Mitigate input drawbacks of Expense Tracking Application

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Expense Sharing Applications: Manual Input

We have considered <u>Splitwise</u> as our reference app.

Drawback of Manual Input

1. Input Errors
2. Time Consuming
3. Errors while reading from Receipt
4. Non English Linguistic Errors
5. Technology Unfamiliarity Errors

Miscellaneous Errors:

- Non intuitive user interface
- Frequent use of Backspace

Solutions:

1. **Improved User Interface**

2. **Input via Image**

3. **Input via Voice**

4. **Input via SMS**

Solution 1: Manual Input Interface

1. **Inbuilt, Minimized, customized**
2. **Separate components for different entries**
3. **Better UI leads to less error**
4. **Restriction of entry of invalid input**

Cons:

1. **No automation of input**
2. **Increase in navigation time**
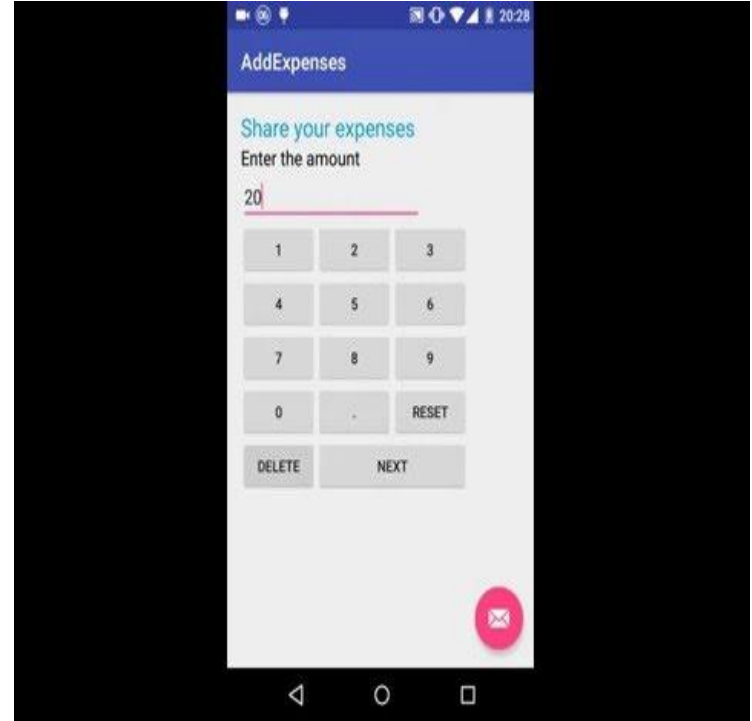
Solution 2: Input via Image

Implemented using Tesseract OCR

Training with given data is required

Advantages:

1. **Saves bills in history permanently**
2. **It overcomes linguistic barrier**

Disadvantages

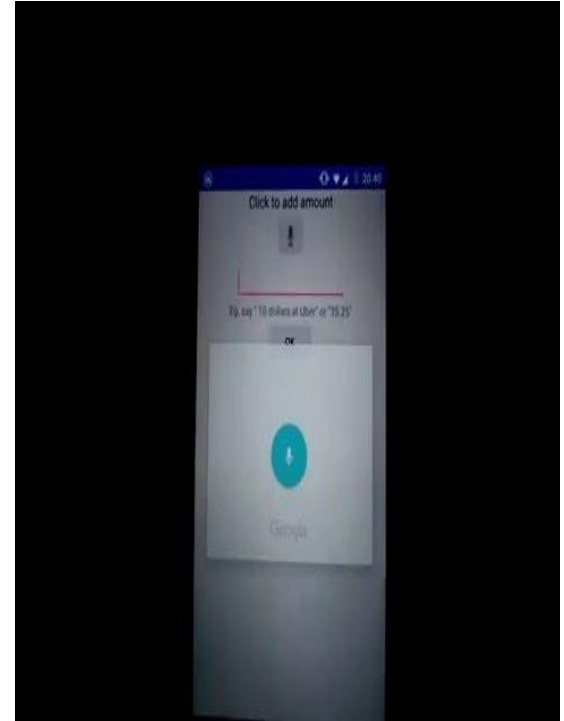1. **Blurry or damaged bills cause problems.**

Solution 3: Input via Voice

Using Google Recognizer intent for speech

1. Intuitive, fast and reliable
2. Can be used to populate both the amount and description
3. Adequate accuracy in numerical data

Issues:

1. Language barrier or varied results with different accents

Solution 4: Input via SMSes

1. **Scan SMS Inbox for expense messages**
2. **Implementation**
   a. **Android APIs**
   b. **Regex to match dollar amounts**
   c. **REST call to the backend to save the expense data**
3. **Advantages**
   a. **Natural way to look out for expense related messages.**
   b. **Automated expense entry**
4. **Disadvantages**
   a. **False positives due to raw text processing**
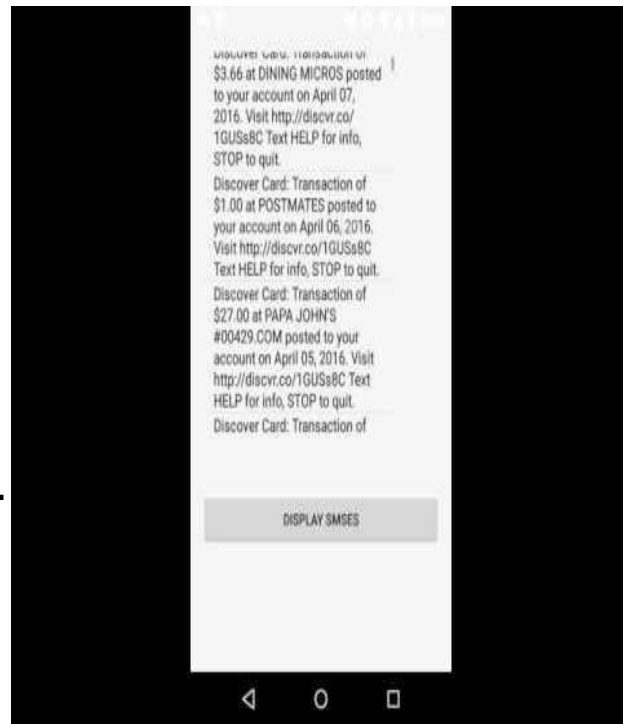
Architecture
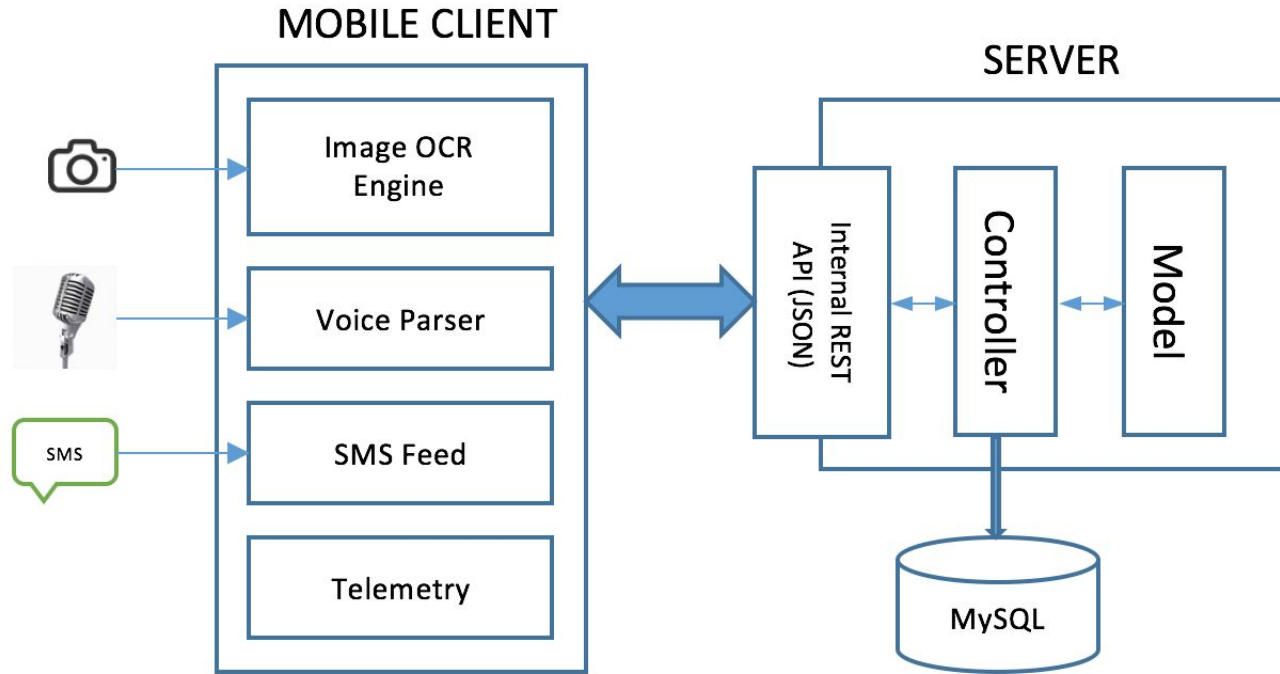
Telemetry

1. **Collect metrics**
2. **High-level Metrics**
   a. **Type of solution used**
   b. **Duration**
3. **Granular Metrics**
   a. **No. of keystrokes in terms of**
      i. **Edit**
      ii. **Delete**
   b. **For attributes like**
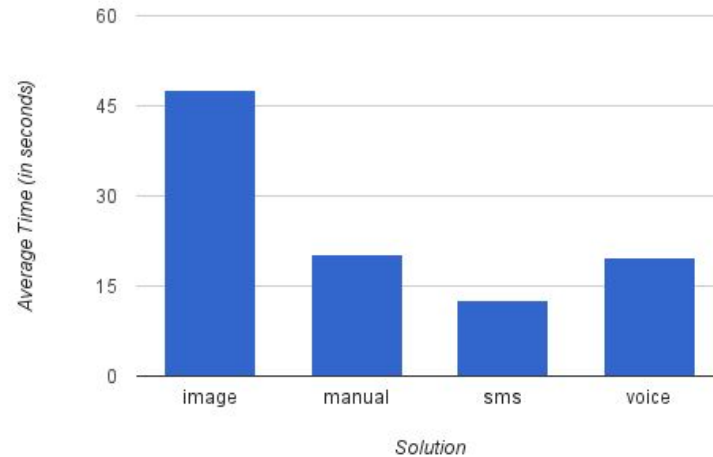   i. **Amount**
      ii. **Description**

billtype	duration	Amount		Description	
		Delete	Edit	Delete	Edit
manual	24.051	1	4	1	7
sms	20.048	0	0	0	0
voice	15.885	0	0	0	0
image	57.623	2	2	3	14
voice	13.777	0	0	2	0
manual	13.815	2	2	0	12

Results from Data

Total Usage for each solution (%)

- Image — 11.3%
- Manual — 25.1%
- SMS — 29.6%
- Voice — 34%
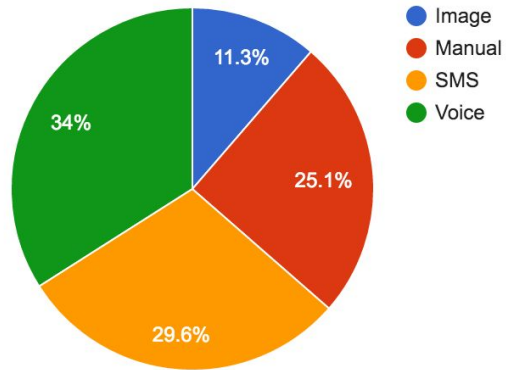
Average Time vs. Solution

Results from Data

AVERAGE USAGE TIME PER SOLUTION PER USER

Results from Data

Amount and Description Key-stroke Efficiency
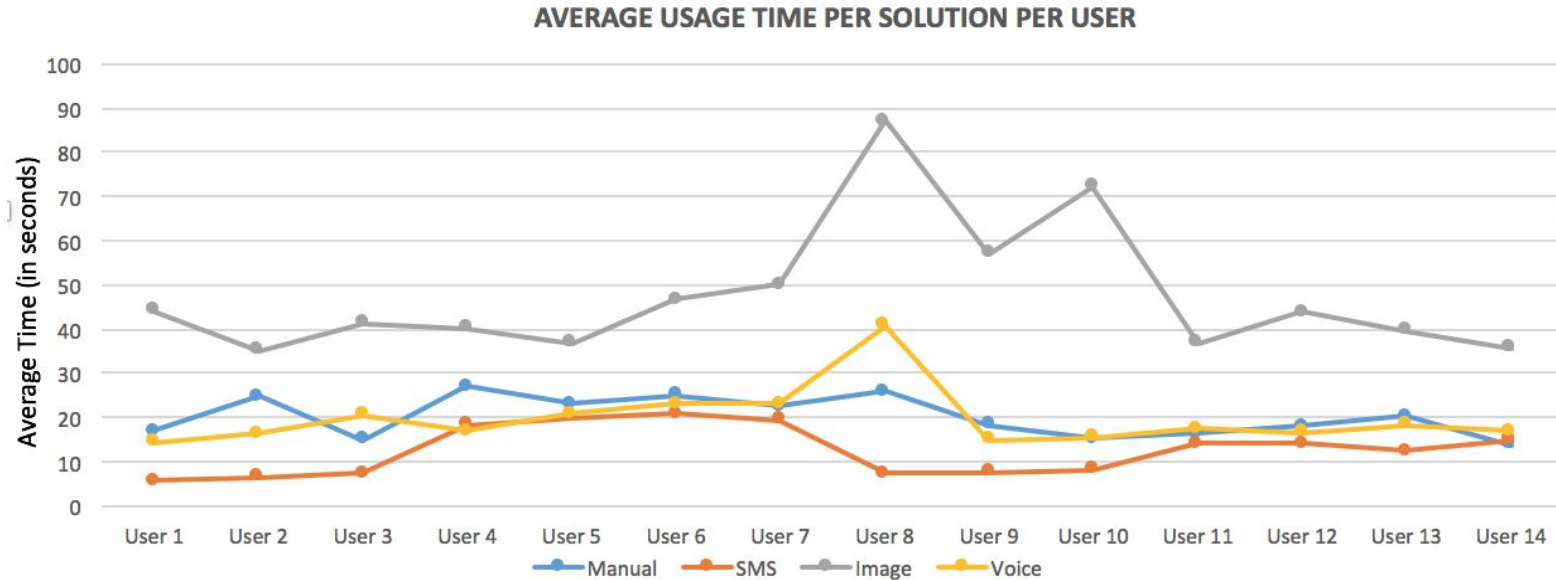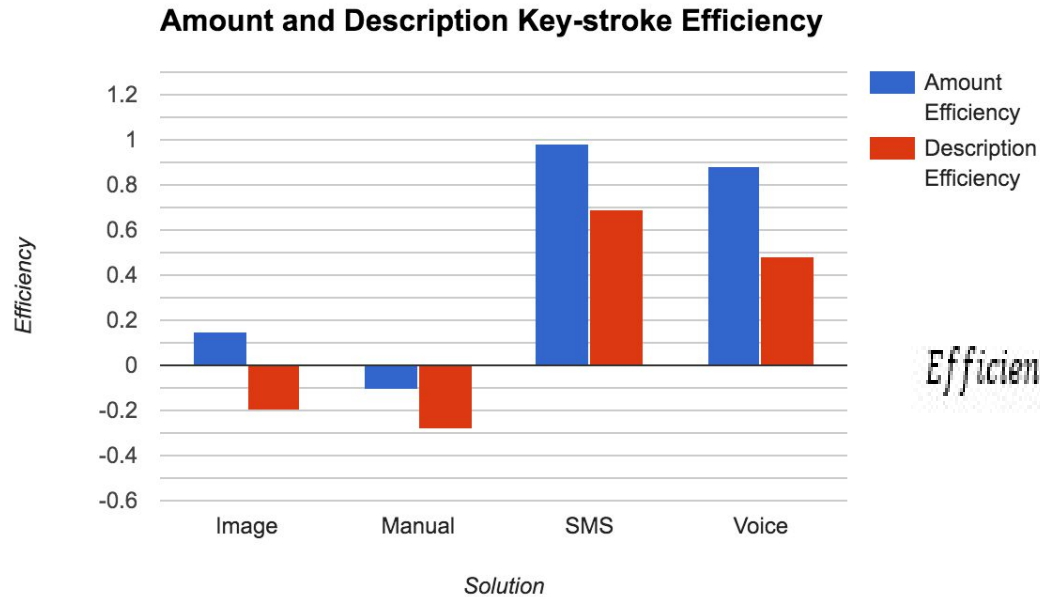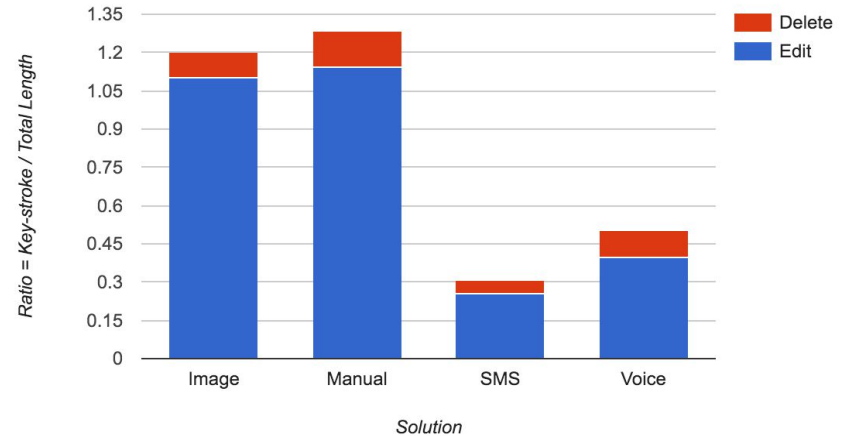
$$Efficiency = \frac{(Length\ of\ the\ input - Total\ keystrokes)}{Length\ of\ the\ input}$$

Results from Data

Effort in terms of Key-stroke for Amount
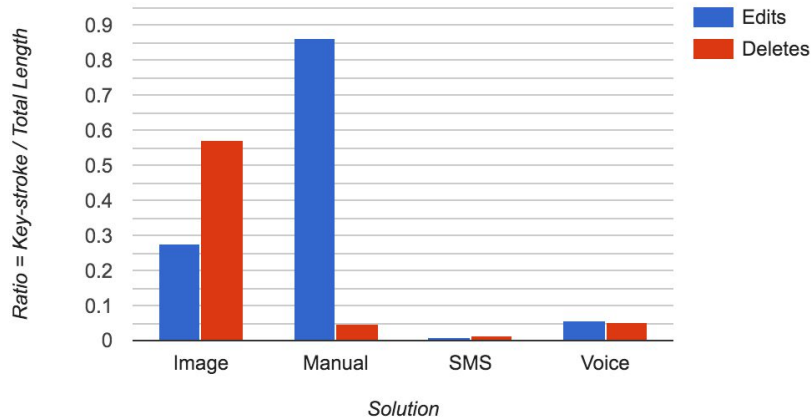
Effort in terms of Key-stroke for Description

$$UIF = \frac{\text{Number of Deletes or Edit}}{\text{Length of the input}}$$

Interpretation from Results

1. **Most Used: Voice (34%)**

2. **Minimal Usage time: SMS (12.7 seconds)**

3. **Keystroke efficiency (Amount): SMS (0.98)**

4. **Keystroke efficiency (Description): SMS (0.67)**

5. **Least User Intervention Factor (Amount): SMS (0.010)**

6. **Least User Intervention Factor (Description): SMS (0.155)**

Best Solutions

SMS

1. Least time consuming
2. Minimal effort
3. Most efficient
4. No third party API is required

Voice

1. Most widely used
2. Natural and intuitive input

Future Scope

1. User Interface to display or modify the previous expenses

2. Itemized entry of expenses from bill through image

3. Include the paid version of image OCR to improve the accuracy

4. Pro version to visualize the expenses and detailed breakdown for each category of expenses

Thank You

Questions?