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ТҮЙІН

Мақалада деректерді зерттеу, деректерді терең талдау, білім алу, білім қорындағы деректерді өңдеу әдістері, интеллектуалды талдау әдістері және медицина саласындағы Data Mining технологиясын қолдану аспектілері қарастырылады. АИТВ жұқтырған пациенттер тобы бөлінді, ауру тарихына талдау жүргізілді, іс-қимыл модельдері мен алгоритмі (кіріс деректері) әзірленді, деректерді іздеу әдістерімен талдау және эксперименттер жүргізілді. Барлық аурулар сандық векторлар жиынтығы ретінде ұсынылды және кластерлерге топтастырылды, сипатталған техникаға сәйкес, Хопкинс статистикасының мәні осы үлестіру арқылы есептелді. Кластерлеудің өзі әдеттегі sklearn кітапхана құралдарының көмегімен жүзеге асырылды. Екі өлшемді жазықтықта көп өлшемді деректерді ұсынудың әртүрлі әдістері, негізгі компоненттер әдісі, кохонен сызығы және т. б. ұсынылған.

Кластерлеудің екі түрлі әдісі қарастырылды: k-орташа әдісі (Python sklearn кітапханасының Kmeans функциясын қолдана отырып), АВТО конфигурациясы бар тығыздыққа негізделген кластерлеу әдістері (Python hdbscan кітапханасының HDBSCAN функциясын қолдана отырып). Салыстыру жағдайында кластерлік құрылым бір алгоритмнің әртүрлі параметрлерін өзгерту арқылы бағаланады (мысалы, k топтарының саны); алынған және дайындалған объектілерде модель (немесе бірнеше) салынып, оның параметрлері реттеледі. Содан кейін тестілеу және нәтижелерді талдау жүргізіледі.

АЛҒЫС

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FEATURES OF USING THE BOOTSTRAP 4 FRAMEWORK IN THE DESIGN OF AN ADAPTIVE WEBSITE

ANNOTATION

This article discusses the concept of adaptive design in the process of creating a website. The essence of the frontend frameworks of their varieties is revealed, as well as a detailed analysis of the Bootstrap framework is described. It is concluded that Bootstrap frameworks and the like make the web development process simpler and facilitate the development of an adaptive website design. The world of web programmers has already seen Bootstrap 5, but many are still interested in what Bootstrap 4 has brought in itself. Because it was this version that brought a new round of technologies

to this framework and established itself as a stable and effective tool for web development. Bootstrap is a popular set of tools for web applications and user interfaces with HTML, CSS and JavaScript. The basis for adaptive design is the rules of media queries, which describe the stylistic properties of elements for different screen resolutions. Also, Bootstrap uses a dynamic CSS style language that extends CSS capabilities: developers can manage colors, create nested columns and variables.

Key words: *framework, frontend, layout, adaptive design, web development*

Introduction. The spread of portable communication devices and mobile Internet, there is an active transition of users from computers to mobile devices. Currently, more than 5 billion people on the planet have their own smartphone. This fact is an important condition for companies that have their own website on the Internet. Corporations developing new phones, tablets and computers regularly release new models to the market, which creates additional difficulties for web developers. Now, for the optimal operation of the company, it is necessary that the site is equally convenient to use from different devices. The process of creating the design of such a site is called adaptive design. At the moment, the most popular HTML, CSS, and JS framework for developing adaptive and mobile web projects is Bootstrap.

Materials and methods of research. Adaptive design is a layout method in which the width of the layout is transformed to the width of the device, which ensures successful perception on various devices [1].

The concept of "adaptive web design" was introduced by Ethan Marcotte in 2010 [2]. He brought together three technologies that already existed at that time (flexible grid-based layout, size-adjustable images and multimedia elements, as well as media queries) into a single unified approach, which he called adaptive web design.



Figure 1 - Displaying the content of the website on different devices

The layout of the site consists of blocks, on smartphones and tablets the blocks should be placed vertically (Fig.1), on laptops the blocks are placed horizontally. Principles of adaptive design:

First, the design for the mobile version of the site is designed, at this stage it is necessary to convey the main idea using one column, for this it is necessary to filter out secondary information and highlight the main one.

The mobile first principle is used its main advantages:

- First of all, the user sees the important content of the page, the main information
- The user gets fast page loading even at low connection speed.
- Saving internet traffic
- The interface becomes convenient for navigation in the mobile screen.
- Thanks to this principle, the site gets into the top of Google search.

Also, during the design of an adaptive website design, flexible images are used (the width of the image can be any, provided that it does not protrude beyond the boundaries of the container containing it), grids and a media query to create the most user-friendly website.

The main purpose of these design methods is to create web pages that would adapt to the size of the user's device screen and display the appropriate content for maximum user convenience.

A framework is a platform, a library, a collection of certain rules. The framework provides already built-in classes for working with forms, elements, etc. All this is easy to use, and their performance is guaranteed by the framework itself.

Adaptive frameworks can not only significantly speed up the process of creating an adaptive web design, but also add other options to the site, such as modal windows, off-canvas menus, etc.

Flexibility is a prerequisite for any website, which means that each developer faces the task of choosing an adaptive Framework that will make the layout process easier and more convenient.

Frameworks are divided into two types – back-end Frameworks and front-end Frameworks. The front-end frameworks are used to create the user interface, the back-end frameworks are used to create the software and administrative part. Front-end development is the creation of the client side of the site. The frontend developer is engaged in the layout of the website template and the creation of the user interface. Each front-end specialist has his own developments, which he stores in the form of a framework. Many developers use popular frameworks at work, such as: Twitter, Bootstrap, Foundation 3, Compass. Bootstrap is one of the most common frameworks, which has an extensive database of features and functionality, even novice developers can use it. Bootstrap is a framework, a set of HTML+CSS tools and templates for creating websites more efficiently and quickly.

Results and their discussion. Bootstrap was originally created for internal use by Twitter with the working name Twitter Blueprint, but eventually it was published in open access and became a good set of tools for front-end development called "Bootstrap". It is built on the mobile first principle, which we talked about earlier, the website will automatically scale to different devices. The Bootstrap 4 grid system uses containers, rows and columns to conveniently position the contents. Bootstrap is implemented using flexbox and is fully adaptive. The grid layout system consists of a two-dimensional structure (rows and columns), which serves to organize the content of the website. Thanks to flexbox, grid columns without the "width" attribute set automatically get equal width. For example, four instances of the `.col-sm` class will automatically (at small control points) get the width of one column = 25%. For more information, see the section Automatic positioning with the power of columns. The width of the columns is set as a percentage, which allows the columns to be flexible and resize relative to their parent element. Bootstrap uses `em` and `rem` grid parameters to set most sizes, and `px` pixels for grid breakpoints and container widths. This is because the width of the visibility zone on each device is measured in pixels and does not change with the font size.

	Extra small <579px	Small ≥576px	Medium ≥768px	Large ≥992px	Extra large ≥1200px
maximum width of the container	None(auto)	540px	720px	960px	1140px
class prefix	<code>.col-</code>	<code>.col-sm-</code>	<code>.col-md-</code>	<code>.col-lg-</code>	<code>.col-xl-</code>
number of columns	12				
indentation width	30px(15px on each side of the column)				
can be nested	Yes				
ordering columns	Yes				

Figure 2 - Bootstrap grid sizes for different devices

The grid in Bootstrap is one of the most important components of the structure, it serves as the basis for creating the entire layout.

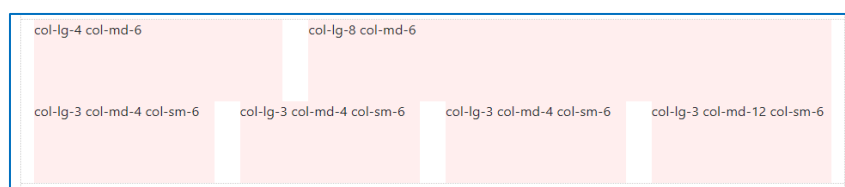


Figure 3 - Diagram of grid layouts in Bootstrap

The Bootstrap 4 grid consists of:

- wrapper containers (elements with the container and container-fluid class);
- rows (elements with row class);
- adaptive blocks (elements having one or more classes equal to col or starting with col).

- all these parts of the grid are ordinary HTML elements, to which certain classes are simply added.

The Bootstrap grid usually consists of 12 fields, the figure below shows how the grid changes according to the size of the application screen. On large devices, the content of the site is presented in the form of 4 columns and three rows, then, depending on the decrease in the diameter of the screen, the number of columns decreases, so on medium-sized devices, a layout of three columns is displayed, in which 3 columns and 4 rows. The layouts of telephone devices reflect one column and 12 rows. Some updates have been released in the Bootstrap version. The main grid parameters are given in the table 1 below:

Table 1 - The main grid parameters

	Extra small <576px	Small ≥576px	Medium ≥768px	Large ≥992px	Extra large ≥1200px
maximum width of the container	-	540px	720px	960px	1140px
class name	.col-	.col-sm-	.col-md-	.col-lg-	.col-xl-

A new size has been added to the grid –col-xl, which now replaces the value of col-lg. Thus, all class designations have moved one level lower. In addition, the last abbreviation of the col-xs class has disappeared, now it is written as simply col- with a hyphen at the end.

To existing functions:

- grid layout system;
- custom form elements;
- typography (icons, built-in functions for displaying images);
- javascript plugins;
- components.

A new col class has been added, which can be used to create columns of the same width.

In previous versions, the Bootstrap grid used the Float method, but now it is based on FlexBox technology. The advantage of this solution is that if earlier with content of different volumes the blocks differed in height, now with different text lengths, the columns will have the same height. Because of this, the design of the portal looks more stylish.

The full Bootstrap build contains descriptions of fonts, grids, and styles of web elements. If the exact style of the site has not yet been determined, you can use the full build. You can use any of the Bootstrap components, as well as add your own. At the moment, tens of thousands of sites built on Bootstrap use their own design.

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АННОТАЦИЯ

В данной статье рассматривается концепция адаптивного дизайна в процессе создания веб-сайта. Раскрыта суть фронтэнд-фреймворков и их разновидностей, а также описан подробный анализ фреймворка Bootstrap. Сделан вывод, что фреймворки Bootstrap и подобные им упрощают процесс веб-разработки и облегчают разработку адаптивного дизайна веб-сайта. Мир веб-программистов уже видел Bootstrap 5, но многих до сих пор интересует, что нового принесла в себе Bootstrap 4.. Потому что именно эта версия привнесла новый виток технологий в этот фреймворк и зарекомендовала себя как стабильный и эффективный инструмент для веб-разработки. Bootstrap - это популярный набор инструментов для веб-приложений и пользовательских интерфейсов с использованием HTML, CSS и JavaScript. Основой адаптивного дизайна являются правила media queries, которые описывают стилистические свойства элементов для разных разрешений экрана. Кроме того, Bootstrap использует динамический язык стилей LESS, который расширяет возможности CSS: разработчики могут управлять цветами, создавать вложенные столбцы и переменные.

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