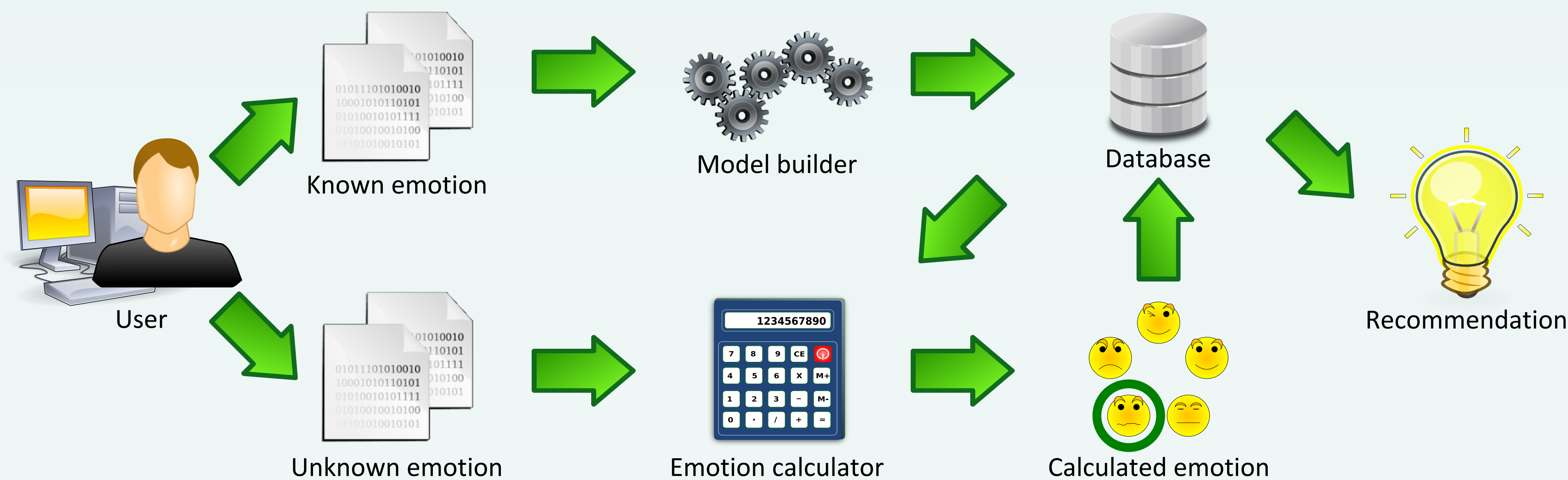


Detecting User's Emotions

Problems

- Negative emotions have bad impact on user's productivity at work
- These emotions are hard to detect without disturbing the user from his work
- How to monitor these emotions for largest possible group of people with most available equipment



Goals

- Monitor user's biometrics with keyboard and mouse
- Detect user's emotions from logged data
- Recommend appropriate activity to improve user's emotional state
- **Improve user's productivity at work**

Monitoring

What Do We Monitor

- Keyboard - latency, flight time (graphs, digraphs, trigraphs, shortcuts)
- Mouse - speed, acceleration, scrolling speed, click duration (single and double click of left, right and middle button)

Monitoring Phase

- During the monitoring phase we monitor the user for about 40 days to get enough data to build his model
- During this phase user manually enters how he feels at the moment
- After this period we start the recommending phase

Recommending Phase

- During the recommending phase we monitor the user without the need to specify his emotions
- We track the user within short periods (10 minutes) to get an unknown sample of data from which we try to detect his emotions
- We occasionally switch back to the monitoring phase for about one day in every two/three weeks to keep the model up-to-date

How do you feel?

Happy

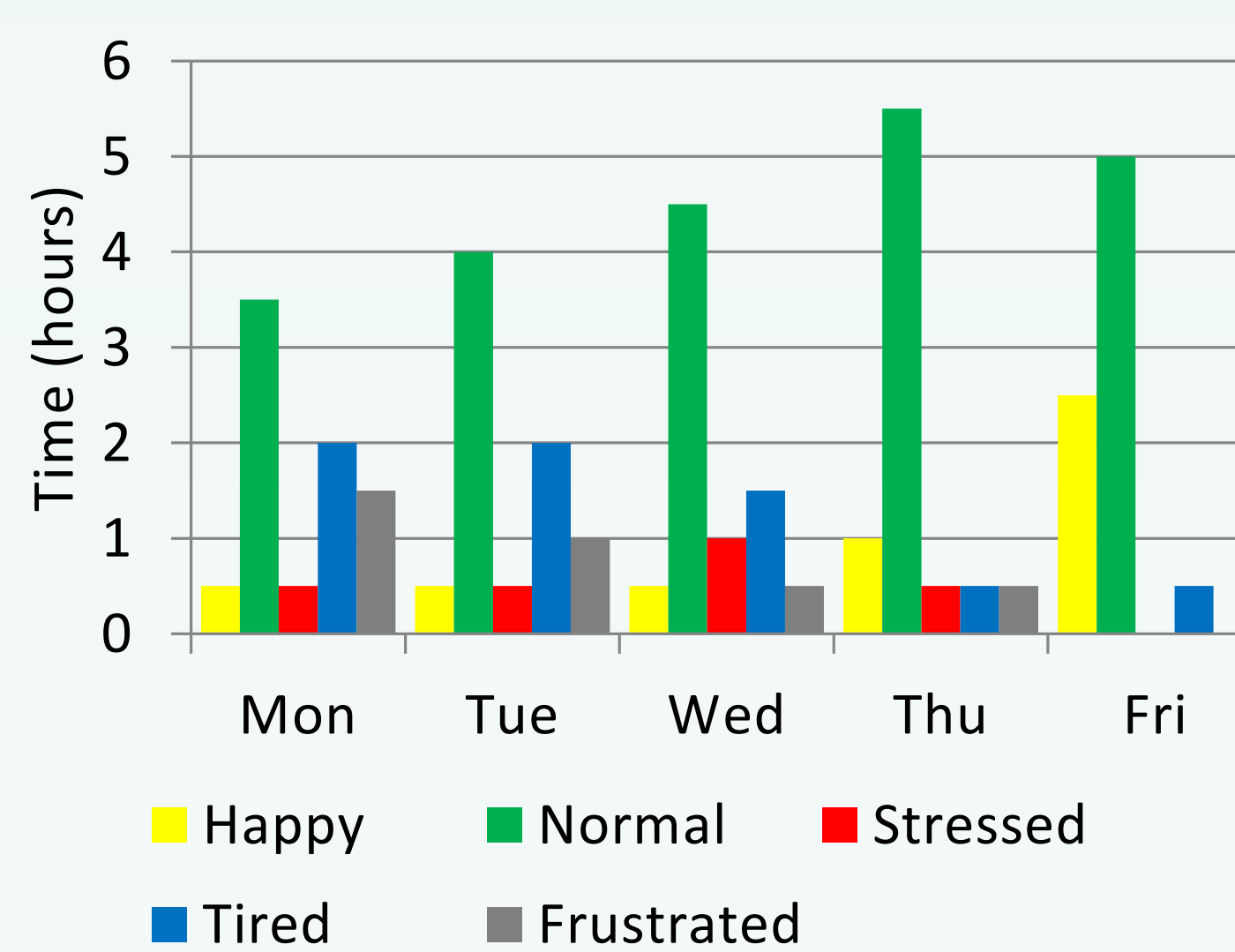
Normal

Stressed

Tired

Frustrated

Guest



Data Representation

- The model is represented by emotion vectors consisting of 343 subvectors, one for each metrics, for example latency for key A
- The subvector is actually a histogram containing 1000 bins

Data Optimization

- Logged data showed that a lot of bins were empty
- We have experimentally found out that using key-value structure we can achieve a compression ratio of 20 to 600 of the emotion vector
- Implementing these changes we have achieved significant reduction of memory usage

Data Statistics

- 20% of unknown data samples tracked during the recommending phase filled less than 20 bins
- 35% of unknown data samples filled less than 80 bins
- 49% of unknown data samples filled less than 150 bins

Recommending

Symptoms

- Stress - environment, lot of work, relationship problems, illness
- Tiredness - lack of sleep, lot of work, lack of water
- Frustration - failure in work, stereotype, difficult life situation

Recommendations

- Basic needs - food, drink, environment improvement
- Short break - joke, encouragement, music, lamer post, 9GAG post
- Long break - walk, exercise, change of activity on computer

Improvements

- Better productivity at work
- Stamina
- Mood
- Work environment
- Fitness

Vector Distance Comparator

- Calculate Manhattan distance between the subvectors of the model and the unknown data sample
- Calculate similarity as function of the worst and the actual distance between subvectors and skip the metrics with no logged data

Cosine Similarity Comparator

- Define weight of the subvector as sum of values in this subvector
- Calculate weighted average of cosine similarities between the model and the unknown data sample using logarithm of subvector weights

Recommendation

Joke

Chuck Norris was once bitten by a poisonous snake. After three days of agonizing pain, the cobra died.

Recommendation

ACCIDENTALLY OPEN INTERNET EXPLORER

Recommendation

Listen to **Crazy** Aerosmith

Accuracy of Detecting a Correct Emotion (in Percent)

Emotion	VDC	WCC	CSC
Happy	17.4	9.1	51.7
Normal	96.5	73.3	95.3
Stressed	29.0	36.4	51.0
Tired	55.3	45.3	61.9
Frustrated	9.9	9.6	41.2

Threshold = 20

Emotion	VDC	WCC	CSC
Happy	20.0	8.5	60.8
Normal	96.6	72.7	96.1
Stressed	30.6	36.0	68.0
Tired	62.0	47.8	70.7
Frustrated	10.6	8.9	51.9

Threshold = 80

Emotion	VDC	WCC	CSC
Happy	21.1	4.0	76.5
Normal	97.0	72.6	96.4
Stressed	38.2	43.8	76.9
Tired	66.3	50.0	76.0
Frustrated	9.9	6.1	68.9

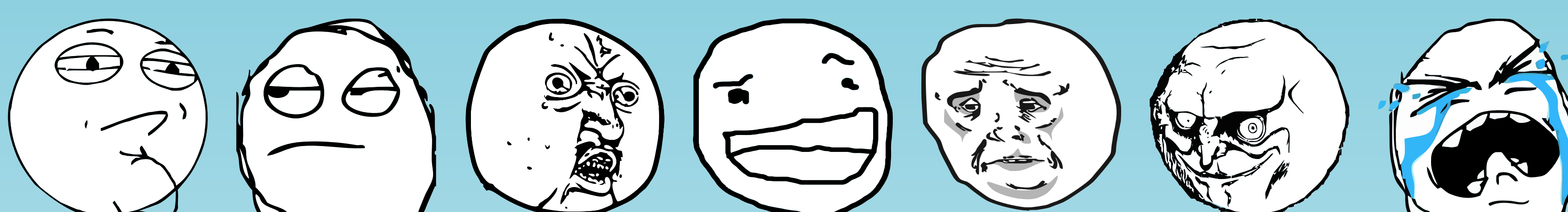
Threshold = 150

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