Systemy CAD/CAE 2024/2025

Zadanie 1

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Zmodyfikowany fragment kodu odpowiedzialny za rysowanie kombinacji liniowej splajnów

```matlab
% My implementation
if (nr ~= size(coeff_vector, 2))
    disp("Poorly constructed coeff_vector")
end

u = zeros(size(x));
for j=1:nr
    u = u + coeff_vector(j) * compute_splines(knot_vector, p, j, x);
end

% Plot with background image
figure;
plot(x, u, 'LineWidth', 3, 'color', 'red');
axis tight;
hold on;
I = imread('image.jpg');
I_flipped = flipud(I);      % Flip image vertically - to fix coordinates
h = image('CData', I_flipped, 'XData', [0, 100], 'YData', [0, 100]);
uistack(h, 'bottom');       % Send image to background
hold off;
saveas(gcf, 'spline_on_image.png');

% Plot without background image
figure;
plot(x, u, 'LineWidth', 3, 'color', 'red');
axis tight;
xlim([0, 100]);
ylim([0, 100]);
saveas(gcf, 'spline_only.png');

% End of my implementation
```
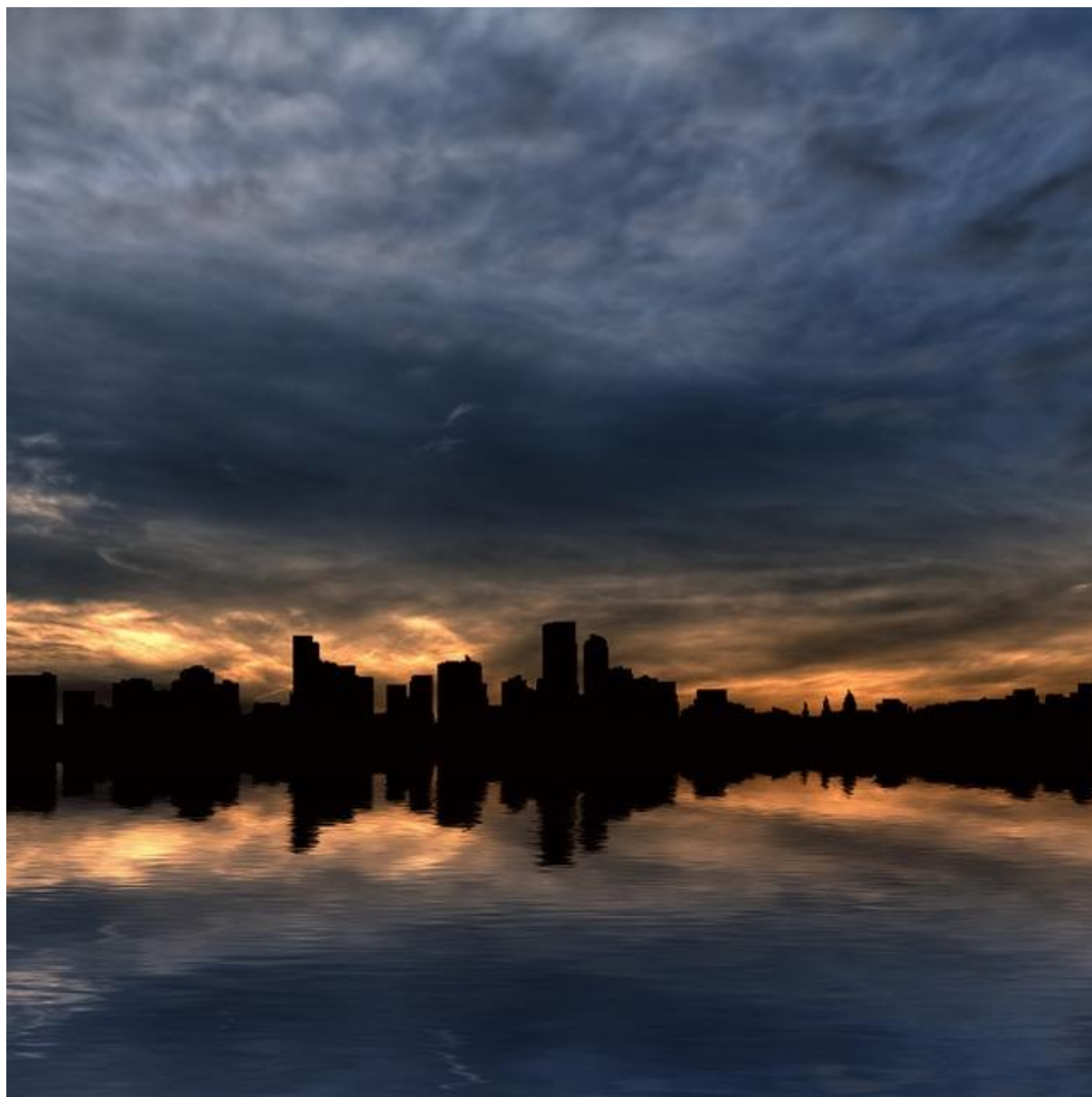
Wektory

Wektor węzłów (knot vector)

```
[0, 0, 0.62, 3.44, 4.38, 4.84, 5.16, 5.31, 7.81, 7.97, 9.38, 10.0, 10.78,
11.56, 13.12, 13.44, 15.0, 15.62, 16.09, 17.34, 18.12, 19.22, 19.53, 20.62,
21.41, 21.72, 22.5, 22.81, 25.0, 25.62, 25.94, 26.09, 27.97, 28.28, 28.59,
29.22, 30.0, 31.87, 32.03, 33.28, 33.75, 34.69, 34.84, 36.25, 37.03, 37.19,
38.59, 39.53, 41.25, 42.97, 43.91, 45.0, 45.16, 46.25, 48.44, 48.75, 49.06,
51.56, 52.03, 52.34, 52.81, 53.59, 55.0, 55.16, 56.41, 57.19, 58.44, 60.62,
61.72, 62.97, 63.12, 65.78, 65.94, 67.34, 69.06, 70.16, 72.19, 72.97, 73.12,
73.59, 74.38, 75.16, 75.31, 75.94, 76.25, 76.72, 77.34, 77.66, 79.06, 79.53,
81.56, 82.19, 82.97, 84.53, 86.41, 88.28, 90.78, 92.03, 92.81, 93.59, 94.22,
95.0, 96.25, 97.81, 98.12, 99.38, 100, 100]
```
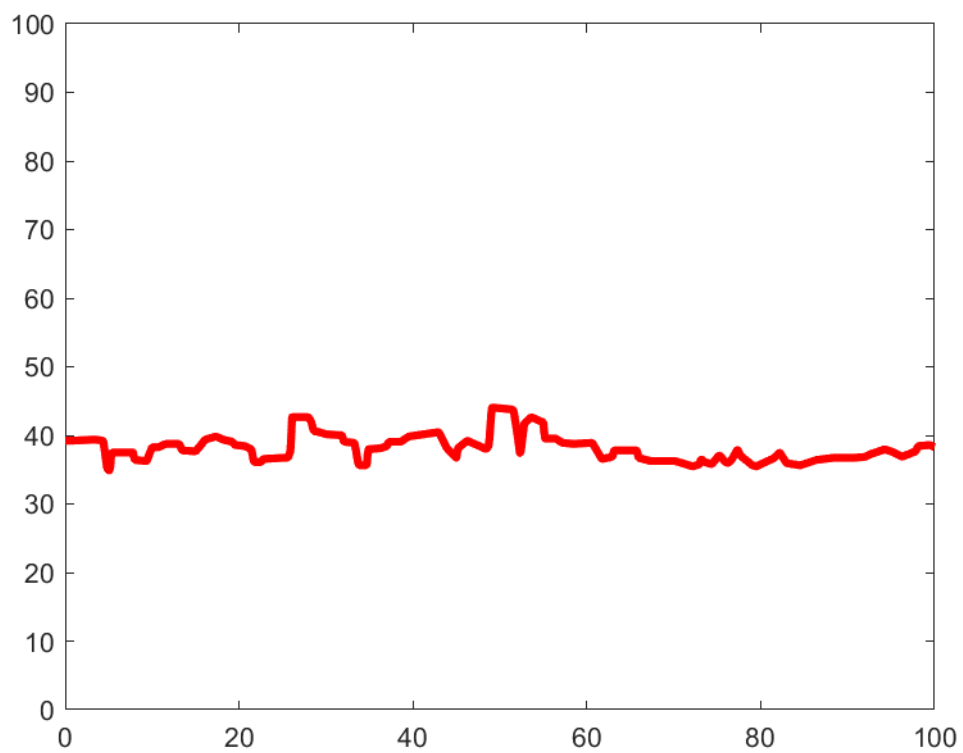
Wektor współczynników (coefficient vector)

```
[39.22, 39.22, 39.38, 39.22, 35.0, 34.84, 37.5, 37.5, 36.41, 36.25, 38.28,
38.28, 38.75, 38.75, 37.81, 37.66, 38.59, 39.38, 39.84, 39.38, 39.06, 38.59,
38.44, 37.97, 36.09, 36.09, 36.56, 36.72, 36.72, 37.81, 42.66, 42.66, 42.03,
40.62, 40.47, 40.16, 40.0, 39.06, 38.91, 35.62, 35.62, 37.97, 38.12, 38.44,
39.06, 39.06, 39.84, 40.16, 40.47, 38.12, 36.72, 38.12, 39.22, 37.97, 38.59,
44.06, 43.75, 40.0, 37.03, 41.72, 42.66, 41.87, 39.53, 39.53, 38.91, 38.75,
38.91, 36.56, 36.88, 37.81, 37.81, 36.72, 36.25, 36.25, 36.25, 35.47, 35.78,
36.56, 36.09, 35.78, 37.03, 37.03, 36.09, 35.94, 36.56, 37.97, 37.03, 35.62,
35.47, 36.72, 37.5, 35.94, 35.62, 36.41, 36.72, 36.72, 36.88, 37.34, 37.66,
37.97, 37.66, 36.88, 37.66, 38.44, 38.59, 38.28]
```
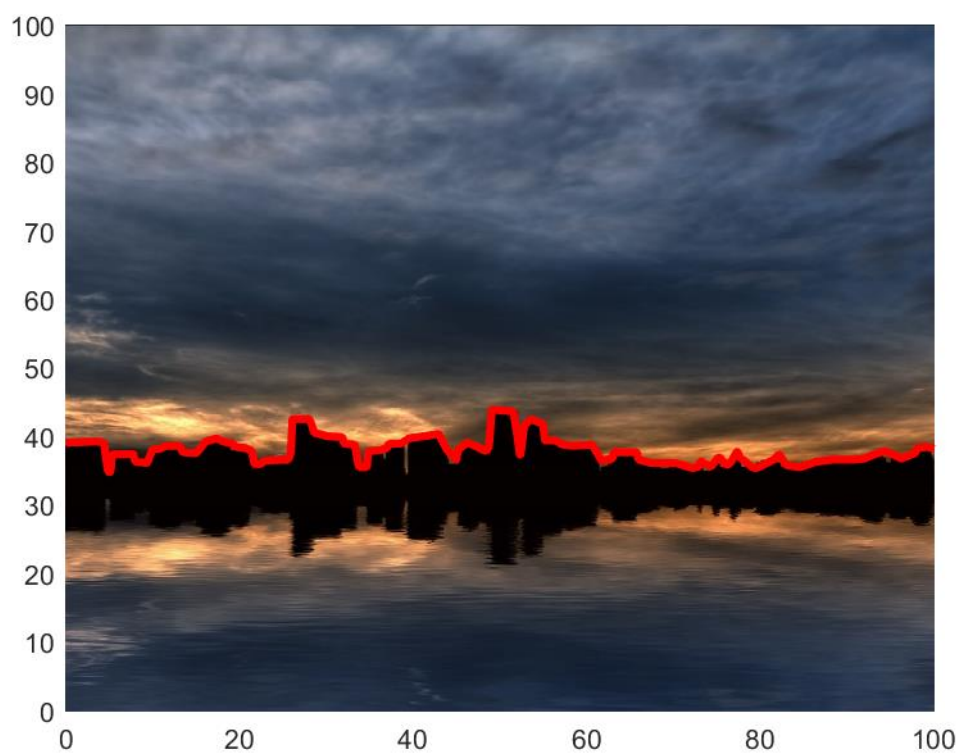
Wyniki

Rysunek 1. Panorama

Rysunek 2. Kombinacja liniowa splajnów

Rysunek 3. Panorama z kombinacją liniową B-Splajnów