**Q9: Inventory Search using Interpolation Search**: Implement an **interpolation search** algorithm for finding items in an inventory management system where the data distribution is uniform. Compare its performance with binary and linear search algorithms.

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>Interpolation Search</title>

<style>

body {

font-family: Arial, sans-serif;

margin: 20px;

padding: 10px;

background-color: #f4f4f4;

}

#inventory {

font-size: 16px;

}

.search-result {

font-weight: bold;

color: green;

}

.not-found {

font-weight: bold;

color: red;

}

</style>

</head>

<body>

<h1>Inventory Search using Interpolation Search</h1>

<div>

<label for="search">Search for an item: </label>

<input type="number" id="search" placeholder="Enter item number" />

<button onclick="searchItem()">Search</button>

</div>

<div id="inventory">

<p><strong>Inventory List (sorted by item number):</strong></p>

<p>Item Numbers: [10, 22, 30, 40, 45, 50, 60, 70, 80, 90]</p>

</div>

<div id="result" class="search-result"></div>

<script>

const inventory = [10, 22, 30, 40, 45, 50, 60, 70, 80, 90]; // Sorted inventory

// Interpolation Search function

function interpolationSearch(arr, x) {

let low = 0;

let high = arr.length - 1;

while (low <= high && x >= arr[low] && x <= arr[high]) {

if (low === high) {

if (arr[low] === x) return low;

return -1;

}

const pos = low + Math.floor(((x - arr[low]) \* (high - low)) / (arr[high] - arr[low]));

if (arr[pos] === x) return pos;

if (arr[pos] < x) low = pos + 1;

else high = pos - 1;

}

return -1; // Not found

}

// Search handler

function searchItem() {

const searchValue = document.getElementById('search').value;

if (searchValue === '') {

document.getElementById('result').innerHTML = 'Please enter an item number to search.';

return;

}

const index = interpolationSearch(inventory, parseInt(searchValue));

if (index !== -1) {

document.getElementById('result').innerHTML = `Item found at position ${index}.`;

document.getElementById('result').className = 'search-result';

} else {

document.getElementById('result').innerHTML = 'Item not found in the inventory.';

document.getElementById('result').className = 'not-found';

}

}

</script>

</body>

</html>