Audience Measurement and Sentimental Analysis

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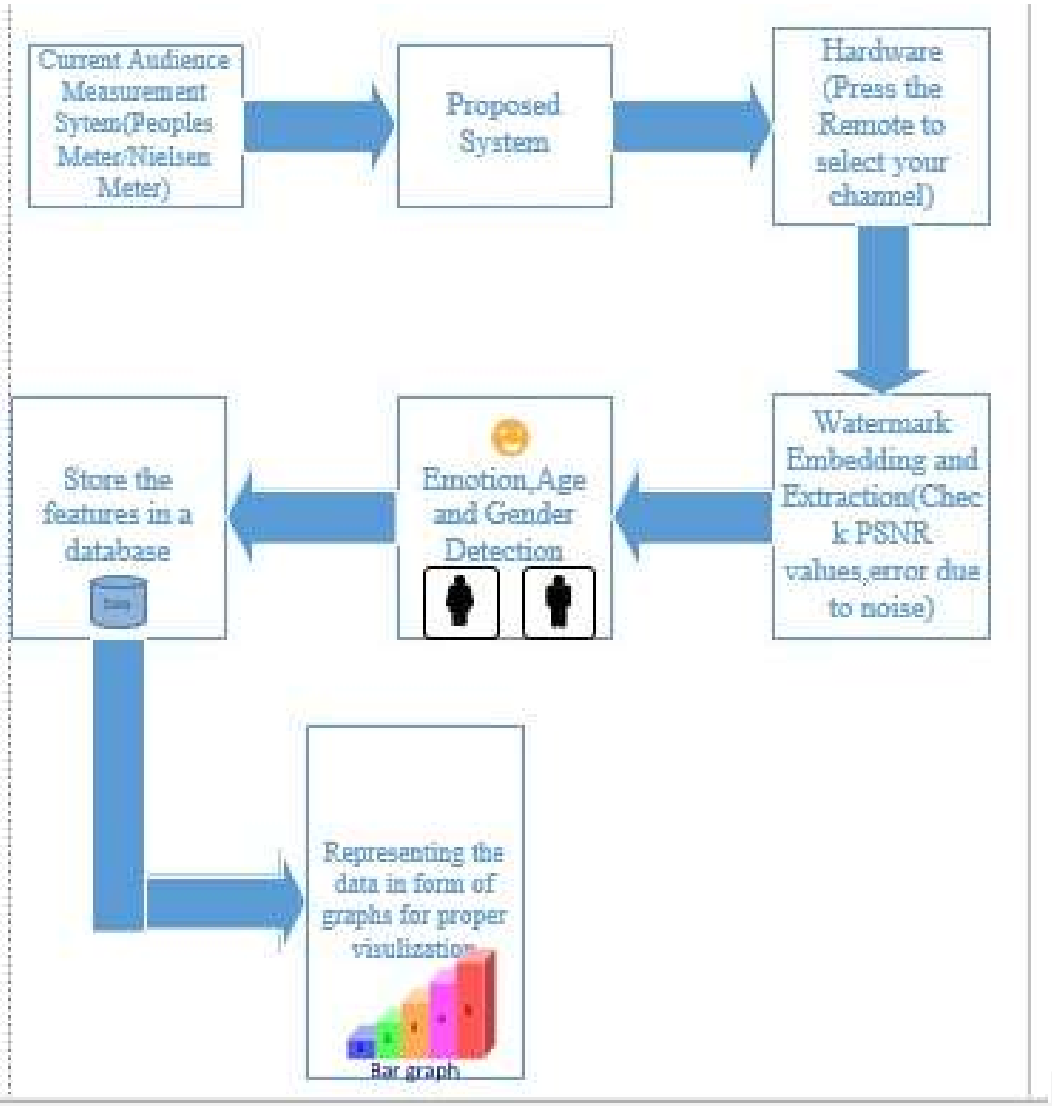


A smart system which measures the television audience as well as provides valuable insights about the viewers to the channel providers.

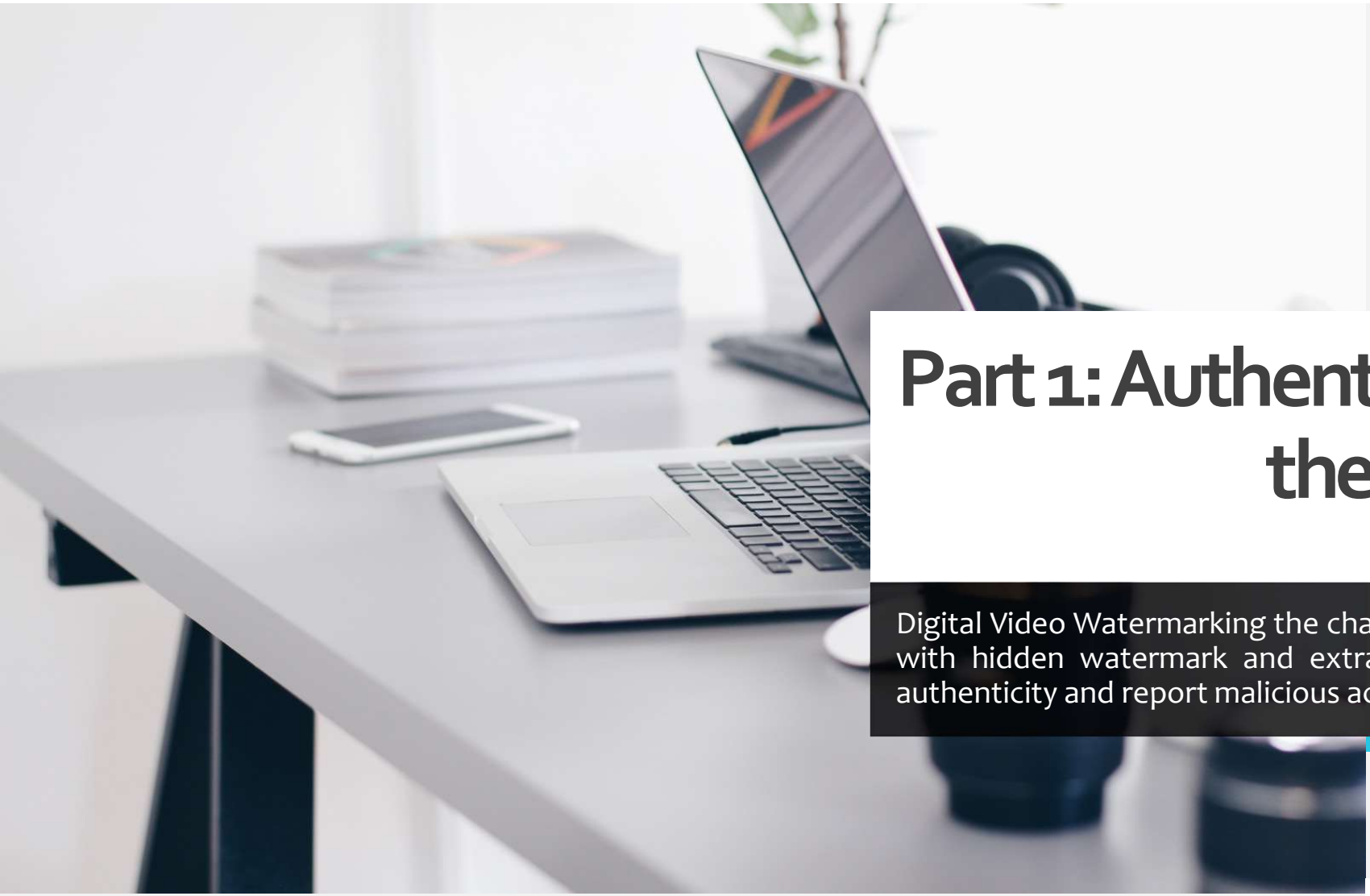
About the product

Advanced Bar-O-meter or People's Meter

Product Features

Advanced Bar-O-meter or People's meter

- Check the authenticity of the channels
- Total viewers watching the channel/program
- Viewer's demographic information like-
  - Total members in a family
  - Gender
  - Age
  - Emotion



Part 1: Authentication of the channels

Digital Video Watermarking the channel provider content with hidden watermark and extracting it to check its authenticity and report malicious activities.

Digital Watermarking

The embedding of data like watermark and digital signature into digital media like image, audio and video, such that when that data is extracted or detected, it can be used for determining the originality of the data. This process is called as watermarking or digital watermarking.

Reason of watermarking

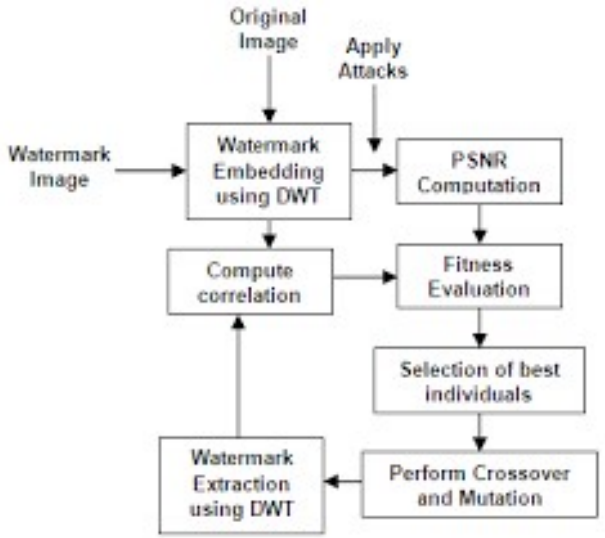
The main reason why digital watermarking is popular is because it provides copyright protection, which prevents illegal copying and circulation of video. Under copyright protection, the data such ownership information and logo of the digital media is authenticated, without degrading the quality of the content. To prove the correct ownership the data is extracted and used as authoritative proof.

DWT

In this method, the original carrier image is average split into four parts. For each part, the DWT and DCT transforms are successively applied, and the first two alternating current (AC) coefficients are used to form a new matrix. Finally, the watermark is embedded into this new matrix using an SVD-based watermarking method. Since these four parts are all embedded by the same watermark, this method has a high robustness to cropping operations.

Evaluating the robustness of the watermarking

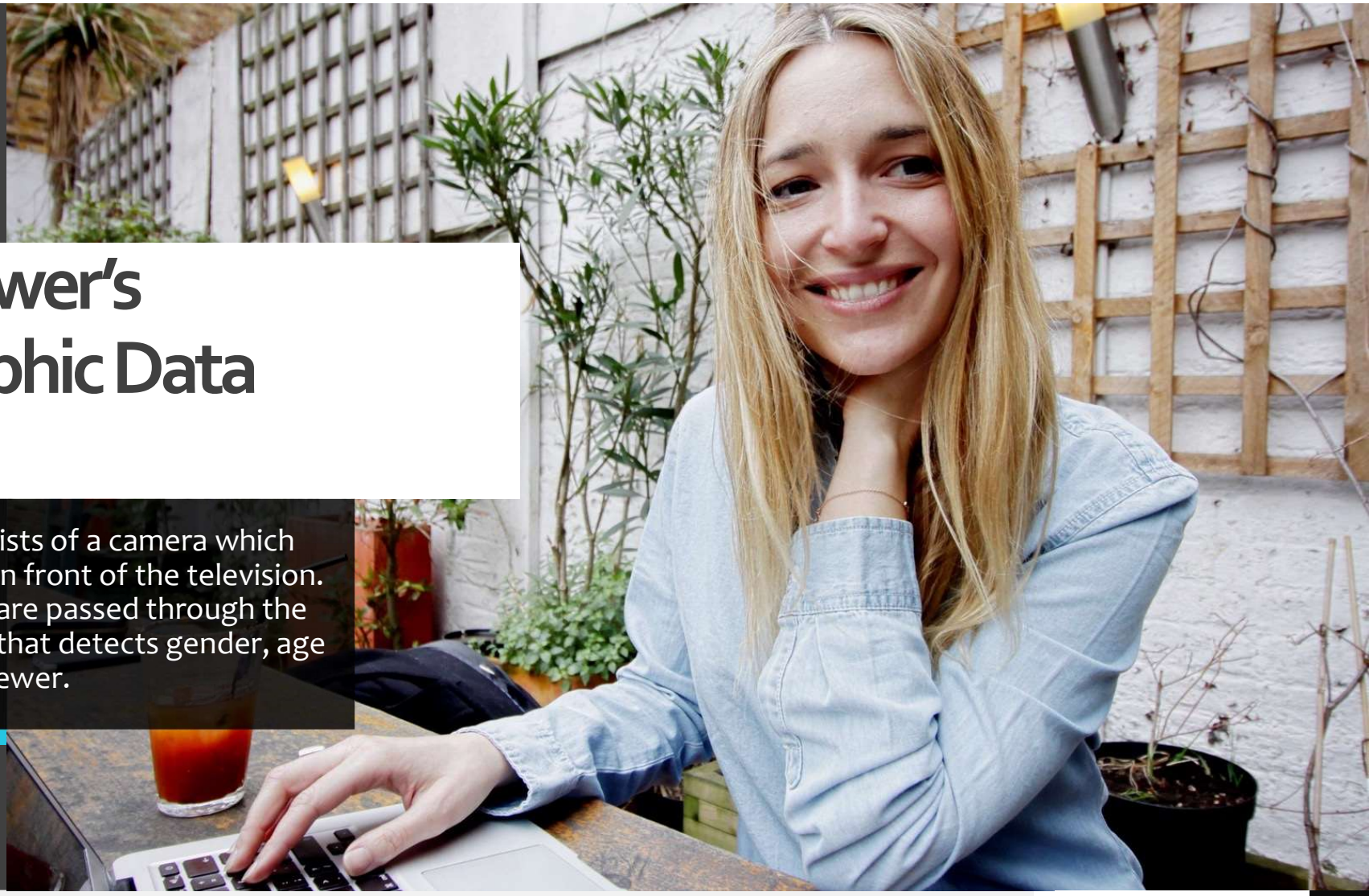
The robustness of the video watermarking is proven by extraction of the watermark after exposing the video feed to certain attacks. Some of these attacks are gaussian noise, salt and pepper noise, cropping, histogram equalization, sharpening filter and intensity adjustment. The typical values for the PSNR in video watermarking are between 60 and 80 db.



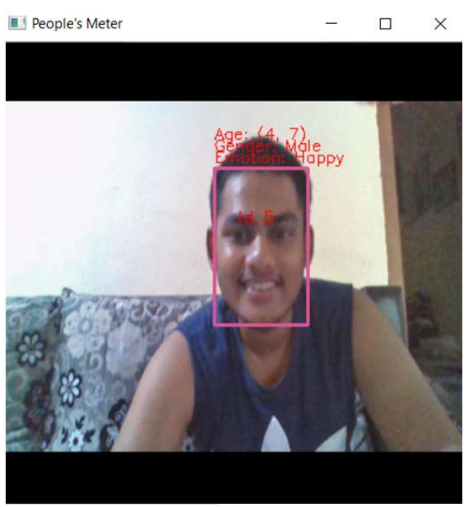
Attacks	Noise Factor	PSNR
Gaussian noise	0.9977	65.88
Salt & Pepper noise	0.9972	69.4819
Cropping	0.9987	37.3145
Histogram equalization	0.9980	49.0789
Sharpening filter	0.9983	71.3505
Intensity adjustment	0.9982	68.2943

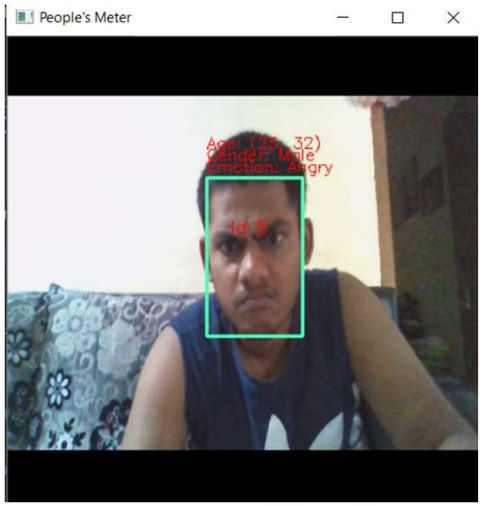
Part 2: Viewer's Demographic Data Collection

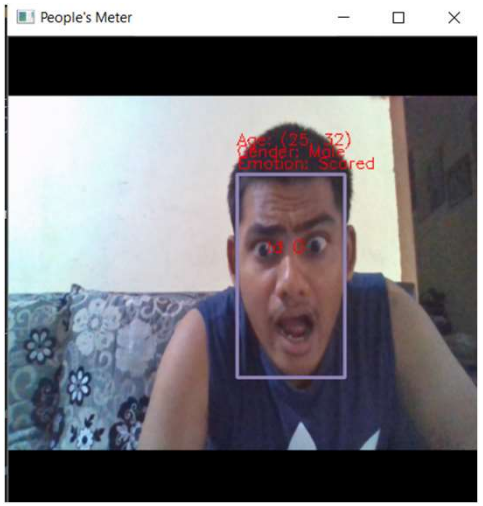
The smart meter consists of a camera which captures the viewers in front of the television. This captured frames are passed through the recognition software that detects gender, age and emotion of the viewer.

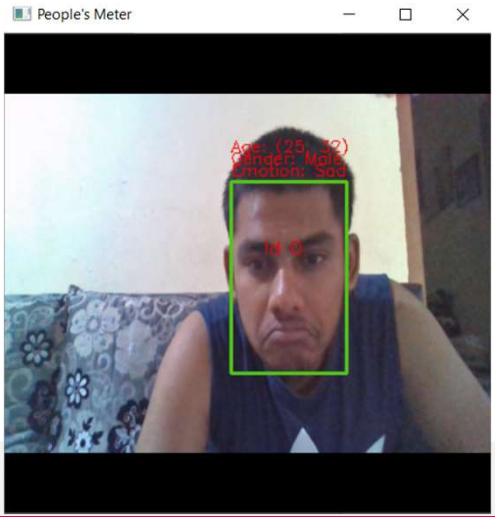


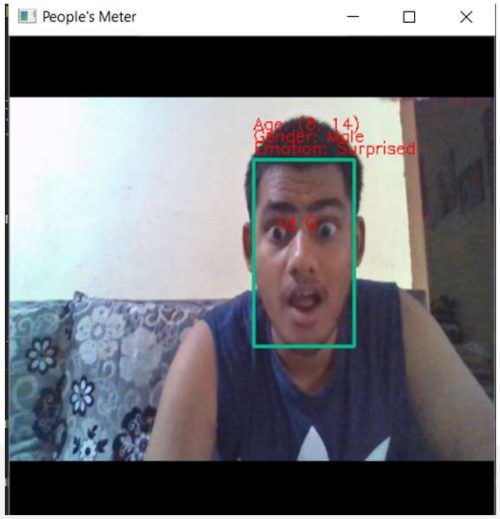
Recognition Samples

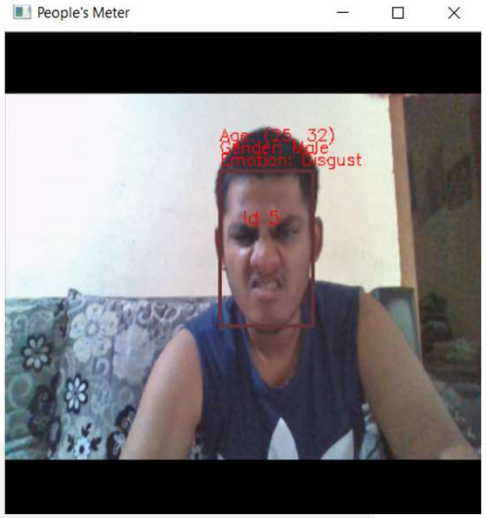




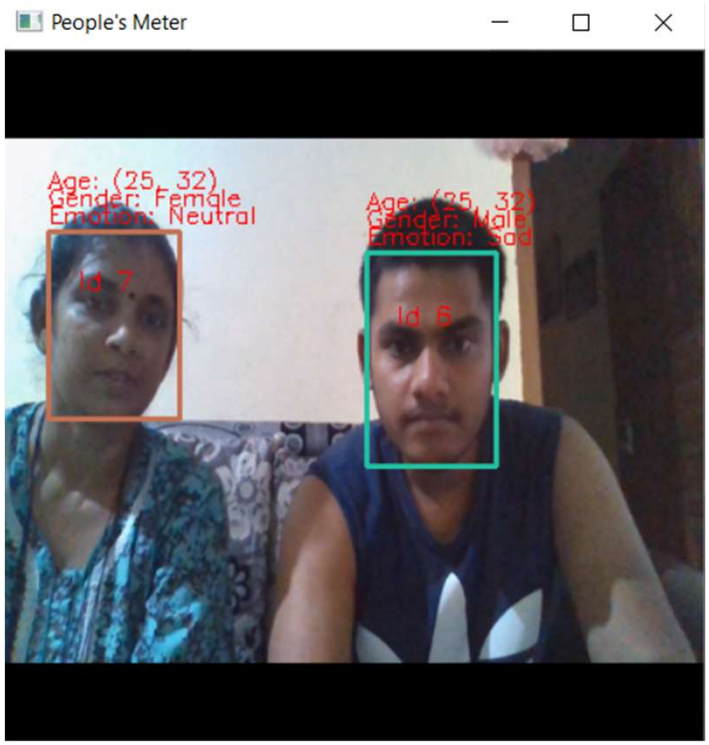








Recognition Samples (Multiple Viewers)



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Data Collection

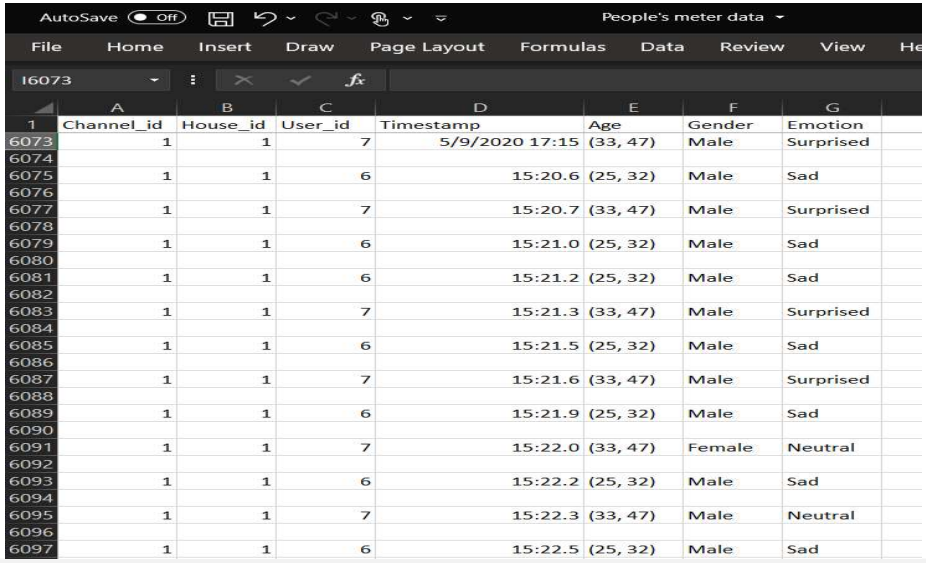

```
{'Channel_id': 1, 'House_id': 1, 'User_id': 10, 'Timestamp': '2020-05-09 17:17:32.498092', 'Age': '(15, 24)', 'Gender': 'Female', 'Emotion': 'Happy'}

{'Channel_id': 1, 'House_id': 1, 'User_id': 11, 'Timestamp': '2020-05-09 17:17:32.673016', 'Age': '(4, 7)', 'Gender': 'Male', 'Emotion': 'Sad'}

{'Channel_id': 1, 'House_id': 1, 'User_id': 10, 'Timestamp': '2020-05-09 17:17:33.082859', 'Age': '(15, 24)', 'Gender': 'Female', 'Emotion': 'Happy'}

{'Channel_id': 1, 'House_id': 1, 'User_id': 11, 'Timestamp': '2020-05-09 17:17:33.254188', 'Age': '(15, 24)', 'Gender': 'Male', 'Emotion': 'Sad'}
```


Data dictionaries are created for each frames, which can also be used to push in database.



AutoSave Off — People's meter data

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	A	B	C	D	E	F	G
1	Channel_id	House_id	User_id	Timestamp	Age	Gender	Emotion
6073	1	1	7	5/9/2020 17:15	(33, 47)	Male	Surprised
6074							
6075	1	1	6	15:20.6	(25, 32)	Male	Sad
6076							
6077	1	1	7	15:20.7	(33, 47)	Male	Surprised
6078							
6079	1	1	6	15:21.0	(25, 32)	Male	Sad
6080							
6081	1	1	6	15:21.2	(25, 32)	Male	Sad
6082							
6083	1	1	7	15:21.3	(33, 47)	Male	Surprised
6084							
6085	1	1	6	15:21.5	(25, 32)	Male	Sad
6086							
6087	1	1	7	15:21.6	(33, 47)	Male	Surprised
6088							
6089	1	1	6	15:21.9	(25, 32)	Male	Sad
6090							
6091	1	1	7	15:22.0	(33, 47)	Female	Neutral
6092							
6093	1	1	6	15:22.2	(25, 32)	Male	Sad
6094							
6095	1	1	7	15:22.3	(33, 47)	Male	Neutral
6096							
6097	1	1	6	15:22.5	(25, 32)	Male	Sad

People's meter data.csv

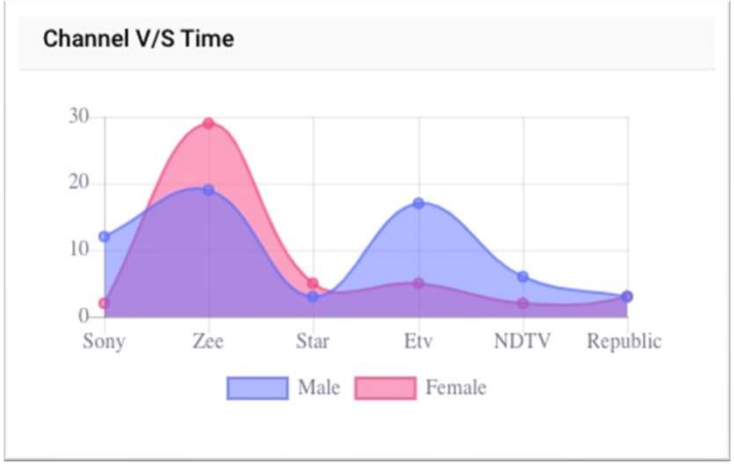
A .csv file containing the demographic data

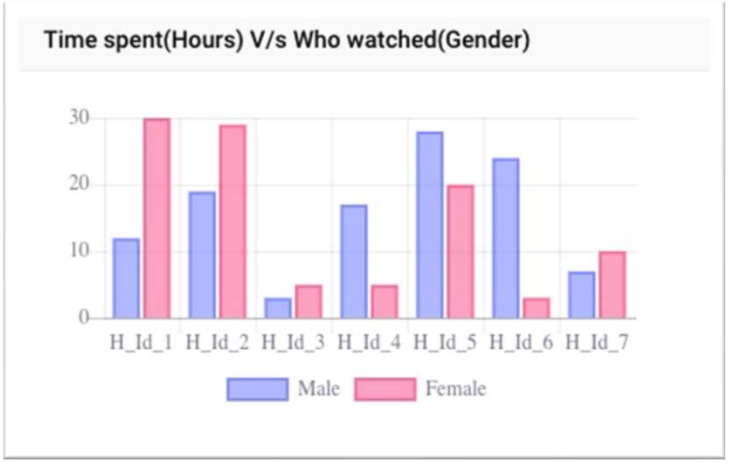
Slide 10

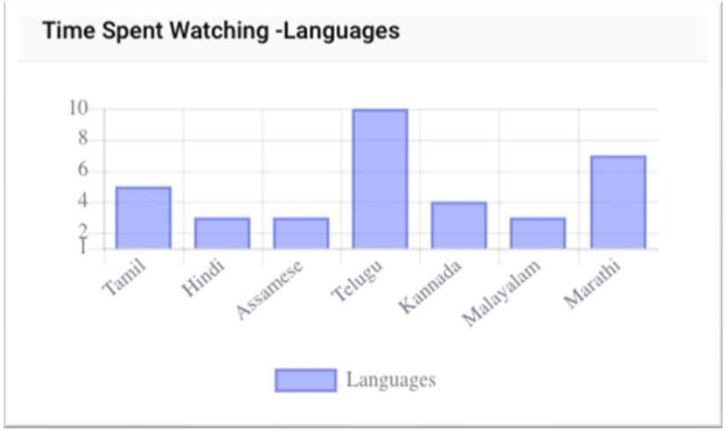
A1 Author, 5/9/2020

Data Visualization

A website running on the local server, where the measurement authority can login and check the visualizations.







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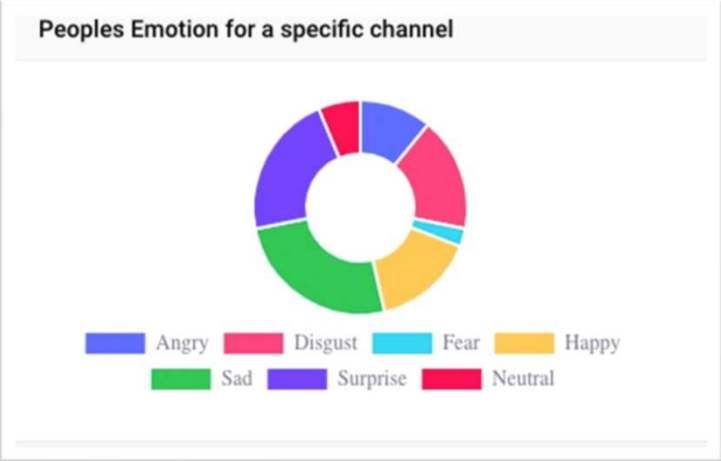

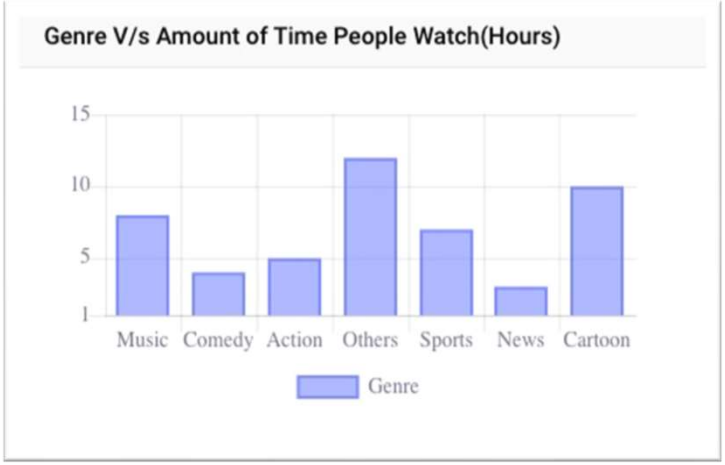

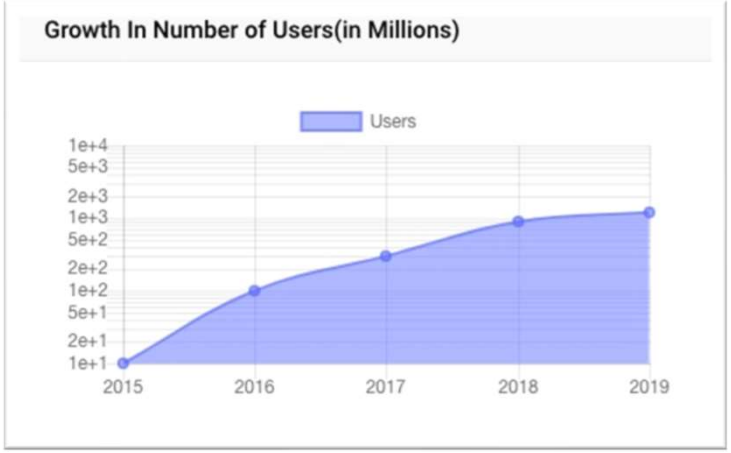

ThankYou