KO‘P O‘LCHAMLI BERILGANLARNI ASP.NET IMKONIYATLARI BILAN VIZUALLASHTIRISH

Maxsumov Axrorjon Ne’matjon o‘g‘li
O‘zbekiston Milliy universiteti magistranti
E-mail: axror94@umail.uz

Annotatsiya:
Ushbu maqolada, tabiiy yoki hisoblash eksperimentlari jarayonini ASP.NET texnologiya asosida vizuallashtirish ko‘rib chiqiladi.

Kalit so‘zlar: ASP.NET texnologiya, funksiya va jadvalli ma’lumotlar

Keng ma’noda axborotni vizuallashtirish masalasi o‘n minglab yillardan beri qo‘llanilayotgan so‘z hisoblanadi. Qoya tasvirlari, hududlarning birinchi xaritalari, zamonaviy kartografiya va iqlimshunoslik, tomografik tadqiqotlar, mintaqaviy iqtisod, tarmoqlarda axborotni saqlash va qidirish tizimlari, tasvirlarni aniqlash, mobil robototexnikada navigatsiya, texnik tizimlarni loyihalashda ko‘p o‘lchovli tahlillar va h.k.

Ushbu maqolada, tabiiy yoki hisoblash eksperimentlari jarayonida olingan haqiqiy, uzluksiz yoki diskret shakldagi sonlar ko‘rinishidagi ikki o‘lchamli berilganlar massivlarini ASP.NET texnologiya asosida vizuallashtirish ko‘rib chiqiladi.

Agar ikki o‘lchamli berilgnalar diskret holda berilsa, ularni jadvalda tasvirlash va berilganlarni ikki o‘lchamli massivda berish mumkin (1-jadval).

	1-ustun	2-ustun	…	n-ustun
1-qator	b_{11}	b_{12}	…	b_{1n}
2-qator	b_{21}	b_{22}	…	b_{2n}
…	…	…	…	…
m-qator	b_{m1}	b_{m2}	…	b_{mn}

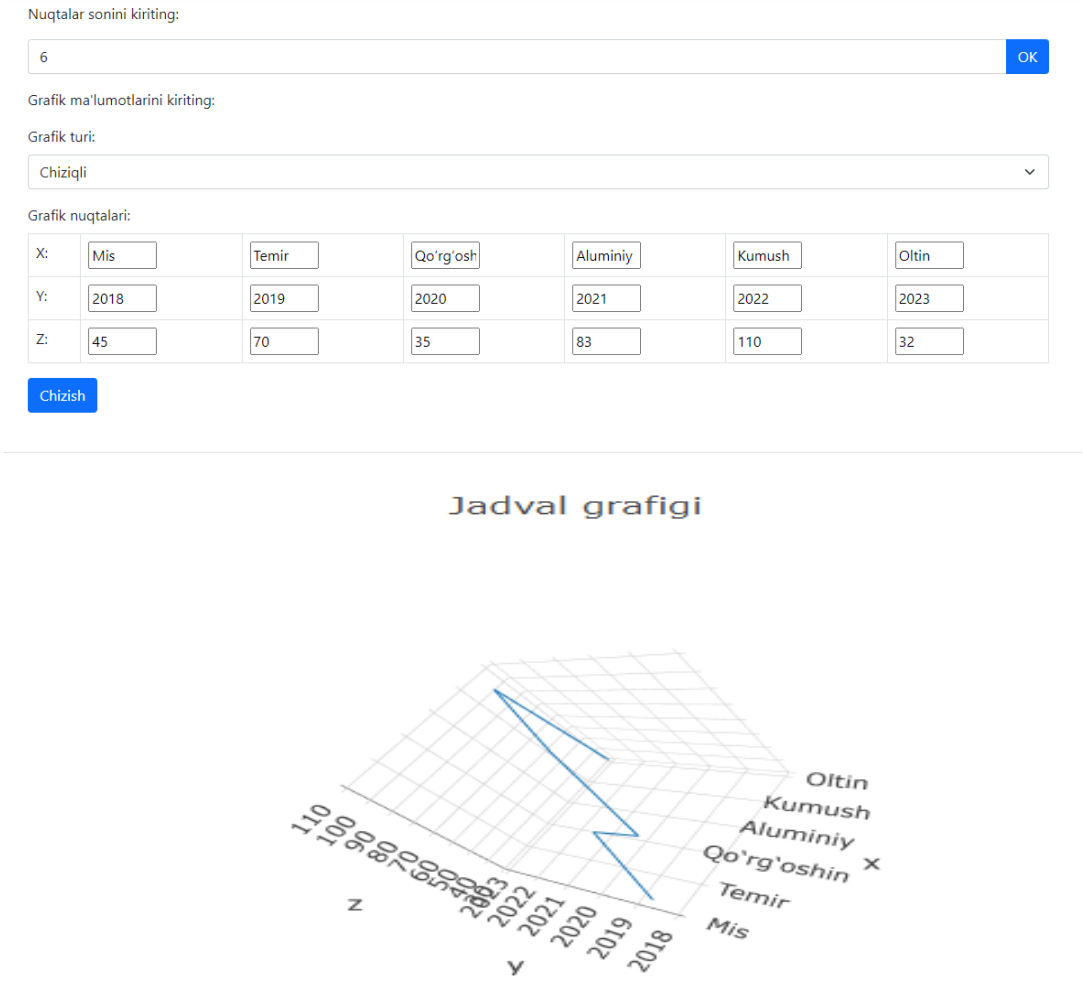
Agar ikki o‘lchamli berilganlar uzluksiz holda biror formula orqali ifodalansa, ularni ikki o‘zgaruvchili funksiya $z = f(x, y)$ ko‘rinishida yozish mumkin, bu yerda x o‘zgaruvchining o‘zgarish oralig‘i $x \in [a, b]$, y o‘zgaruvchining o‘zgarish oralig‘i $y \in [c, d]$ beriladi.

Masalan, konlardangi qazilma boyliklarning (mis, temir, qo‘rg‘oshin, aluminiy, kumush, oltin, platina) oxirgi 5 yil mobaynida o‘zlashtirilgan miqdorini ifodalashni ikki o‘lchovli massiv sifatida tasvirlash qulay (2-jadval).

2-jadval

	Mis	Temir	Qo‘rg‘oshin	Aluminiy	Kumush	Oltin	Platina
2018	45	70	35	83	110	32	17
2019	48	75	36	90	115	35	18
2020	51	87	37	95	120	45	18
2021	55	90	37	88	125	48	19
2022	50	98	40	94	128	50	20

ASP.NET dagi kodi va grafigi



Grafig kodi:

```
<p>Nuqtalar sonini kiriting: </p>
<div class="mb-3 input-group">
    <input type="number" min=2 max=20 name="nuqtalar_soni" id="nuqtalar_soni" class="form-control">
    <button onclick="Nuqtalar_soni()" type="button" class="btn btn-primary">OK</button>
</div>

<p>Grafik ma’lumotlarini kiriting: </p>
```

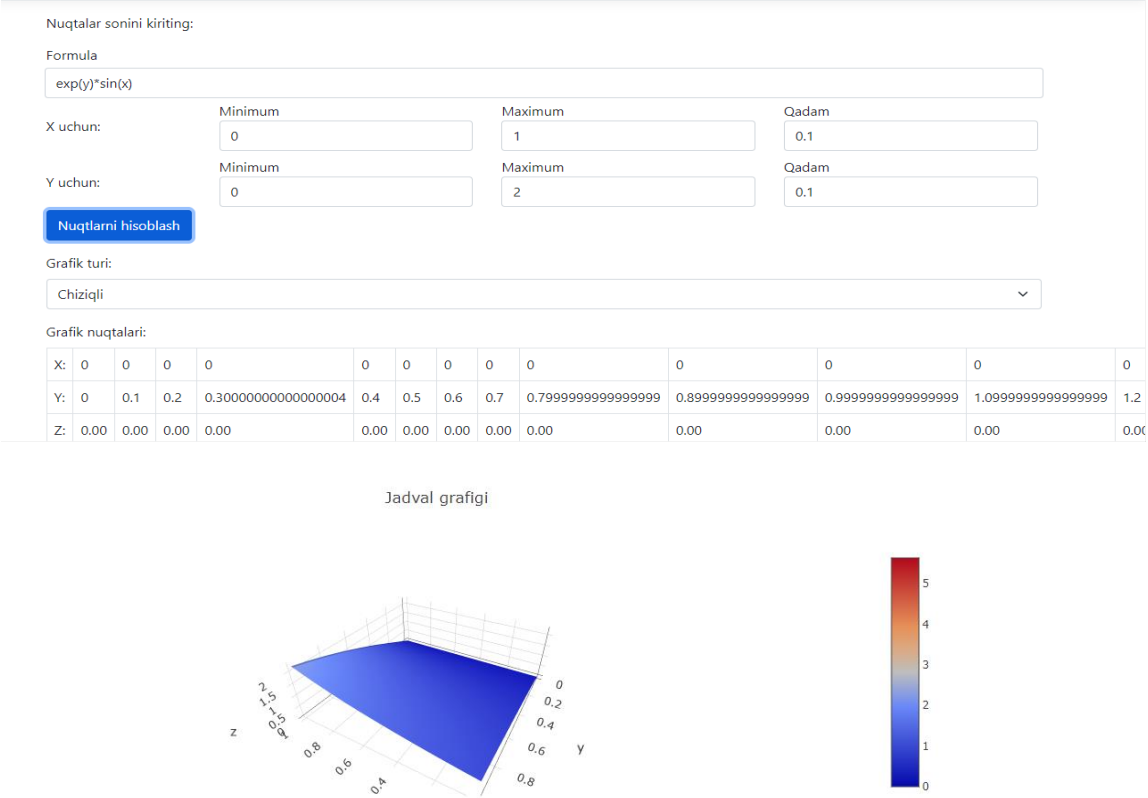
```
<div class="mb-3">
   <label for="grafik_turi" class="form-label">Grafik turi: </label>
   <select class="form-select" name="grafik_turi" id="grafik_turi">
      <option value="lines">Chiziqli</option>
      <option value="markers">Nuqtali</option>
      <option value="linear">Chiziqli + nuqtali</option>
      <option value="soha">Soha</option>
   </select>
</div>
<div class="mb-3">
   <label class="form-label">Grafik nuqtalari: </label>
   <table class="table table-bordered">
      <tr id="X">
         <td>X:</td>
      </tr>
      <tr id="Y">
         <td>Y:</td>
      </tr>
      <tr id="Z">
         <td>Z:</td>
      </tr>
   </table>
</div>

<button onclick="Chizish()" class="btn btn-primary">Chizish</button>

<div id='myDiv'></div>

<script src='/js/plotly-2.18.2.min.js'></script>

<script>
   function Nuqtalar_soni() {
      let nuqtalar_soni = document.getElementById('nuqtalar_soni').value;
      let X = document.getElementById('X');
      let Y = document.getElementById('Y');
      let Z = document.getElementById('Z');
      let _x = "", _y = "", _z = "";
      for (let i = 0; i < nuqtalar_soni; i++) {
```

```
            _x += ‘<td> <input type=text class="jadvalli_x" name="X[]" value="${i
+ 1}"> </td>‘;
            _y += ‘<td> <input type=text class="jadvalli_x" name="Y[]" value="${i
+ 1}"> </td>‘;
            _z += ‘<td> <input type=text class="jadvalli_y" name="Z[]"> </td>‘;
        }
        X.innerHTML = "<td>X:</td>" + _x;
        Y.innerHTML = "<td>Y:</td>" + _y;
        Z.innerHTML = "<td>Z:</td>" + _z;
    }

    function Chizish() {
        const Xs = [...document.querySelectorAll("input[name=‘X[]’]")].map(el =>
el.value);
        const Ys = [...document.querySelectorAll("input[name=‘Y[]’]")].map(el =>
el.value);
        const Zs = [...document.querySelectorAll("input[name=‘Z[]’]")].map(el =>
parseFloat(el.value));
        const shakl = document.getElementById(‘grafik_turi’).value;
        let turi = ‘scatter3d’;
        if ([‘linear’, ‘scatter’, ‘lines’].includes(shakl)) turi = ‘scatter3d’;
        if ([‘soha’].includes(shakl)) turi = ‘mesh3d’;
        if (turi === ‘scatter3d’) {
            var graph = {
                x: Xs,
                y: Ys,
                z: Zs,
                type: turi,
                mode: shakl,
            };
        }
        else {
    @* let _Xs = [], _Ys = [], _Zs = []; *@
    @* for (let i = -1; i <= 1; i = i + 0.1)
            for (let j = -1; j <= 1; j = j + 0.1) {
            _Xs.push(i);
            _Ys.push(j);
            _Zs.push(Math.cos(i) - Math.cos(j));
```

```
        } *@
    var graph = {
        x: Xs,
        y: Ys,
        z: Zs,
        type: turi,
    };
    }

    console.log(graph);
    var data = [graph];

    var layout = {
      title: 'Jadval grafigi',
      showlegend: false
    };

    Plotly.newPlot('myDiv', data, layout, { scrollZoom: true, modeBarButtonsToRemove: ['zoom2d', 'lasso2d', 'select2d', 'zoomIn2d', 'zoomOut2d', 'resetScale2d'] });
        }
</script>
```

Endi uzluksiz shaklda berilganlar uchun misol keltiramiz. Bir jinsli qattiq jism x nuqtasining t vaqtdagi harorati $z = f(x, y)$ bo‘lsin, bu yerda $x \in [0, \pi]$, $t \in [0,1]$. Agar qattiq jismning turli qismlarining harorati turlicha bo‘lsa, hususiy holda $z = e^{-a^2 t} \sin x$ formula bilan ifodalsh mumkin, bu yerda $a^2 = \frac{k}{c \cdot \rho}$, k - issiqlik o‘tkazuvchanlik koeffitsiyenti, ρ-qattiq jism zichligi, c - solishtirma issiqlik sig‘imi, misol uchun $a^2 = 2$ bo‘lsin.

ASP.NET dagi kodi va grafigi



Grafig kodi:

```
<p>Nuqtalar sonini kiriting: </p>
<div class="alert alert-danger" id=‘xato‘ style="display:none">
```

Formulada xato! Formulani tekshiring, o‘zgaruvchi sifatida x va y dan foydalaning!

```
</div>
<div class="mb-3">
  <div class="row g-1 align-items-center">
    <label for="formula">Formula</label>
    <input type="text" name="formula" id="formula" class="form-control">
  </div>
  <div class="row">
    <div class="col-2 align-self-center"> X uchun:</div>
    <div class="col-10">
      <div class="row">
        <div class="col m-1">
          <label for="min">Minimum</label>
          <input type="number" name="min" id="min" class="form-control">
        </div>
        <div class="col m-1">
```

```
                    <label for="max">Maximum</label>
                    <input type="number" name="max" id="max" class="form-
control">
                </div>
                <div class="col m-1">
                    <label for="h">Qadam</label>
                    <input type="number" name="h" id="h" class="form-control">
                </div>
            </div>
        </div>
        <div class="row">
            <div class="col-2 align-self-center">Y uchun:</div>
            <div class="col-10">
                <div class="row">
                <div class="col m-1">
                    <label for="miny">Minimum</label>
                    <input type="number" name="miny" id="miny" class="form-
control">
                </div>
                <div class="col m-1">
                    <label for="maxy">Maximum</label>
                    <input type="number" name="maxy" id="maxy" class="form-
control">
                </div>
                <div class="col m-1">
                    <label for="hy">Qadam</label>
                    <input type="number" name="hy" id="hy" class="form-control">
                </div>
            </div>
        </div>
        <button onclick="Nuqtalar_soni()" type="button" class="btn btn-
primary">Nuqtlarni hisoblash</button>
    </div>

    <div class="mb-3">
        <div class="mb-3">
```

```
        <label for="grafik_turi" class="form-label">Grafik turi: </label>
        <select class="form-select" name="grafik_turi" id="grafik_turi">
            <option value="lines">Chiziqli</option>
            <option value="markers">Nuqtali</option>
            <option value="linear">Chiziqli + nuqtali</option>
            <option value="soha">Soha</option>
        </select>
    </div>
    <label class="form-label">Grafik nuqtalari: </label>
    <table class="table table-bordered">
        <tr id="X">
            <td>X:</td>
        </tr>
        <tr id="Y">
            <td>Y:</td>
        </tr>
        <tr id="Z">
            <td>Z:</td>
        </tr>
    </table>
</div>

<button onclick="Chizish()" class="btn btn-primary">Chizish</button>

<div id='myDiv'></div>

<script src='/js/plotly-2.18.2.min.js'></script>
<script src="/js/parser.js"></script>

<script>
    let natijalar = [];
    let natijalar_srf = [];
    let turi = 't';
    let tickx = [], ticky = [];
    let tickx_ = [], ticky_ = [];
    function Nuqtalar_soni() {
        natijalar = [];
        natijalar_srf = [];
```

```
tickx = [], ticky = [];
tickx_ = [], ticky_ = [];

let formula = document.getElementById('formula').value;
let min = parseFloat(document.getElementById('min').value);
let max = parseFloat(document.getElementById('max').value);
let h = parseFloat(document.getElementById('h').value);
let miny = parseFloat(document.getElementById('miny').value);
let maxy = parseFloat(document.getElementById('maxy').value);
let hy = parseFloat(document.getElementById('hy').value);
let X = document.getElementById('X');
let Y = document.getElementById('Y');
let Z = document.getElementById('Z');
let _x = "", _y = "", _z = "";
natijalar = [];
natijalar_srf = [];
natijalar_srfx = [];
natijalar_srfy = [];
try {
    const ifoda = Parser.parse(formula);
    for (let i = min; i <= max; i = i + h) {
        srf = [];
        for (let j = miny; j <= maxy; j = j + hy) {
            const natija = ifoda.evaluate({ x: i, y: j });
            natijalar.push({ x: i, y: j, natija: natija.toFixed(2) })
            srf.push(natija.toFixed(2));
        }
        natijalar_srf.push(srf);
    }
    for (let i = min; i <= max; i = i + h) { tickx.push(i); tickx_.push(i); }
    for (let i = miny; i <= maxy; i = i + hy) { ticky.push(i); ticky_.push(i); }
    xato.style.display = 'none';
}
catch (error) {
    xato.style.display = 'block';
    return;
}
```

```
        for (let natija of natijalar) {
            _x += '<td name='X[]'>${natija.x}</td>';
            _y += '<td name='Y[]'>${natija.y}</td>';
            _z += '<td name='Z[]'>${natija.natija}</td>';
        }
        X.innerHTML = "<td>X:</td>" + _x;
        Y.innerHTML = "<td>Y:</td>" + _y;
        Z.innerHTML = "<td>Z:</td>" + _z;
    }
    let Xs = [], Ys = [], Zs = [];
    function Chizish() {
        Xs = [...document.querySelectorAll("td[name='X[]']")].map(el =>
el.textContent);
        Ys = [...document.querySelectorAll("td[name='Y[]']")].map(el =>
el.textContent);
        Zs = [...document.querySelectorAll("td[name='Z[]']")].map(el =>
parseFloat(el.textContent));
        const shakl = document.getElementById('grafik_turi').value;
        turi = 'scatter3d';
        if (['linear', 'scatter', 'lines'].includes(shakl)) turi = 'scatter3d';
        if (['soha'].includes(shakl)) turi = 'mesh3d';
        if (['soha'].includes(shakl)) turi = 'surface';
        if (turi === 'scatter3d') {
            var graph = {
                x: Xs,
                y: Ys,
                z: Zs,
                type: turi,
                mode: shakl,
            };
        }
        else {
            var graph = {
                x: tickx,
                y: ticky,
    @* z: Zs, *@
                z: natijalar_srf,
```

```
            type: turi,
@* colorscale: ‘Greens’, *@
        };
}
@* console.log(Xs); *@
@* console.log(graph); *@
var data = [graph];

var layout = {
   title: ‘Jadval grafigi’,
   showlegend: false
};
rangemin = Math.min(...Zs);
rangemax = Math.max(...Zs);
rangeXmin = Math.min(...Xs);
rangeXmax = Math.max(...Xs);
rangeYmin = Math.min(...Ys);
rangeYmax = Math.max(...Ys);
var layout_srf = {
   title: ‘Jadval grafigi’,
   showlegend: false,
   scene: {
      aspectmode: "manual",
      aspectratio: {
@* x: 3.5, y: 3.5, z: 1, *@
   x: 3, y: 3, z: 1,
      },
xaxis: {
@* nticks: tickx.length, *@
@* ticktext: tickx, *@
@* tickvals: tickx_, *@
@* tick0: -10, *@
@* range: [-200, 100], *@
@* range: [rangeXmin * 5, rangeXmax * 5], *@
      },
yaxis: {
   nticks: 7,
@* range: [-100, 100], *@
```

```
        @* range: [rangeYmin * 5, rangeYmax * 5], *@
            },
        zaxis: {
           nticks: 10,
        @* range: [rangemin * 5, rangemax * 5], *@
            }
           },
        };
        console.log(rangemin * 5, rangemax * 5);
        if (turi == 'surface') layout = layout_srf;

        Plotly.newPlot('myDiv', data, layout, { scrollZoom: true, modeBarButtonsToRemove: ['zoom2d', 'lasso2d', 'select2d', 'zoomIn2d', 'zoomOut2d', 'resetScale2d'] });
        }
    </script>
```

FOYDALANILGAN ADABIYOTLAR RO'YXATI: (REFERENCES)

1. Романова И.К. Современные методы визуализации многомерных данных: анализ, классификация, реализация, приложения в технических системах. Наука и Образование. МГТУ им. Н.Э. Баумана. Электрон. журн. 2016. № 03. С. 133–167.
2.https://learn.microsoft.com/ru-ru/aspnet/web-pages/overview/data/7-displaying-data-in-a-chart
3. https://professorweb.ru/