSAL ON A DECENTRALIZED SOCIAL MEDIA FOR SCIENTIFIC COMMUNICATION

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LIST OF ABBREVIATIONS

API : Application Programming Interface

Colab : Colaboratory

CHAPTER 1

INTRODUCTION

1.1 Background

Scientific communication plays a vital role in advancing research and knowledge sharing across academic communities. Traditional social media platforms while effective for general communication often lacks specialized features necessary for scientific discource. The emergence of decentralized technologies particularly the ActivityPub [1] Protocol and the Fediverse presents an oppurtunity to create a more switable platform for academic communication.

1.2 Gap Identification

Current platforms for scientific communication face several limitations:

- Limited accessibility of scientific communication to the wider population beyond the niche community.
- Limited support for mathematical expressions and scientific notations.
- Lack of integration with academic citation systems.

1.3 Motivation

To create a social media platform that empowers researchers and academics to communicate their scientific work effectively. By bridging the gap between specialized communities and the general public, the platform aims to promote the understanding and appreciation of cutting-edge research across a wider audience.

1.4 Objectives

- Develop a federated social media platform using ActivityPub protocol with support for mathematical/scientific typesetting.
- Enable seamless integration with existing reference management tools

CHAPTER 2

RELATED THEORY

2.1 Federation

A federated social network is a decentralized social networking service distributed across distinct service providers. This architecture mirrors the distribution model of email systems, where users with accounts on different providers can freely communicate with each other. The federation of social networks represents a shift towards treating social media as a public utility rather than a centralized service.

Unlike traditional centralized social networks where all users interact through a single service provider, federated networks allow users to:

- Choose their preferred instance (server) while still communicating with users on other instances
- Maintain control over their data through their chosen instance
- Benefit from instance-specific moderation policies while participating in the broader network

The federation model offers several key advantages over centralized systems:

- Resilience: No single point of failure as the network operates across multiple independent servers
- Data Sovereignty: Each instance maintains control over its users' data and policies
- Interoperability: Users can communicate across instances using standardized protocols
- Scalability: The network can grow organically as new instances join the federation

This distributed approach is particularly relevant for scientific communication as it allows academic institutions to maintain their own instances while participating in the broader scientific discourse across the network.

2.2 ActivityPub Protocol

ActivityPub is a decentralized social networking protocol standardized by the World Wide Web Consortium (W3C) [1]. It provides a client-to-server API for creating, updating, and deleting content, as well as a server-to-server API for delivering notifications and content between different servers. The protocol is built on several key concepts:

Actors

Actors represent users, groups, or applications that can send and receive activities. Each actor has:

- A unique URI that serves as their identity across the federation
- An inbox for receiving activities from other actors
- An outbox for publishing activities to followers

Activities

Activities describe actions that actors take, such as:

- Create: Publishing new content
- Follow: Subscribing to another actor's activities
- Like: Expressing appreciation for content
- Announce: Sharing content with followers

Objects

Objects represent the content being acted upon, such as:

- Notes (posts)
- Articles
- Images
- Comments

2.2.1 Implementation

The implementation of federation through ActivityPub requires several key components:

- HTTP signatures for request authentication
- JSON-LD for data representation
- WebFinger for actor discovery across instances
- Content delivery mechanisms between servers

2.2.2 Security Considerations

Federation introduces specific security requirements:

- Signature verification for cross-instance communications
- Instance-level access control and moderation capabilities
- Protection against spam and abuse across instances
- Data privacy and sovereignty considerations

CHAPTER 3

LITERATURE REVIEW

Havard essay [**?**]

CHAPTER 4

METHODOLOGY

4.1 Overview

4.2 Other section goes here

CHAPTER 5

EXPECTED RESULTS

REFERENCES

[1] C. Webber and J. Tallon, “Activitypub,” W3C. [Online]. Available: https://www.w3.org/TR/activitypub/

APPENDIX A

APPENDIX B