Water Management Summarizations

Problem statements:

1. To forecast weather and reduce the real-time gap for opening and closing of canals. Water Management system for proper irrigation.

2. Weather forecasting using GIS technology for planning purposes

3. Creating alerting/messaging systems on basic communication devices for alerts or cautions on water level in fields, flood or drought and etc

4. Water Management: Proper management of water is the primary need in farming. Agriculture consumes approximately 70% of global fresh water. Irrigation system of the country has been spoiled by excessive water usage and unplanned water management methods. If the intelligent water management system is. Thus, the automatic detection is required used, then the agricultural growth of the country can be substantially improved

5. Water Management system for proper irrigation

6. Weather condition prediction system

Summary

Theme: [IoT, Remote-sensing](Sensors, Cloud, API design), Control System, Time-series

Proposals

a. Sensor-based real-time weather data collection to predict real-time **sequential model based optimal water requirement**(Evapotranspiration rate) in various geographic locations land-wise(even offline capability).

b. Designing control system for actuating pumps in various lands or water sources, canal gates.

c. Design a **Cloud ML API**

- For monitoring, GIS based optimal water survey of a large area, monitoring parameters of water supply throughout several terminals, purpose:
  1. For water scheduling, opening and closing of the canal gates to distribute over the large network.
  2. Monitor continuous water levels in region basis, parameters of water supply over several regions to track whether water supply management fault in the supply lines or not,
  3. If supply is above the optimal, actuate the outlets or notify.

- Forecast weather-condition, purpose:
  1. Local alert system through all the operating centers,
  2. Weather forecast based water optimality, storage estimation for whole area.,
  3. Precautions for adverse weather like storm, rainfall, recommendations for certain situations.

References:

1. Irrigation Water Management
2. Smart Water Management (SWM) Meaning
3. IRRIGATION WATER MANAGEMENT USING SMART CONTROL SYSTEMS: A REVIEW

Operating Units

1. Main operating center

a. Contains the master ML app/system for large area at the canal end,
b. Contains the sensors network machinery(equipped with control system for automation of water scheduling, etc.)
c. Obtains collaborative data from all local operating units to estimate optimal water requirement, for analytics or to take action in adverse situation(not solvable by local units).

2. Local operating center

a. Communicates between farm-land end to main unit
b. Collects water optimality data from lands in a small zone, analyzes, sends the overall data,
c. Tries to monitor leakage problem, individual land problem related to water supply, monitor water quality(sent from the installed land- system).

3. Consumer end(Farmers)

a. Individual senor, network-module setup for individual farm lands.
b. Sends real-time data with a predefined- schedule to local center
c. Actuates the optimal water flow, maintains water level, water quality to corresponding lands.
d. Sends water level, water check, additional weather condition stats to farmer apps.

e. Farmer APP

* Receive real-time alert, notification from registered farm-land system.
* Notification regarding adverse weather condition, nearby water leakage alert from local center.
* Water scheduling alert regarding canal gate open/close, from main center via local unit.

Takeaway from feedback:

1. The real-time monitoring system to the farmers end must be affordable even small farmers.
2. The monitoring module must be robust, durable for all weather conditions and, some routine checks to be made to ensure they are working properly or not.
3. The communication/alert must be work even without internet(can use GSM module, Zigbee, Nrf for a collaborative units, as these are a bit costly)
4. The canal gate operation involves government permission, so the proposed system can be suggested for better opearbility and farming
5. The alert regarding adverse weather condition storm, flood, unhealthy water, water leakage poblem, water level in the land should be easily interpretable.
6. The system from canal to small land end must be well synchronized, very less real-time gap should be there.