Bilkent University

Department of Computer Engineering

Senior Design Project

Project short-name: AutAware

Final Report

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Progress Report

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1.0 Introduction

Autism is a complex neurobehavioral condition that affects social interaction, development language and communication skills [1]. However, it has many symptoms and effects on individuals. Depending on the impairment levels individuals may have a normal life otherwise they may a devastating disability that may require and institutional care.

Autism do not only affect the individuals also their families are affected by this complex neurobehavioral condition. In Turkey it is believed there are 1.5 million individuals with autism. If we also include families, autism affects 4.5 million people in Turkey [2].

Parents of children with autism require reaching communities for their unique situations. In recent researches it was found that giving parents opportunities to express their likes and dislikes about support networks can lead to identifying how support networks can be more effective and accessible to parents and families [3]. However, in Turkey it is difficult to find much information about autism as the knowledge is distributed across many sites. For a disorder in which having the latest knowledge is so important this creates a huge problem for the families. Researchers conclude most of the families in Turkey have problem with reaching information about autism [4]. Also, parents require support groups to share their stories with other families and form a solidarity.

Many families in Turkey do not send their children to autism centers and get special care due to insufficient information as they do not have knowledge about how crucial those special cares are. For such a complex neurobehavioral condition not getting special care may have some serious effects on those children.

Idea of AutAware aims to solve all the problems described above with one platform.

2.0 System Overview

AutAware is a platform where families with autistic relatives can reach the latest news and articles, event, communicate with other people, form a solidarity and help people who are in need.

The idea of AutAware comes from the fact that there are no sites which specifically gives latest informations about autism. Most of the autism related news are distributed among many sites and lost in other news and articles. In a world which runs on internet, not having the latest necessary information is a huge issue. It both affects autistic people and their families.

AutAware aims to help those people. However, AutAware should not be mixed up with charity applications. They are about making donations, not providing information. It is true that economy may be a concern for families but many families also suffer from lack of information and support groups.

AutAware knows that no family is like each other they are all different, they all have different problems, but they all have one thing in common, providing the best care they can to their children. Therefore, AutAware generates content individually for each user to create the ultimate user experience. Users will find content which they might be more interested in or more relevant to their situation. To create this wonderful experience, AutAware checks the articles that user is interested in. Later based on those interest AutAware finds users who have similar interests. Based on those users AutAware learns and predicts which other content user might be interested in and shows this content to user as a recommendation.

Moreover, to provide a social support to those families AutAware behaves like a social platform. There are forums which users can share their stories, discuss about autism and ask for advice. There are also events in AutAware, users see events that are near to them. Besides it the user wished he or she can create a new event and share it with others.

3.0 Algorithmic Design of AutAware

3.1 Tag Generation

One of the most important features of the AutAware is its key feature. In AutAware all news and articles are specified with their specific keys. Users can search among over distinct 7000 different tags in 483417 tag - text pairs. Usually a tag or keyword in a text is the noun of the sentence. It is crucial to detect these nouns and show them as a tag. We use Natural Language Toolkit library to detect nouns in a text [5]. After crawling the news and articles. We run our Tag Generation code to detect nouns and insert them to our database for each text. However this is a time consuming issue, because for each tag - text pair, we make a request to our database.

One of the problems with Tag Generation is that Natural Language Toolkit does not work with Turkish texts. At first thought not to put tags for Turkish texts. But later in our interview with a person related to an autistic person, said it would be good to have Turkish tags as well. After that we decided to use generate Turkish tags further. In order to achieve that we used Google Translate's API. We translated all Turkish texts to English after that we run our tag generation algorithm to detect tags. Then re-translated the generated tag to Turkish and added to our database.

3.2 Locality Sensitive Hashing for Finding Near Duplicates

In AutAware we show content from many sites. As we crawled many news and articles, there is a possibility that 2 sites we crawled might given the same news. Even though they might explain the same news in a different way in the context they are the same. So there is no point of showing the same news over and over to the user. For example when we fetch the news related to autism in Hurriyet. We are given the corresponding two news,

1. http://www.hurriyet.com.tr/galeri-metamfetamin-uretirken-yakalandi-otizm-ilaclari-bunlar-dedi-41024513
2. http://www.hurriyet.com.tr/yerel-haberler/bursa/merkez/metamfetamin-uretirken-yakalandi-otizm-ilacla-41024494

Even though they are from the same site they explain the same thing. One of them is published as a local news and the other one is stated as agenda news. So when the user sorts the news for their published day or searches for a keyword those two news will appear as one under the order, which is not a good feeling.

In order to solve this problem we generated a Locality Sensitive hashing algorithm. Basically we are finding the Jaccard Distance between two news. But finding Jaccard Distance directly as comparing is very time consuming which time take days depending on the data size. So we divide each news in to its shingles as k = 4 then. Then we create a signature matrix. Later we apply locality sensitive hashing to this matrix. We find the candidate news pair which might have the same content. For each candidate pair we compute the cosine distance and if the similarity rate is higher than %25 we delete one of the news from our database. After that operation all the news or articles we show to our users become unique.

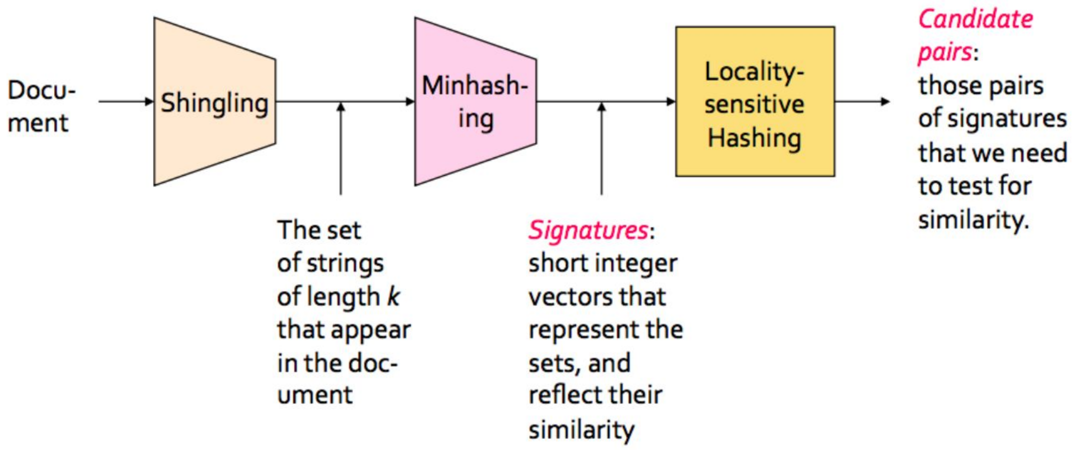
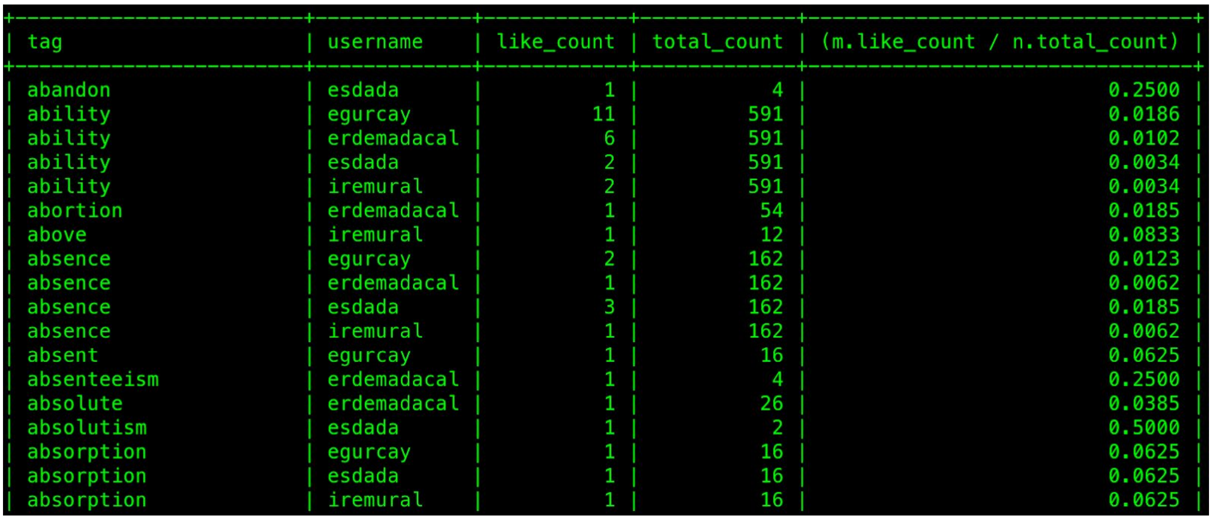

Docu-ment
Shingling
Minhash-ing
Locality-sensitive Hashing
Candidate pairs: those pairs of signatures that we need to test for similarity.
The set of strings of length k that appear in the doc-ument
Signatures: short integer vectors that represent the sets, and reflect their similarity

Figure 1: Locality Sensitive Hashing

Source:https://towardsdatascience.com/understanding-locality-sensitive-hashing-49f6d1f6134

3.3 Singular Value Decomposition for Recommendation System

One the unique features of AutAware is its recommendation system to users. Each user is given recommended news based on their likes and other user who liked the similar news. For example if user A liked the news or articles which includes following tags, development, Asperger, drugs. And user B liked the tags, development and drugs we recommend user B news that includes drugs
tag in its context. In order to achieve that we apply singular value decomposition to the user - tag matrix.
From the database we fetch the following as a result of multiple queries and temporary tables.



```
+------------------------+-------------+------------+-------------+--------------------------------+
| tag                    | username    | like_count | total_count | (m.like_count / n.total_count) |
+------------------------+-------------+------------+-------------+--------------------------------+
| abandon                | esdada      |          1 |           4 |                         0.2500 |
| ability                | egurcay     |         11 |         591 |                         0.0186 |
| ability                | erdemadacal |          6 |         591 |                         0.0102 |
| ability                | esdada      |          2 |         591 |                         0.0034 |
| ability                | iremural    |          2 |         591 |                         0.0034 |
| abortion               | erdemadacal |          1 |          54 |                         0.0185 |
| above                  | iremural    |          1 |          12 |                         0.0833 |
| absence                | egurcay     |          2 |         162 |                         0.0123 |
| absence                | erdemadacal |          1 |         162 |                         0.0062 |
| absence                | esdada      |          3 |         162 |                         0.0185 |
| absence                | iremural    |          1 |         162 |                         0.0062 |
| absent                 | egurcay     |          1 |          16 |                         0.0625 |
| absenteeism            | erdemadacal |          1 |           4 |                         0.2500 |
| absolute               | erdemadacal |          1 |          26 |                         0.0385 |
| absolutism             | esdada      |          1 |           2 |                         0.5000 |
| absorption             | egurcay     |          1 |          16 |                         0.0625 |
| absorption             | esdada      |          1 |          16 |                         0.0625 |
| absorption             | iremural    |          1 |          16 |                         0.0625 |
```

Figure 2: Normalized Tag - Like Results

The last column show the normalized results of the tags and user specific user like counts. For example ‘Asperger’ tag is much more common among the texts than ‘Pervasive’ as it is more common disorder. So a user is more likely to see and like ‘Asperger’ tag than ‘Pervasive’ tag. However if the use liked the Asperger’ tag, ‘Pervasive’ tag at the same amount we know user likes ‘Pervasive’ tag more as its less common but users finds it and likes it. So each ‘tag’ - ‘user like count’ pairs are normalized to get better results.

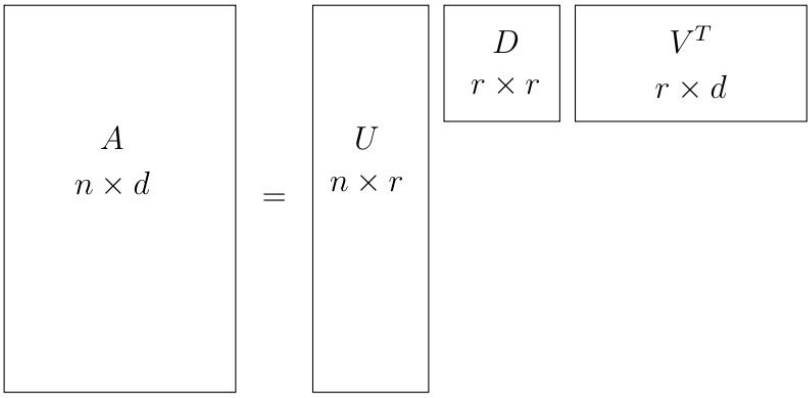


Figure 3: Singular Value Decomposition Matrix

Source: https://www.cs.cmu.edu/~venkatg/teaching/CStheory-infoage/book-chapter-4.pdf

After fetching the results from database we convert it to matrix. And for the empty cells in the matrix we apply singular value decomposition to predict values for empty cells. For each user we find highest values of the prior empty cells and add the related tag to out database as recommended tag to specific users.

4.0 Final Architecture and Design

4.1 Subsystem Decomposition

As it was stated earlier, AutAware is a web application. Thus, it uses client/server architectural style to establish the interaction between users and application. The client side is only responsible for displaying the required information. However, the server side includes more complex operations like recommendation system and locality sensitive hashing. Currently, our application consist of 4 different tiers, which falls into category of 4-tier system architecture.

Presentation Tier, the topmost layer, is responsible for displaying user interfaces. It can also be considered as the client itself, and rest of the tiers are part of server. We used React JS to implement this part, which increase the development time, but it provides a better user experience with lazy loading and rendering only the updated components. React JS is created for building single page applications. However, we have more than one page. Thus, in order not to make the organization of the file complex, we decided to use newly developed technologies like Context API and an experimental architecture called Atomic Design which helps with creating consistent, solid and reusable visual components. Atomic Design separates the components into 5 different categories which are: atoms, molecules, organisms, templates and pages. We will not go into details due to the fact that it might take pages to explain this concept, and how to use it. However, we are going to provide some information about what each of these terms mean. In order not to create confusion about these terms, there will be some visuals of each component at the end of this paragraph. Atom is the smallest component which can be button or a textfield. Molecules are combinations of one or more atoms to create a functional component like a form element. Organisms are combination of atoms and molecules to create a specific reusable components like form element with buttons and a segment. Templates describe the structure of the page and create relationships with all the other components through positioning, placement. However, templates itself does not provide any functionality. Finally, pages are where the components are distributed for combined one specific purposes like a login page [6, 7]. This style of organization makes UML diagrams unnecessary complex due to the number of components.

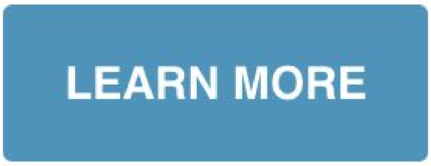
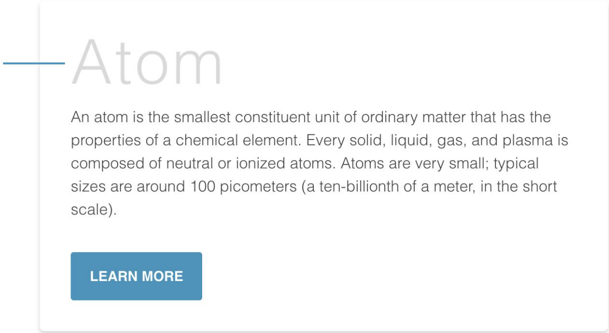


Figure x: Atom [7]


Atom

An atom is the smallest constituent unit of ordinary matter that has the properties of a chemical element. Every solid, liquid, gas, and plasma is composed of neutral or ionized atoms. Atoms are very small; typical sizes are around 100 picometers (a ten-billionth of a meter, in the short scale).

Figure 4: Molecule [7]

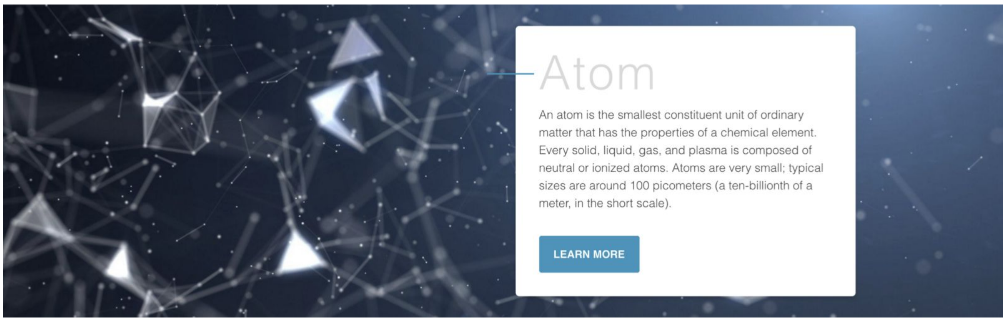

Atom

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Figure 5: Organism [7]

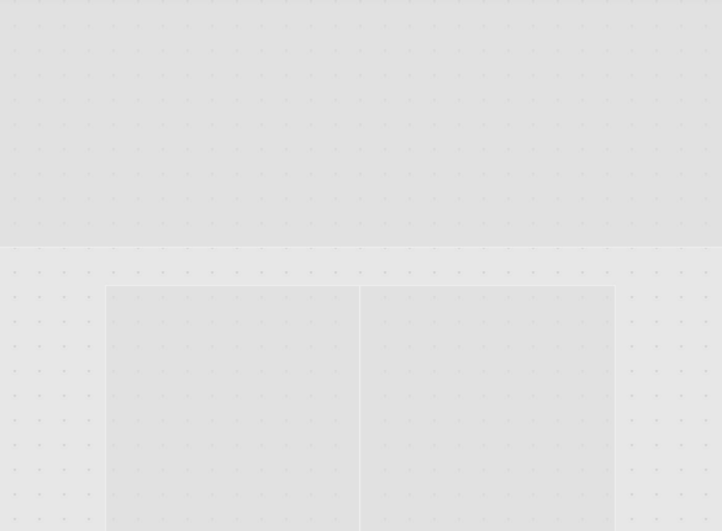
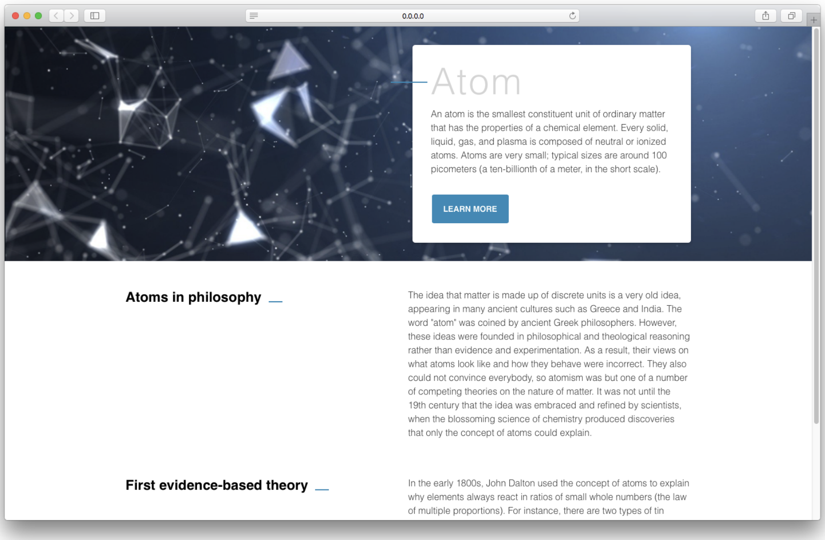


Figure 6: Template [7]



Atom

An atom is the smallest constituent unit of ordinary matter that has the properties of a chemical element. Every solid, liquid, gas, and plasma is composed of neutral or ionized atoms. Atoms are very small; typical sizes are around 100 picometers (a ten-billionth of a meter, in the short scale).

Atoms in philosophy

The idea that matter is made up of discrete units is a very old idea, appearing in many ancient cultures such as Greece and India. The word "atom" was coined by ancient Greek philosophers. However, these ideas were founded in philosophical and theological reasoning rather than evidence and experimentation. As a result, their views on what atoms look like and how they behave were incorrect. They also could not convince everybody, so atomism was but one of a number of competing theories on the nature of matter. It was not until the 19th century that the idea was embraced and refined by scientists, when the blossoming science of chemistry produced discoveries that only the concept of atoms could explain.

First evidence-based theory

In the early 1800s, John Dalton used the concept of atoms to explain why elements always react in ratios of small whole numbers (the law of multiple proportions). For instance, there are two types of tin

Figure 7: Page [7]

Logic Tier is the next layer on the list, which establish connection between the lowermost layer Data Tier and the topmost layer Presentation Tier. It establish its connection with Presentation Tier via Restful API, and gets the data from Data Tier via SQL queries. It includes many other functionality like sending email in order to reset users' password.

Data Tier contains the database which stores the gathered information gathered by Information Tier.

Information Tier was was part of the Logic Tier, but then it become very complex that we decided it should be a tier itself in order to give better representation of the system. Information Tier is responsible for gathering all the information in the Data Tier. It mostly consists of crawlers, recommender system, tag generators, locality sensitive hashing. This layer is not exactly part of web platform, but without it there will be no data to display and no recommendation system.

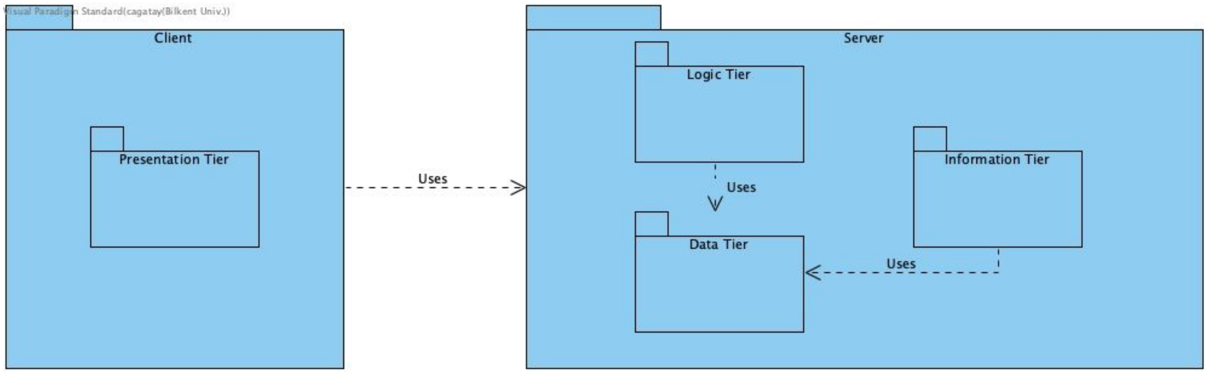


Figure 8: Subsystem Decomposition

4.2 Client

As it was stated earlier, client is consist of only Presentation Tier. Its only job is to display visual components which are created using Atomic Design. In addition, we used a custom CSS library called Semantic UI in order to save some development time. Although, it does provide the basic structure of the components, we had to alter most of them to adapt our system. It also uses various amount of libraries to provide functionality like Google Map API to display events, Google GeoCoding API to get the current location of the user and update it. React JS is famous for its efficient rendering methods. Most of the component, we have designed based on these concept which is called lazy loading. Lazy loading means that a component is rendered if and only if it is updated in order to provide best user experience. As we have mentioned earlier, there are over 100 components. Thus, UML diagram is not efficient enough to display relations between each component.

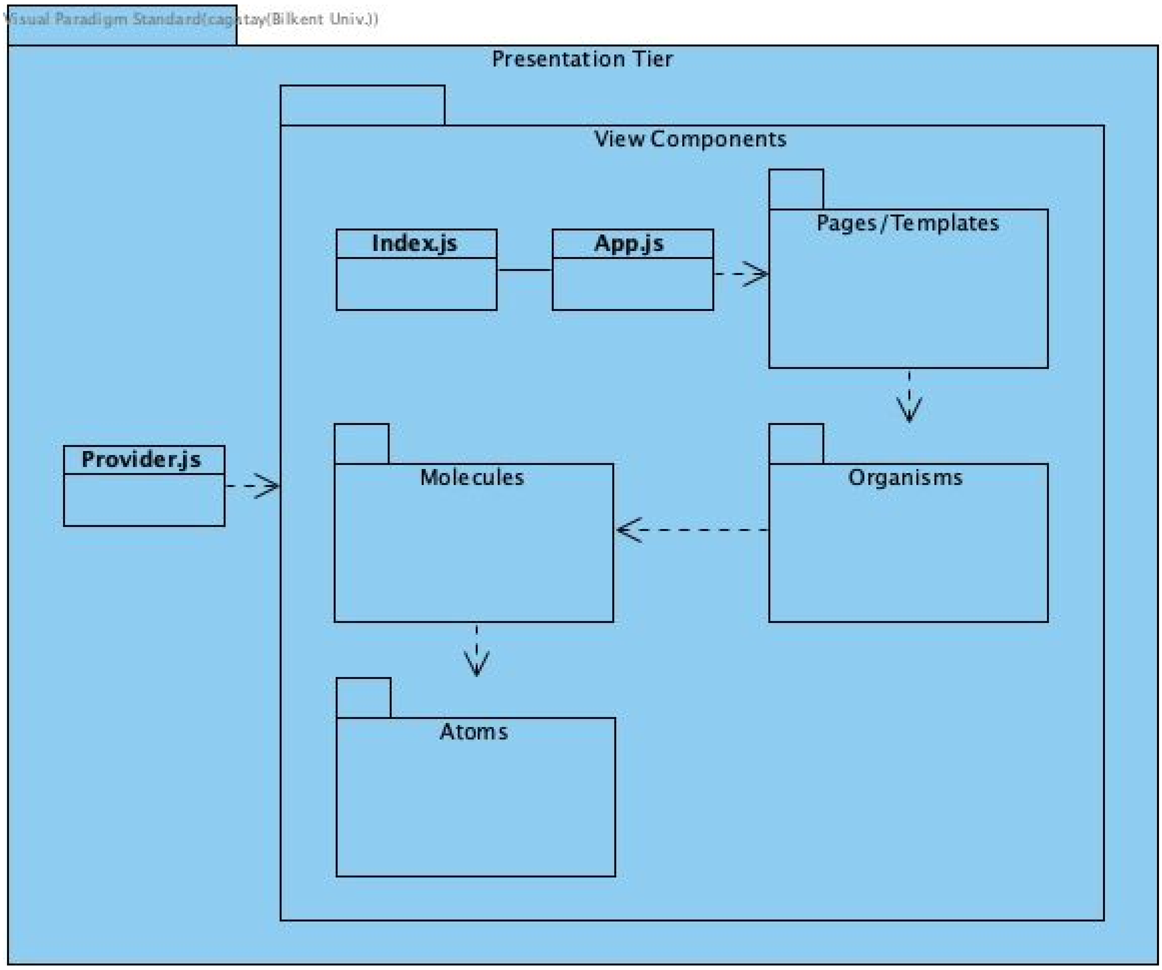


Figure 9: Presentation Tier

Provider.js is responsible for Context API, which allow use to reach same variable value from any component without using Props. Index.js is responsible for initializing React JS, and App.js can be considered as the root of visual components. We also combined Page and Template concept of Atomic Design. It will be very hard to read from an UML. Thus, we will write down what each package contains.

- Pages/Templates

Home.js	News.js	Forum.js
Event.js	Login.js	Register.js
ForgotPassword.js	NewsComment.js	ForumComment.js
Profile.js	EditProfile.js	OtherProfile.js
Search.js		

Figure 10: Pages/Templates

- Organisms

HomeBody.js	NewsBody.js	ForumBody.js
EventBody.js	LoginBody.js	RegisterBody.js
ForgotPasswordBody.js	NewsCommentBody.js	ForumCommentBody.js
ProfileBody.js	EditProfileBody.js	OtherProfileBody.js
SearchBody.js	Header.js	

Figure 11: Organisms

- Molecules

CreateThread.js	EditContent.js	FilterBar.js
FilterBar.js	FilterBarProfile.js	ForgotPasswordContainer.js
LoginContainer.js	MapComp.js	Comments.js
Description.js	MakeComment.js	ProfileFilterBar.js
ProfileIcon.js	RegisterContainer.js	ScrollerItem.js
ScrollerItemPlaceholder.js	SearchBar.js	SearchFilter.js
StickyFeed.js	StickyTags.js	

Figure 12: Molecules

- Atoms

CreateThreadButton.js	CreateThreadTextfield.js	DescriptionContent.js
EditForm.js	EditMail.js	EditPassword.js
ForgotPasswordForm.js	ForgotPasswordHeader.js	LoginForm.js
LoginHeader.js	LoginMessage.js	MarkerWithInfo.js
ProfileFilter.js	RegisterForm.js	RegisterHeader.js
RegisterMessage.js	ScrollerDescription.js	ScrollerFooter.js
ScrollerFooterPlaceholder.js	ScrollerHeader.js	ScrollerTags.js
SearchDropdown.js	SearchFilterInput.js	SearchOptions.js
SortFilter.js	TagButton.js	TagFilter.js

Comment.js	

Figure 13: Atoms

4.3 Server

Server consists of 3 different tiers which are Logic Tier, Information Tier, Data Tier.

4.3.1 Logic Tier

Logic Tier is responsible for establishing connection between Data Tier and Presentation Layer. We used Node JS to implement this layer. It uses Restful API to communicate with Presentation Layer, and uses SQL queries to get the required data from Data Tier.

This tier consists on only one file which is called Server.js. It includes all the required API calls.

Post Methods

- login(mail, username, password)
- register(mail, username, firstname, lastname, password, relevance)
- check-login()
- logout()
- forgot-password-email(mail)
- forgot-password-code(mail, code)
- forgot-password-change(mail, password)
- forgot-password-resend-code(mail)
- upload-image()
- update-user-info(firstname, lastname, income, educationlevel, age, city, country, about, firstlanguage, secondlanguage)
- like-news(link)
- unlike-news(link)
- like-thread(id)
- unlike-thread(id)
- comment-news(link, text)
- comment-thread(id, text)
- delete-comment-news(link, commentID)
- create-thread(text, title, tags)
- change-password(username, password)
- check-password(username, password)
- create-event(eventname, description, time, address, city, country, latitude, longitude)
- delete-user-thread(id)
- comment-thread(id, text)

- delete-comment-thread(commentID, threadID)

Get Methods

- get-news(index)
- get-thread(index)
- get-products()
- get-events()
- get-user-events()
- get-username-events(username)
- tag-keywords(keyword)
- get-article-tag(link)
- get-news-article-keyword(keyword, type, index)
- get-news-comment-count(link)
- get-user-info()
- get-username-info(username)
- get-top-10-tags()
- get-thread-tag-top-10-tags()
- get-top-5-tags()
- get-thread-tag-top-5-tags()
- get-tags-query(keyword)
- get-tags-news(link)
- get-tags-thread(id)
- get-tag-index-news(index, tag)
- get-tag-index-thread(index, tag)
- get-news-id(id)
- get-thread-id(id)
- get-comment-id(id)
- get-comment-news(link, text)
- get-comment-news-with-id(id)
- is-user-liked-news(link)
- is-user-liked-news-id(id)
- is-user-liked-thread-id(id)
- get-thread-tag-query(keyword)
- get-thread-type(index, type, tags)
- get-user-liked-news()
- get-username-liked-news(username)
- get-username-thread(username)
- get-image()
- get-image-username(username)
-

4.3.2 Data Tier

The Data Tier exists in the Google Cloud Server. This tier contains the Database informations class which is responsible for storing all user, content and other data

This layer manages interactions with the database. It will communicate with the Logic Tier and Information Tier to service requested data.

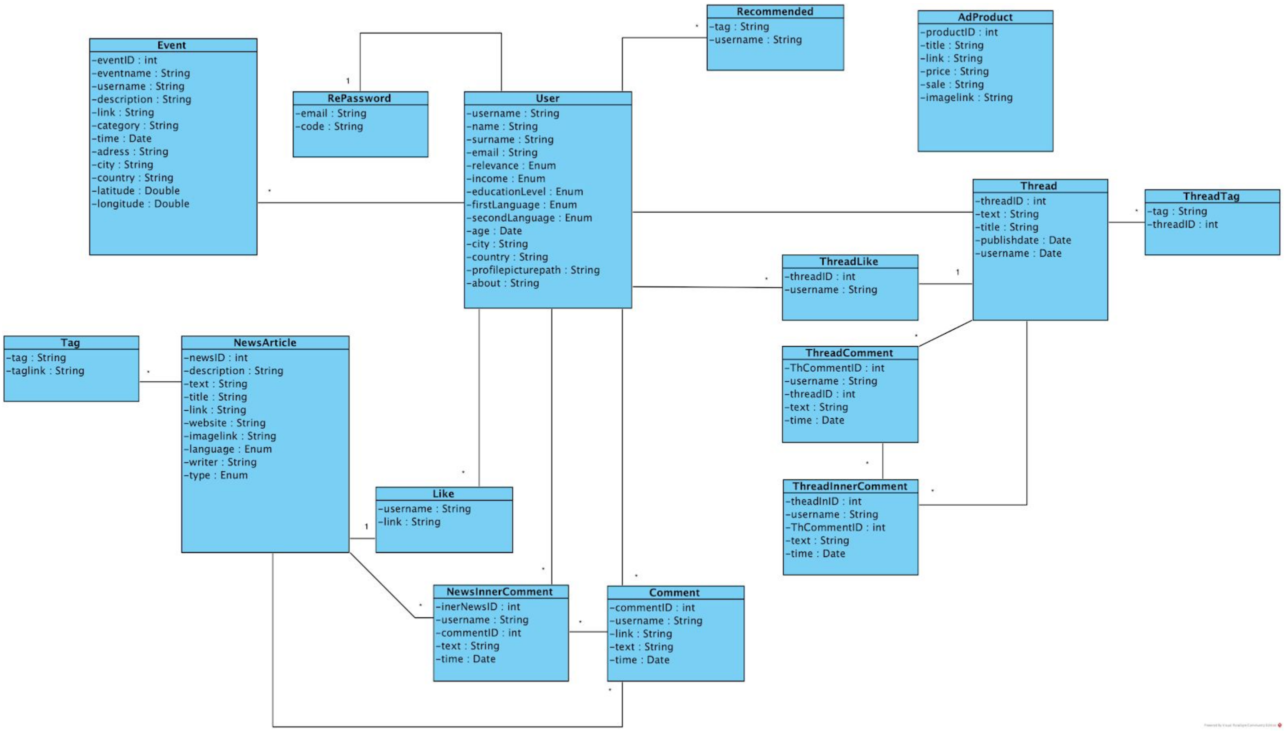


Figure 14: Data Tier

User: This class handles all user information such as username, relevance to autistic person, income, education level, age, address, profile picture path in the server.

NewsArticle: This class manages all the crawled news and articles. It has attributes like, description, html version of text, like number, website and a type to indicate whether it is an article or a news.

Event: This class handles both events taken from the Eventbrite and events created by the users. It takes a username to indicate whether it is a user created event or not. It has also attributes like latitude and longitude to show the exact event location on the map.

Tag: This class handles tags related to articles and news.

Like: This class manages user likes to articles and news.

Comment: This class manages user comments to articles and news. It has a date attribute to know the exact comment time.

Recommended: This class manages the user specific recommended tags.

AdProduct: This class manages ad products related data. The crawled product data is handled by this class.

Thread: This class manages threads creates by the user. It has attributes like text, title, publish date and username.

ThreadLike: This class is responsible for handling user likes to generated threads.

ThreadComment: This class is responsible for handling user comments to generated threads.

ThreadTag: This class handles tags related to threads. Tags are given by the user while creating the threads.

RePassword: This class manages user re-password request. When a user requests for a password change a key is sent to the user. This class is responsible for that.

4.3.3 Information Tier

Information Tier is responsible for gathering/generating required data for the Data Tier. We used Python to implement all the executables in this tier. The main objective of this tier is to either generate data for Data Tier or improve the data which is already present in the Data Tier.

We get our news from Medical News, Science Direct, Hurriyet, Milliyet, The Guardian, and GittiGidiyor. Only Hurriyet and Milliyet provides an API for getting news easily, but we contacted with The Guardian to get an API key. For the rest, we wrote our own crawlers by using BeatifulSoup and Selenium.

We implemented a Locality Sensitive Hashing algorithm to distinguish near duplicates and, then we coded a tag generator using Python NLTK. Moreover, we implemented a translate algorithm from turkish to english and english to turkish in order to generate turkish tags with the help of Google Translate API. Lastly, we used these tags in our recommendation system which is based on Singular Value Decomposition and Stochastic Gradient Descent.

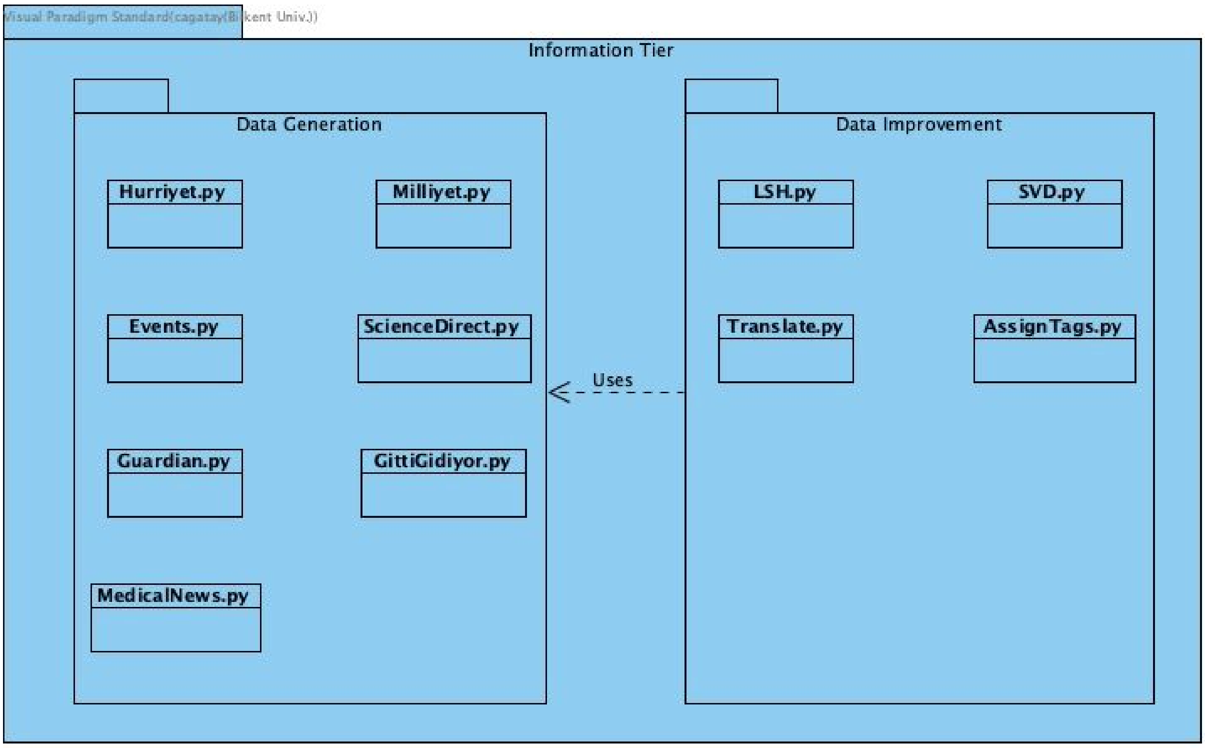
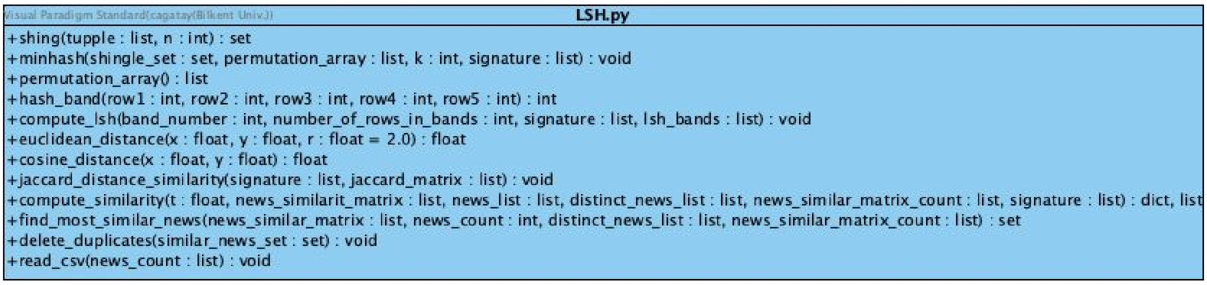


Figure 15: Information Tier

Most of the executables in this Tier is straightforward, except for LSH.py whose structure can be seen in the figure below.



```
+shing(tupple : list, n : int) : set
+minhash(shingle_set : set, permutation_array : list, k : int, signature : list) : void
+permutation_array() : list
+hash_band(row1 : int, row2 : int, row3 : int, row4 : int, row5 : int) : int
+compute_lsh(band_number : int, number_of_rows_in_bands : int, signature : list, lsh_bands : list) : void
+euclidean_distance(x : float, y : float, r : float = 2.0) : float
+cosine_distance(x : float, y : float) : float
+jaccard_distance_similarity(signature : list, jaccard_matrix : list) : void
+compute_similarity(t : float, news_similarit_matrix : list, news_list : list, distinct_news_list : list, news_similar_matrix_count : list, signature : list) : dict, list
+find_most_similar_news(news_similar_matrix : list, news_count : int, distinct_news_list : list, news_similar_matrix_count : list) : set
+delete_duplicates(similar_news_set : set) : void
+read_csv(news_count : list) : void
```

Figure 16: LSH.py

5.0 Impact of Engineering Solution

5.1 Economical Impact

- AutAware is developed mostly by using free API's and services. However the following API's charge AutAware, as the number of their usage increases.
    - Google Maps API: For dynamic maps 14$ every month
    - Google Street View API: For dynamic view 14$ every month
    - Google GeoCoding API: 0.005$ for each call
    - Google Translate API: For 1.000.000 characters 20$
- For AutAware.com domain 40 TRY needs to paid every year. For a more secure HTTPS connection the domain price increases.
- With current running machines on G Cloud daily spend is 2$ (App Engine, Compute Engine and SQL sever included).
- In AutAware users can make donation. This functionality currently does not send money to any place as we do not have the rights.

5.2 Social Impact

The aim of the AutAware to maximize the awareness to Autism. With that in mind all of the functionalities provided by AutAware feels its users like they are not alone. All users can create a thread to show others what is their mind or which type of issues they facing and what type of needs they have. Also users can view events all over in Turkey to socialize meet people. In a neurobehavioral condition like autism it is crucial to socialize with other people. Most people who have autism disorder, have problems with socializing and they are learning how to act in different types of social situations. Usually they have the desire to interact with other people but they do not know how. So attending social events, communities creates outcome like happiness on those type of people [8]. When we look at the AutAware map we see that most of the event occur in Istanbul, Ankara, İzmir and other big cities. Sadly some of the cities even do not have events. However all users can create an event and increase their social skills with their relatives who have autism.

5.3 Impacts on Security

All user information that is taken by users is requested by permission. For example in the events page if the user does not want to share her/his location the map will not start on the users location. Also we do not give user information to other services. Only AutAware development team has authorization to see related user information. All users password are encrypted and all user information is stored securely on Google’s cloud. Only selected IP’s have access to this database SQL server.

6.0 Engineering Solutions and Contemporary Issues

According to our researches, we saw that nowadays whenever people want to do something, they want to do all of the things from a single place. For example, if they want to pay a bill, they just open their banks mobile application and from that app, they can pay their most of the bills. Information about autism is very messy on internet. In order to get information and interact with other people, you encounter a lot of difficulties. Therefore for people with autistic relatives, we aimed to create easiness. In Autaware, we solve this problem by crawling websites regularly in order to gather up most of the information that can be found about autism on Internet and providing bunch of functionalities like recommending news and articles to users that they might be interested, allowing them to create events in order to help them to create their community and allowing them to share their own information and opinion on Autaware.

7.0 Tools and Technologies Used

7.1 Development Tools and Frameworks Used

1. **GitHub**
   GitHub is a Git platform that helps developers to work collaboratively. It is used as a build management tool. [9]

2. **G Cloud**
   G Cloud is a set of solutions and frameworks that offers its clients various kind of solutions. In this project we used G Cloud as our main base for AutAware. All of our computer engines, SQL machines and app engines rely on Google Cloud services. One of the reasons for choosing G Cloud for our base is it gives 300$ free trial credit. Also Google is known for it is reliable services. [10]

3. **Trello**
   While implementing AutAware we used Trello for our project management tool. Task assignment and tracking were handled on Trello. Trello is a very user friendly tool and very easy to use compared to its competitors. [11]

4. **Visual Studio Code**
   As a source-code editor as a team we used Visual Studio Code. It includes support for debugging syntax highlighting, snippets and git integration. [12]

5. **Postman**
   Postman is used for testing client - server request calls. The tool provides all send requests and receive responses through our REST API. AutAware also relies on REST API for client - server services. [13]

6. **MySQL Database**

   In AutAware we have many relations between tables. So using a relational database instead of a NoSQL service is a better option. It is fast and reliable. All of our database relies on a SQL server that is running in a machine in Google Cloud. All of our informations are stored securely on Google's Cloud. [14]

7. **Google Compute Engine**

   For deployment we use Google Compute Engine. In the machine we run an Apache server for our services. The machine is located in the US and has the following properties; 1vCPU, 3.75GB Memory and Intel Haswell as CPU Platform. It is a baseline machine and fairly cheap. [15]

8. **Express JS**

   It is a flexible Node JS framework for building HTTP API's quickly and easily. It is simple to use and very effective. [16]

9. **Semantic UI**

   It is a modern front-end development framework for React JS. It has a more sleek look compared to its competitor Material UI. [17]

7.2 Library and API's Resources Used

1. **React JS**

   React JS is a JavaScript library that is used for building responsive user interfaces. React makes it easier create interactive user interfaces. It has encapsulated components and all of the components manage their states. All UI of the AutAware is written by using Reach JS. [18]

2. **Google Maps API**

In AutAware it is used for displaying user and Eventbrite events on the maps. Its Street View functionality added extra to show users where events occurs. [19]

3. **Google GeoCoding API**

   It is used for in Events page for generating events. When a user tries to create an event s/he can drop a pinpoint on the map and the full address is automatically generated for the event. [20]

4. **Google Translate API**

   It is used for translating Turkish news to English and English tags to Turkish. It is an expensive API to use. Most of our Google free credist were consumed by this API. [21]

5. **Eventbrite API**

   AutAware fetches the current events on Turkey from Eventbrite. Later those events are displayed on the map. [22]

6. **BeautifulSoup**

   It is a Python package to parse HTML documents. It basically extracts data from HTML. It is used for crawling news, articles and autism related products for ad feature. [23]

7. **Selenium**

   It is playback tool and usually used for testing web applications. It is while crawling data. In some sites the data is given after pressing a button without changing the URL, selenium automates that. [24]

8. **Natural Language Toolkit**

A Python library used for natural language processing in English. Used for tag generations. [25]

9. **Scipy**

   A python library for scientific and statistical computing. Used for singular value decomposition in recommendation system. [26]

10. **Guardian API**

    It is used for fetching English news about Autism from Guardian.com. [27]

11. **Hurriyet API**

    It is used for fetching Turkish news about Autism from Hurriyet.com. [28]

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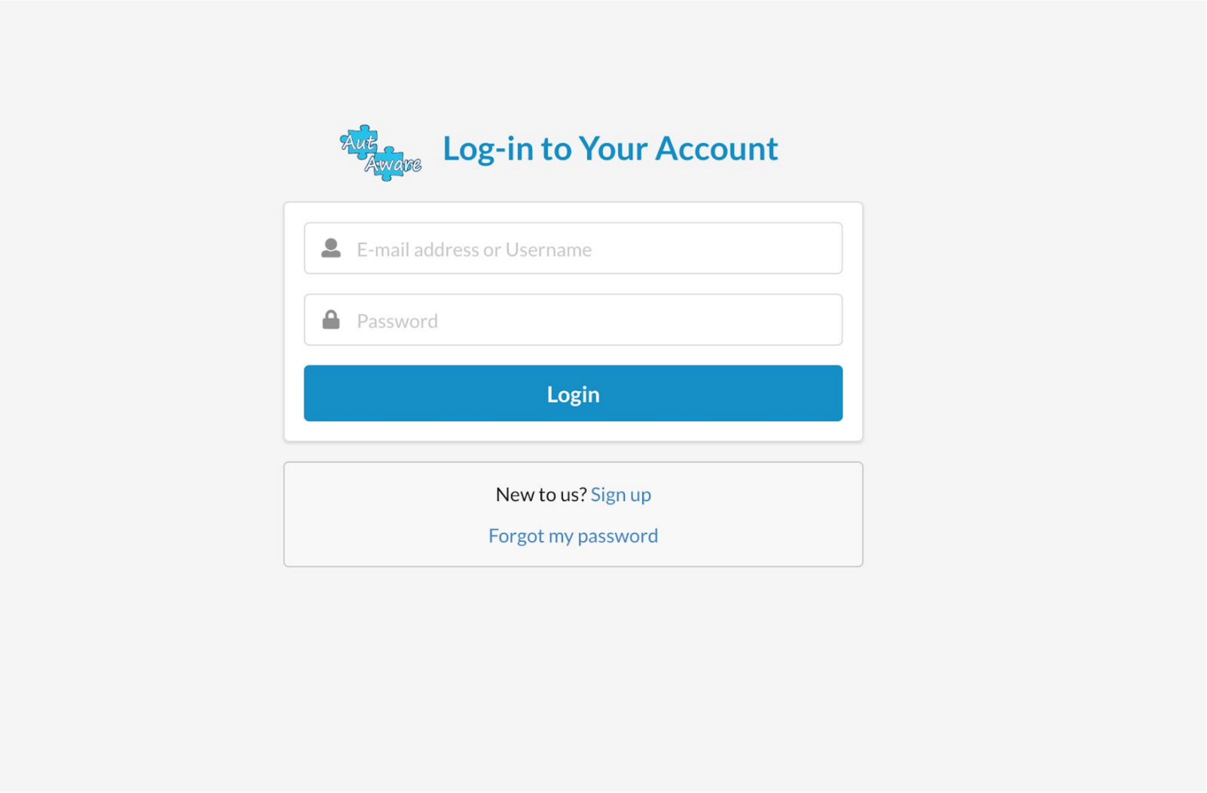
Appendix: User Manual

Login Page



Log-in to Your Account

E-mail address or Username

Password

New to us? Sign up

Forgot my password

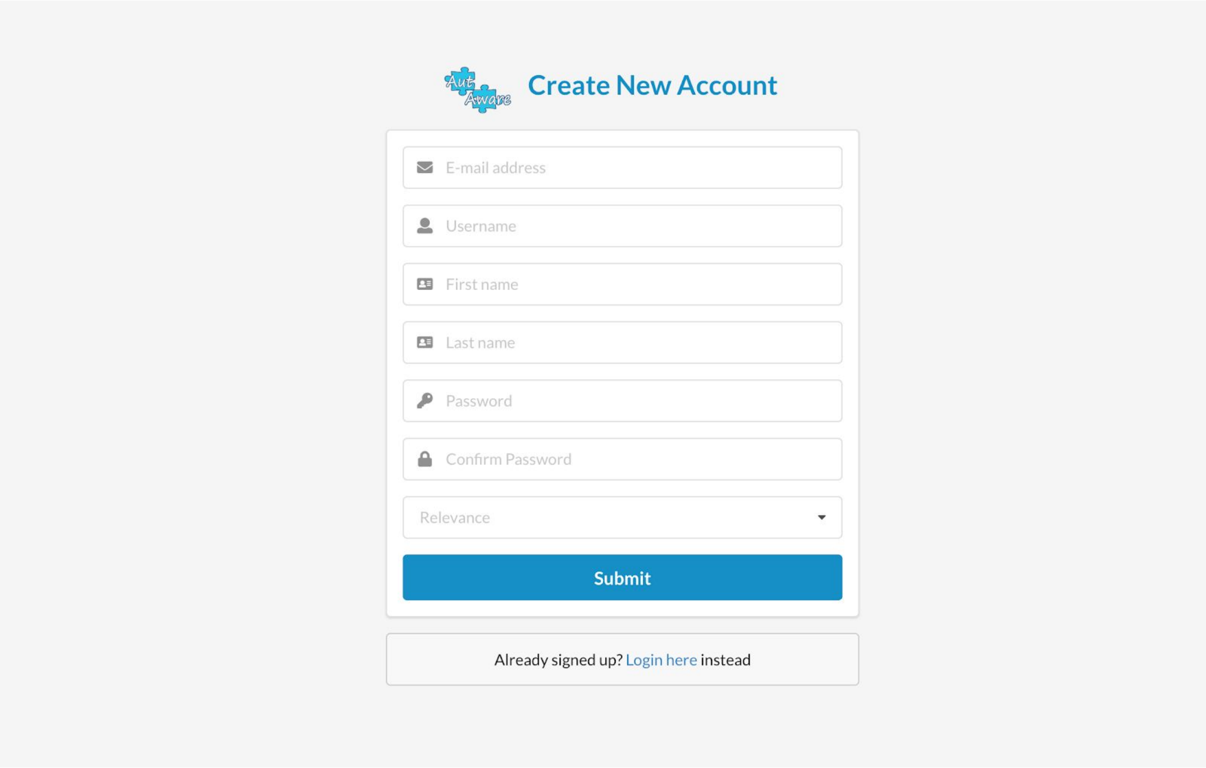
Figure 17: Login Page

This page is also the welcoming page of the application. In order to experience AutAware, the user must be a member and verify herself/himself. If the user is not a member, he can go to AutAware registration page by clicking Sign Up button at the bottom of the form. If the user is already a member, she/he must fill the login form with her/his username and password.

If the inputs match the credential information in our database, they are automatically redirected directly to the homepage.

In addition, the user is able to reset her/his password by clicking "forgot my password" button if she/he has forgotten the password. Then, the user can change the password with the confirmation mail sent by AutAware.

Registration Page



Create New Account

E-mail address

Username

First name

Last name

Password

Confirm Password

Relevance

Submit

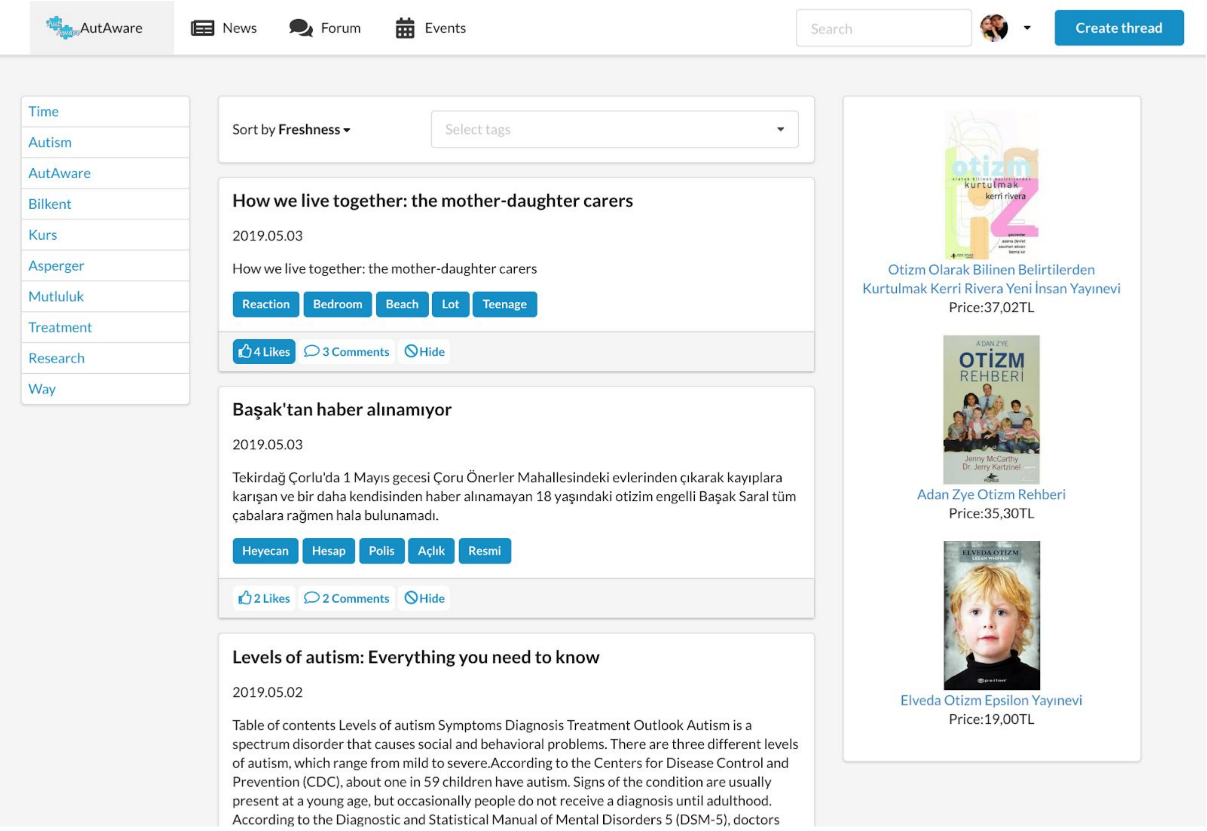
Already signed up? Login here instead

Figure 18: Registration Page

On the registration page, the user takes the first step into AutAware by filling all the empty spaces appropriately. The username must be at least 6 characters long and has not been selected before. The e-mail address must be a valid email address since an verification email will be sent for the possible password reset process.

If the username or mail she/he has entered matches another member in our database, the page returns an error. If the user is already a member, she/he can go to the login page by clicking the "Login Here" button at the bottom of the form.

Homepage



How we live together: the mother-daughter carers

2019.05.03

How we live together: the mother-daughter carers

Reaction Bedroom Beach Lot Teenage

4 Likes 3 Comments Hide

Başak'tan haber alınamıyor

2019.05.03

Tekirdağ Çorlu'da 1 Mayıs gecesi Çoru Önerler Mahallesindeki evlerinden çıkarak kayıplara karışan ve bir daha kendisinden haber alınamayan 18 yaşındaki otizim engelli Başak Saral tüm çabalara rağmen hala bulunamadı.

Heyecan Hesap Polis Açlık Resmi

2 Likes 2 Comments Hide

Levels of autism: Everything you need to know

2019.05.02

Table of contents Levels of autism Symptoms Diagnosis Treatment Outlook Autism is a spectrum disorder that causes social and behavioral problems. There are three different levels of autism, which range from mild to severe.According to the Centers for Disease Control and Prevention (CDC), about one in 59 children have autism. Signs of the condition are usually present at a young age, but occasionally people do not receive a diagnosis until adulthood. According to the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5), doctors

Otizm Olarak Bilinen Belirtilerden Kurtulmak Kerri Rivera Yeni İnsan Yayınevi
Price:37,02TL

Adan Zye Otizm Rehberi
Price:35,30TL

Elveda Otizm Epsilon Yayınevi
Price:19,00TL

Figure 19: Homepage

The user encounters this page after logging in to the application. The homepage includes carefully prepared data to inform you about autism. The feed at the center of the page displays the newest content by default when the page is opened and it has two different sort types. These are “Freshness” and “Popularity”. If “Popularity” is selected, the content with more likes and comments will be listed first. At the right side of the page, products related to autism are listed. This list is updated periodically and displayed randomly. Using the recommendation button, the user can access the content that AutAware predicts that she/he may like them. On this page, every content contains their tags. The user can check the tags, likes and comments of all content. Also she/he can select some specific tags and list contents that contain that tag from “Select Tags”. At the left side of the page, the most common keywords in all content within the application are listed as tags. At the top side of the page, there is a header includes some buttons for navigating between pages.

Header

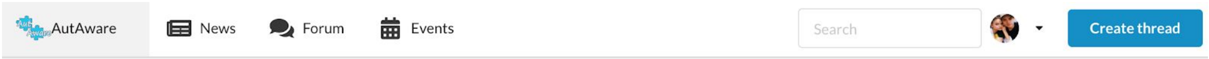


Figure 20: Header

Header is available on every page and provides ease of transition between pages. “News” button lists only news and scientific papers. “Forum” button lists only threads created by users. “Events” button redirects to Events page. The user is able to search the entire content using the search box on the header. By using “Create Thread” button, the user is able to create a thread.

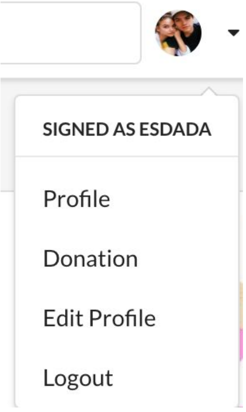
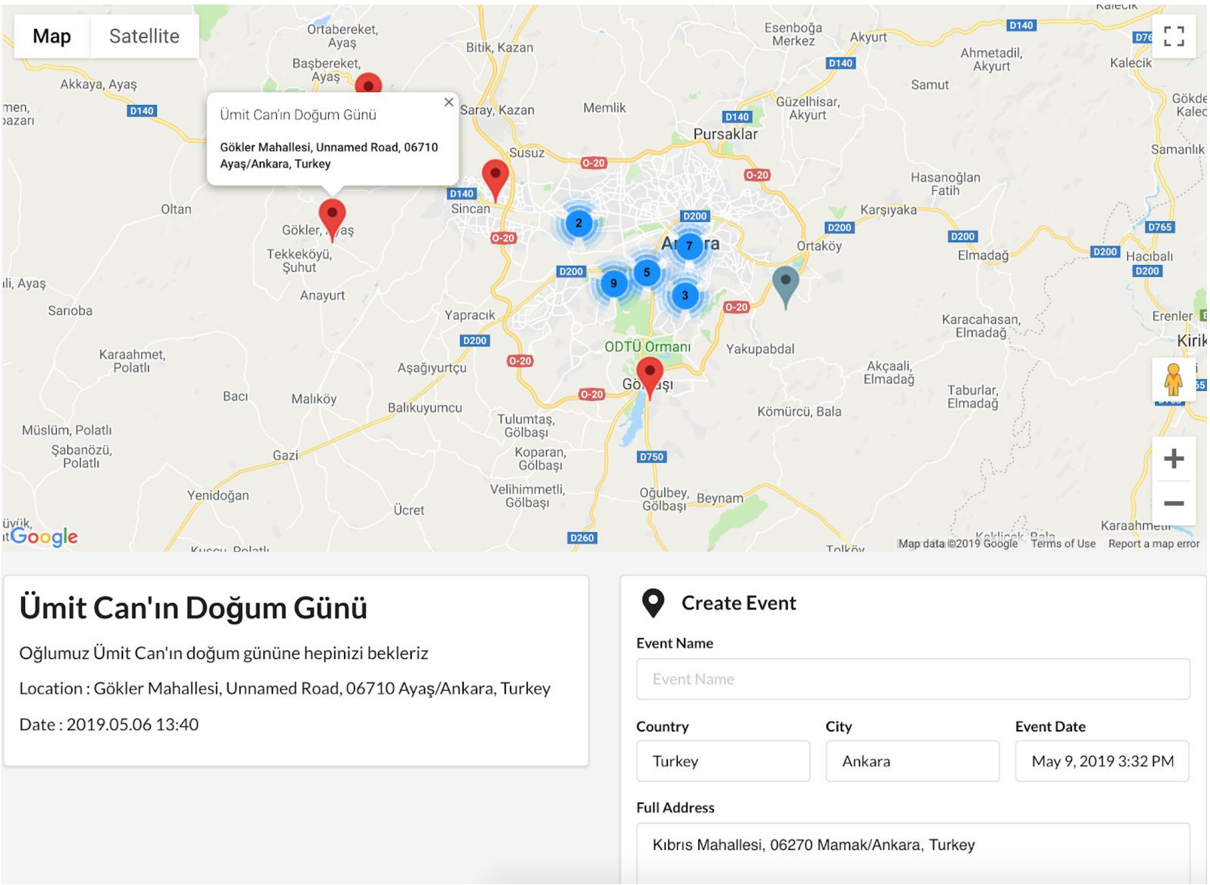


Figure 21: Menu

The user can click her/his profile photo on the header to open the menu. In the menu, “Profile” button redirects to the user’s profile. “Edit Profile” button redirects to

Edit Profile page. “Donation” button provides you to make a donation to us. With “Logout” button, the user can log out without any problems.

Events Page



Ümit Can'ın Doğum Günü

Gökler Mahallesi, Unnamed Road, 06710 Ayaş/Ankara, Turkey

Ümit Can'ın Doğum Günü

Oğlumuz Ümit Can'ın doğum gününe hepinizi bekleriz

Location : Gökler Mahallesi, Unnamed Road, 06710 Ayaş/Ankara, Turkey

Date : 2019.05.06 13:40

Create Event

Event Name: Event Name

Country: Turkey

City: Ankara

Event Date: May 9, 2019 3:32 PM

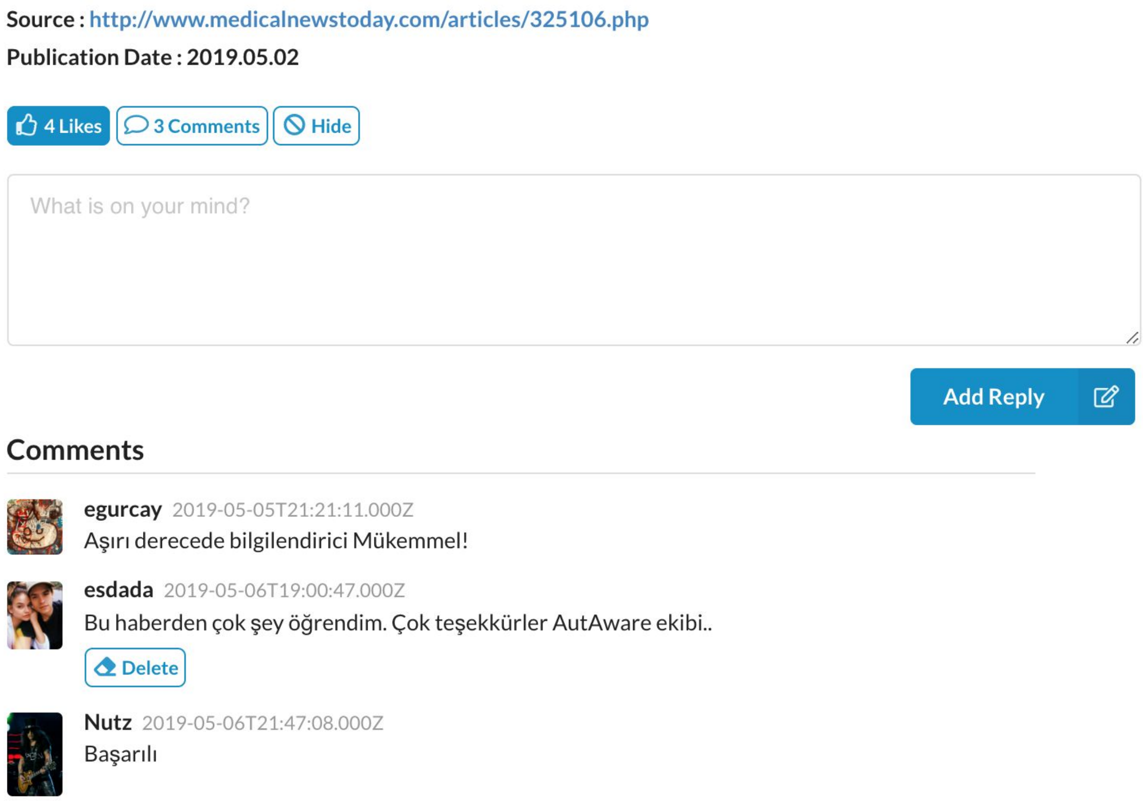
Full Address: Kıbrıs Mahallesi, 06270 Mamak/Ankara, Turkey

Figure 22: Events Page

Events page shows all selected events for our users on the map. Upon entering this page, the application sends a request to learn your location. If the location permit is given, it opens the map by centering your current location. If the location permit is not granted or the request is not answered, the map will take Ankara as the center.

Each event on the map is marked with a red marker. By clicking on the red markes, information about the clicked event can be seen both on the map and in detail below the page. In addition, the user can click anywhere on the map to create an event at that location. When new event marker(gray marker on the map) is created an event creation form appears at the bottom of the page. The address information of the clicked location is automatically send to the event creation form. The user can create a new event by filling out the form. The user can see the street view of any event using the orange man figure on the right side of the map.

Content Page



Source : http://www.medicalnewstoday.com/articles/325106.php
Publication Date : 2019.05.02

Comments

egurcay 2019-05-05T21:21:11.000Z
Aşırı derecede bilgilendirici Mükemmel!

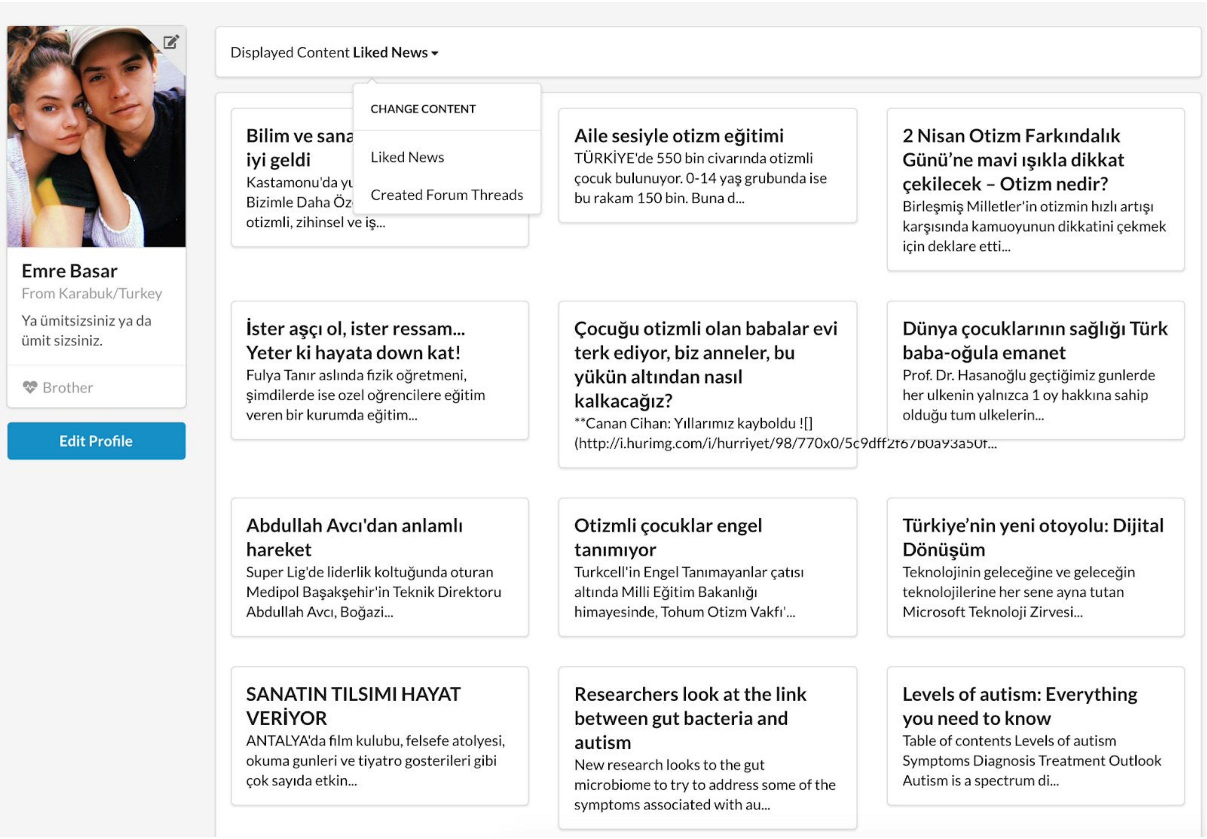
esdada 2019-05-06T19:00:47.000Z
Bu haberden çok şey öğrendim. Çok teşekkürler AutAware ekibi..

Nutz 2019-05-06T21:47:08.000Z
Başarılı

Figure 23: Content Page

On the content page, the user can read abstracts of scientific papers, the description of the news and the entire text and the contents of other users' threads in the forum. She/he may also like content, comment on content, and respond to others' comments. She/he can also delete his own comment at any time. In addition, if the owner of the thread is herself/himself can delete the thread.

Profile Page



Emre Basar
From Karabuk/Turkey
Ya ümitsizsiniz ya da ümit sizsiniz.
Brother

Bilim ve sana iyi geldi
Kastamonu'da yı Bizimle Daha Öz otizmli, zihinsel ve iş...

Aile sesiyle otizm eğitimi
TÜRKİYE'de 550 bin civarında otizmli çocuk bulunuyor. 0-14 yaş grubunda ise bu rakam 150 bin. Buna d...

2 Nisan Otizm Farkındalık Günü'ne mavi ışıkla dikkat çekilecek – Otizm nedir?
Birleşmiş Milletler'in otizmin hızlı artışı karşısında kamuoyunun dikkatini çekmek için deklare etti...

İster aşçı ol, ister ressam... Yeter ki hayata down kat!
Fulya Tanır aslında fizik öğretmeni, şimdilerde ise ozel oğrencilere eğitim veren bir kurumda eğitim...

Çocuğu otizmli olan babalar evi terk ediyor, biz anneler, bu yükün altından nasıl kalkacağız?
**Canan Cihan: Yıllarımız kayboldu ![](http://i.hurimg.com/i/hurriyet/98/770x0/5c9dff2f67b0a93a50f...

Dünya çocuklarının sağlığı Türk baba-oğula emanet
Prof. Dr. Hasanoğlu geçtiğimiz gunlerde her ulkenin yalnızca 1 oy hakkına sahip olduğu tum ulkelerin...

Abdullah Avcı'dan anlamlı hareket
Super Lig'de liderlik koltuğunda oturan Medipol Başakşehir'in Teknik Direktoru Abdullah Avcı, Boğazi...

Otizmli çocuklar engel tanımıyor
Turkcell'in Engel Tanımayanlar çatısı altında Milli Eğitim Bakanlığı himayesinde, Tohum Otizm Vakfı'...

Türkiye'nin yeni otoyolu: Dijital Dönüşüm
Teknolojinin geleceğine ve geleceğin teknolojilerine her sene ayna tutan Microsoft Teknoloji Zirvesi...

SANATIN TILSIMI HAYAT VERİYOR
ANTALYA'da film kulubu, felsefe atolyesi, okuma gunleri ve tiyatro gosterileri gibi çok sayıda etkin...

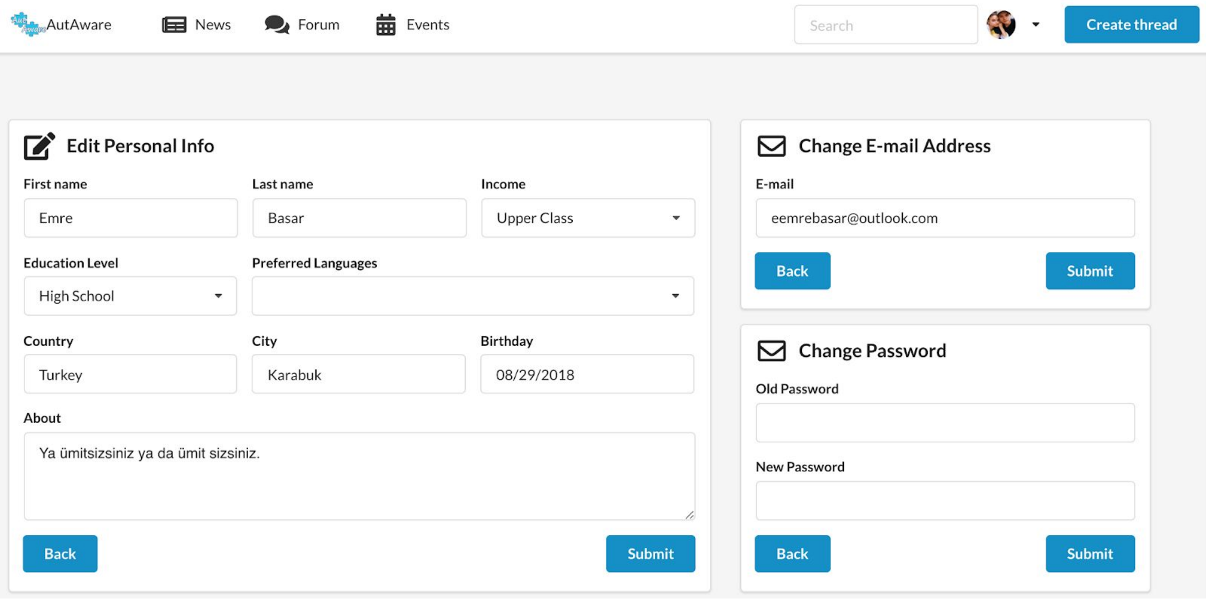
Researchers look at the link between gut bacteria and autism
New research looks to the gut microbiome to try to address some of the symptoms associated with au...

Levels of autism: Everything you need to know
Table of contents Levels of autism Symptoms Diagnosis Treatment Outlook Autism is a spectrum di...

Figure 24: Profile Page

The user can view her/his profile and other users' profile. If the profile page is her/his own profile, she/he can make changes to the profile by using the "Edit Profile" button. On the profile page, the user can view liked content and created threads.

Edit Profile page



Edit Personal Info

First name: Emre

Last name: Basar

Income: Upper Class

Education Level: High School

Preferred Languages:

Country: Turkey

City: Karabuk

Birthday: 08/29/2018

About: Ya ümitsizsiniz ya da ümit sizsiniz.

Change E-mail Address

E-mail: eemrebasar@outlook.com

Change Password

Old Password:

New Password:

Figure 25: Edit Profile Page

By using this page, the user can change her/his information that stored our database.