# Poster:Re-designing Drainage System by Solving Water Logging Using Algorithmic Approach

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## 1. INTRODUCTION

Water logging has been disrupting livelihoods of about one million people in Bangladesh during past two decades.The capital city Dhaka faces extensive water logging during the monsoon (May to October) as a regular phenomenon due to fast and uncontrolled urbanization.This is creating adverse social,physical,economic and environmental impacts in the life and living in Dhaka[1].Not only that,this problem has also been persistent in some big cities of India(i.e,Kolkata)[2]. In this work,we propose a solution to redesign a city's water logging problem.For our case study,we chose Dhaka as our first city to try the proposed application.

## 2. BACKGROUND AND RELATED WORK

Earlier there has been extensive research on water logging in Dhaka city by Tawhid Khandakar Golam[3] and Neelopal[4]. Another case study inclined to water logging along with drainage system proposal has been carried out by two authors[5].These studies have a brief description on the current situation of water logging but there is still the need of a solution for making this problem not persistent anymore.Our proposed solution has the application of user-data along with an algorithmic approach.

## 3. APPROACH AND UNIQUENESS

There have been numerous studies on the current situation of water logging but there is still the need of a solution for making this problem non-persistent.Our idea involves application of algorithmic approach from the reference of user data.Our proposed solution leverages proper estimation of water water clogged upon which measures can be taken alongside re-designing the drainage system all over the city.

### 3.1 Approach

**Step:1** We have collected data of water logging eventss from the user survey via mobile application.Data include the height of logged water as well as the garbage level at different points of the city.(i.e.How many cm of water has been logged in area like Dhanmondi 8-A? ).These data are stored in a database.From these data,we can almost precisely measure the amount of extra water (in volume) that needs to be extracted from a particular area.These areas are determined by using convex hull algorithm.

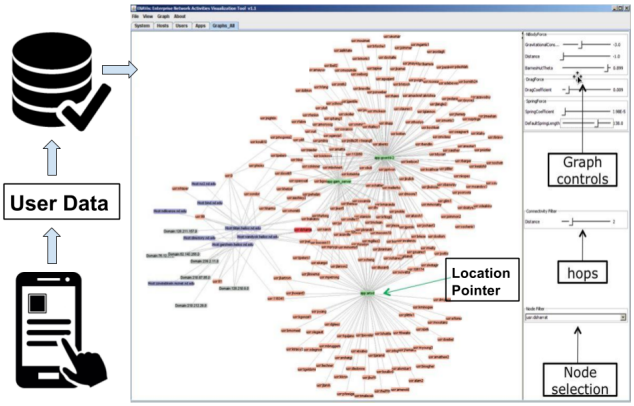


Figure01 :Process of obtaining data and producing pipeline design

**Step:2** The Govt. has a placement map of pipelines of the city with proper measurements (i.e. length, radius etc.).Using Govt. provided data,we calculated how much more water

should be extracted through these pipes.To accommodate all the water in a certain pipeline,the change in the pipeline measurements is calculated.

**Step:3** The rate of flow of water along with time works as some great parameter.To remove the maximum amount of water at an optimal time, Ford-Fulkerson's maximum flow algorithm is applied.

**Step:4** Data yielding from the calculations provide us with a plan for:

i. Properly measured pipelines with maximum capacity and minimum cost.
ii. Extracting the extra water (from calculation) to places with less water logging.

## 3.2 Uniqueness

The water looging problem has been a burning issue now-a-days.In spite of carrying out numerous research and campaigns,it still persists in the city causing sufferings to the people specially those who live in low-lying areas.Our approach is unique as it gives a practical solution based on the current situation.It is not only just a statistics rather it has implementation in real-life.

# 4. RESULTS AND CONTRIBUTIONS

We have collected data from the users via mobile application.They can report different incidents of logging categorized on areas.

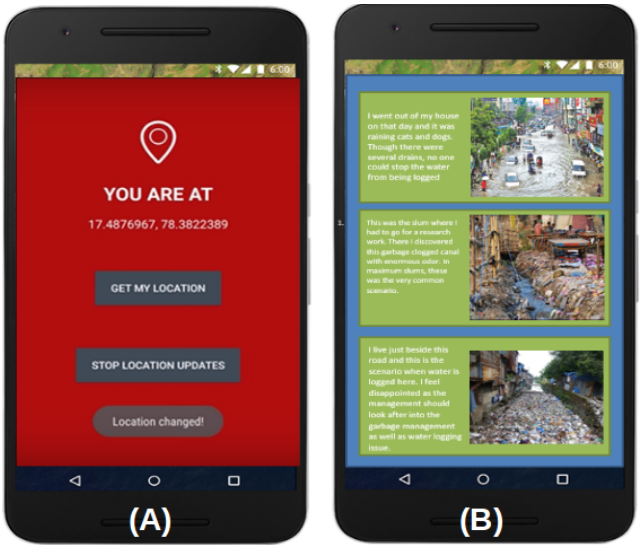


Figure02 :(A)Area detection via GPS., (B)User Reports with uploaded figures.

## 4.1 Results

The location based data collection is done via the GPS location in the mobile application.After the collection of data,they are plotted into a graph.Ford-Fulkerson's maximum flow algorithm yeilds the graph to a proper pipeline design for a specific area accordingly.Around 50 users of 3 to 4 different locations,used our application.

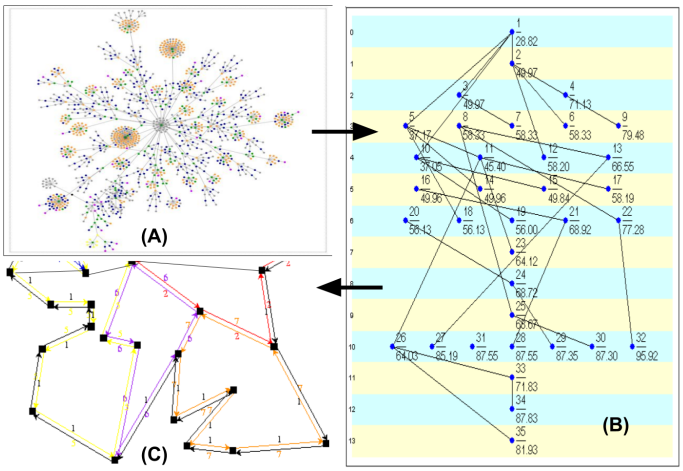


Figure03 :(A)User data based on location,(B)Graph of points associated with values,(C)Pipeline design

## 4.2 Contributions

The contributions of our work are:

- Our alogirithmic approach is feasible and much more optimized.
- The mobile application is user friendly and helps to obtain location based data using GPS.
- The data analysis process is much more inclined towards a better optimizated processing of data.

# 5. FUTURE PLANS

As per our progress,we wish to produce a cross-referencing google map by crowdsourcing[6] user data to formulate actual flooded area (with the help of image processing).We have plans to accumulate regression lines depending of different seasons and place them accordingly in the map.

# 6. REFERENCES

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