In [11]:
```
import cv2
import numpy as np
import matplotlib.pyplot as plt
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split
from sklearn.metrics import classification_report
from sklearn.preprocessing import LabelEncoder, StandardScaler
from sklearn.svm import SVC
from sklearn.tree import DecisionTreeClassifier
from skimage.feature import graycomatrix, graycoprops
import os

def load_dataset(images_dir):
    features_list = []
    categories_list = []

    for category_name in os.listdir(images_dir):
        category_path = os.path.join(images_dir, category_name)

        if os.path.isdir(category_path) and not category_name.startswith(
            for img_file in os.listdir(category_path):
                if img_file.lower().endswith(('.png', '.jpg', '.jpeg')):
                    img_path = os.path.join(category_path, img_file)

                    img_data = cv2.imread(img_path, cv2.IMREAD_GRAYSCALE)
                    if img_data is not None:
                        feature_vector = compute_texture_descriptors(img_
                        features_list.append(feature_vector)
                        categories_list.append(category_name)

    return np.array(features_list), np.array(categories_list)

def analyze_image_intensity(gray_img, num_bins=256):
    intensity_dist = cv2.calcHist([gray_img], [0], None, [num_bins], [0,
    intensity_dist = intensity_dist.flatten()
    intensity_dist = intensity_dist / intensity_dist.sum()

    intensity_values = np.arange(num_bins)
    stats_results = {}

    stats_results['average'] = np.sum(intensity_dist * intensity_values)

    variance = np.sum(intensity_dist * (intensity_values - stats_results[
    stats_results['deviation'] = np.sqrt(variance)

    if stats_results['deviation'] > 0:
        stats_results['asymmetry'] = np.sum(intensity_dist * ((intensity_
    else:
        stats_results['asymmetry'] = 0

    if stats_results['deviation'] > 0:
        stats_results['peakedness'] = np.sum(intensity_dist * ((intensity
    else:
        stats_results['peakedness'] = -3

    non_zero_probs = intensity_dist[intensity_dist > 0]
    stats_results['randomness'] = -np.sum(non_zero_probs * np.log2(non_ze
```

```
    cumulative_dist = np.cumsum(intensity_dist)
    stats_results['percentile_25'] = np.argmax(cumulative_dist >= 0.25)
    stats_results['percentile_50'] = np.argmax(cumulative_dist >= 0.5)
    stats_results['percentile_75'] = np.argmax(cumulative_dist >= 0.75)

    occupied_bins = np.where(intensity_dist > 0)[0]
    if len(occupied_bins) > 0:
        stats_results['lowest'] = occupied_bins[0]
        stats_results['highest'] = occupied_bins[-1]
    else:
        stats_results['lowest'] = 0
        stats_results['highest'] = 255

    return stats_results, intensity_dist

def compute_texture_descriptors(gray_img, num_bins=256):
    stats, dist = analyze_image_intensity(gray_img, num_bins)

    descriptors = [
        stats['average'],
        stats['deviation'],
        stats['asymmetry'],
        stats['peakedness'],
        stats['randomness'],
        stats['percentile_25'],
        stats['percentile_50'],
        stats['percentile_75'],
        stats['lowest'],
        stats['highest']
    ]

    return np.array(descriptors)

def visualize_texture_samples(images_dir, samples_count):
    categories = [f for f in os.listdir(images_dir)
                  if os.path.isdir(os.path.join(images_dir, f)) and not f.

    fig, axes = plt.subplots(samples_count, 3, figsize=(15, 5*samples_cou

    for idx in range(min(samples_count, len(categories))):
        category = categories[idx]
        category_path = os.path.join(images_dir, category)

        image_files = [f for f in os.listdir(category_path)
                       if f.lower().endswith(('.png', '.jpg', '.jpeg'))]

        if len(image_files) > 0:
            sample_path = os.path.join(category_path, image_files[0])
            sample_img = cv2.imread(sample_path, cv2.IMREAD_GRAYSCALE)

            if sample_img is not None:
                stats, intensity_plot = analyze_image_intensity(sample_im

                axes[idx, 0].imshow(sample_img, cmap='gray')
                axes[idx, 0].set_title(f'{category}')
                axes[idx, 0].axis('off')

                axes[idx, 1].bar(range(256), intensity_plot, alpha=0.7, c
                axes[idx, 1].set_title('Интенсивность пикселей')
```

```
                stats_text = (
                    f"Среднее: {stats['average']:.2f}\n"
                    f"Отклонение: {stats['deviation']:.2f}\n"
                    f"Асимметрия: {stats['asymmetry']:.2f}\n"
                    f"Эксцесс: {stats['peakedness']:.2f}\n"
                    f"Энтропия: {stats['randomness']:.2f}\n"
                    f"Диапазон: {stats['lowest']}/{stats['highest']}"
                )

                axes[idx, 2].text(0.1, 0.9, stats_text, transform=axes[id
                                  fontsize=10, verticalalignment='top')
                axes[idx, 2].axis('off')

    plt.tight_layout()
    plt.show()

def calculate_laws_features(img_data, normalize=True):
    L5 = np.array([1,  4,  6,  4,  1])
    E5 = np.array([-1, -2,  0,  2,  1])
    S5 = np.array([-1,  0,  2,  0, -1])
    W5 = np.array([-1,  2,  0, -2,  1])
    R5 = np.array([1,  -4,  6, -4,  1])

    kernels_1d = [L5, E5, S5, W5, R5]
    kernel_labels = ['L5', 'E5', 'S5', 'W5', 'R5']

    filters_2d = []
    filter_labels = []

    for i, kernel_x in enumerate(kernels_1d):
        for j, kernel_y in enumerate(kernels_1d):
            filter_kernel = np.outer(kernel_x, kernel_y)
            filters_2d.append(filter_kernel)
            filter_labels.append(f"{kernel_labels[i]}{kernel_labels[j]}")

    feature_vector = []
    feature_labels = []

    for kernel, label in zip(filters_2d, filter_labels):
        filtered_image = cv2.filter2D(img_data.astype(np.float32), -1, ke
        texture_energy = np.mean(filtered_image ** 2)
        feature_vector.append(texture_energy)
        feature_labels.append(f"laws_{label}")

    feature_vector = np.array(feature_vector)

    if normalize and np.sum(feature_vector) > 0:
        feature_vector = feature_vector / np.sum(feature_vector)

    return feature_vector, feature_labels

def calculate_glcm_descriptors(img_data, distances=[1], angles=[0, np.pi/
    img_data = (img_data // 8).astype(np.uint8)

    glcm_matrix = graycomatrix(img_data, distances=distances, angles=angl
                               levels=32, symmetric=True, normed=True)

    descriptors = []
    properties = ['contrast', 'dissimilarity', 'homogeneity', 'energy', '
```

```
    for prop in properties:
        descriptor_value = np.mean(graycoprops(glcm_matrix, prop))
        descriptors.append(descriptor_value)

    return np.array(descriptors)

images_directory = "./KTH_TIPS"
features_data, target_labels = load_dataset(images_directory)

print(f"Загружено данных: {features_data.shape}")
print(f"Уникальных категорий: {len(np.unique(target_labels))}")

visualize_texture_samples(images_directory, samples_count=2)

image_files_list = []
for category_dir in os.listdir(images_directory):
    full_category_path = os.path.join(images_directory, category_dir)
    if os.path.isdir(full_category_path):
        for filename in os.listdir(full_category_path):
            if filename.lower().endswith(('.png', '.jpg', '.jpeg')):
                image_files_list.append(os.path.join(full_category_path,

print(f"Обнаружено изображений: {len(image_files_list)}")

histogram_features = []
laws_features = []
glcm_features = []
image_labels = []

for idx, file_path in enumerate(image_files_list):
    if idx % 50 == 0:
        print(f"Обработка {idx}/{len(image_files_list)}")

    img = cv2.imread(file_path, cv2.IMREAD_GRAYSCALE)
    img = cv2.resize(img, (128, 128), interpolation=cv2.INTER_AREA)

    hist_feats = compute_texture_descriptors(img)
    laws_feats, _ = calculate_laws_features(img)
    glcm_feats = calculate_glcm_descriptors(img)

    histogram_features.append(hist_feats)
    laws_features.append(laws_feats)
    glcm_features.append(glcm_feats)

    category = os.path.basename(os.path.dirname(file_path))
    image_labels.append(category)

histogram_features = np.array(histogram_features)
laws_features = np.array(laws_features)
glcm_features = np.array(glcm_features)
image_labels = np.array(image_labels)

print(f"Размерность признаков: {histogram_features.shape}")

label_encoder = LabelEncoder()
encoded_labels = label_encoder.fit_transform(image_labels)

feature_sets = {
    'Гистограмма': histogram_features,
    'Laws': laws_features,
```

```
    'GLCM': glcm_features
}

classifiers = {
    'kNN': KNeighborsClassifier(n_neighbors=3, n_jobs=-1),
    'SVM': SVC(kernel='rbf', random_state=42),
    'Дерево': DecisionTreeClassifier(random_state=42, max_depth=10)
}

trained_classifiers = {}

for feature_name, feature_matrix in feature_sets.items():
    print(f"\n{feature_name.upper()}")

    X_tr, X_te, y_tr, y_te = train_test_split(
        feature_matrix, encoded_labels, test_size=0.25, random_state=42,
    )

    normalizer = StandardScaler()
    X_tr_norm = normalizer.fit_transform(X_tr)
    X_te_norm = normalizer.transform(X_te)

    current_models = {}

    for clf_name, clf_template in classifiers.items():
        if clf_name == 'kNN':
            model = KNeighborsClassifier(n_neighbors=3, n_jobs=-1)
        elif clf_name == 'SVM':
            model = SVC(kernel='rbf', random_state=42)
        elif clf_name == 'Дерево':
            model = DecisionTreeClassifier(random_state=42, max_depth=10)

        if clf_name == 'SVM':
            model.fit(X_tr_norm, y_tr)
            predictions = model.predict(X_te_norm)
            current_models[clf_name] = (model, normalizer)
        else:
            model.fit(X_tr, y_tr)
            predictions = model.predict(X_te)
            current_models[clf_name] = model

        print(f"{clf_name}")
        print(classification_report(y_te, predictions, target_names=label
        print()

    trained_classifiers[feature_name] = current_models

best_models = {
    'Hist_kNN': trained_classifiers['Гистограмма']['kNN'],
    'Laws_Tree': trained_classifiers['Laws']['Дерево'],
    'Laws_SVM': trained_classifiers['Laws']['SVM']
}

def perform_texture_segmentation(model_data, model_id, input_image_path,
    target_image = cv2.imread(input_image_path, cv2.IMREAD_GRAYSCALE)
    if target_image is None:
        return None

    height, width = target_image.shape
    segmentation_result = np.zeros((height, width), dtype=np.uint8)
```

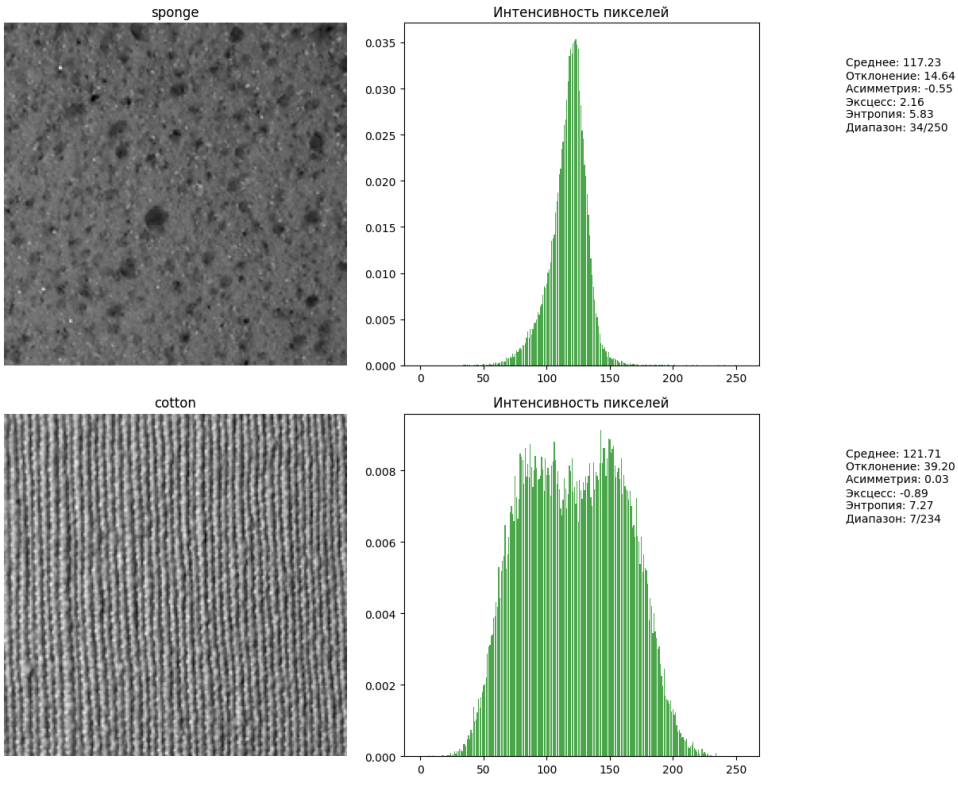
```
    all_predictions = []
    patch_positions = []

    for y in range(0, height - window_size + 1, stride):
        for x in range(0, width - window_size + 1, stride):
            image_patch = target_image[y:y+window_size, x:x+window_size]

            if 'Hist' in model_id:
                patch_features = compute_texture_descriptors(image_patch)
            elif 'Laws' in model_id:
                patch_features, _ = calculate_laws_features(image_patch)
            elif 'GLCM' in model_id:
                patch_features = calculate_glcm_descriptors(image_patch)

            if isinstance(model_data, tuple):
                classifier, feature_scaler = model_data
                scaled_features = feature_scaler.transform(patch_features
                predicted_class = classifier.predict(scaled_features)[0]
            else:
                classifier = model_data
                predicted_class = classifier.predict(patch_features.resha

            segmentation_result[y:y+window_size, x:x+window_size] = predi
            all_predictions.append(predicted_class)
            patch_positions.append((y, x))

    unique_classes, class_counts = np.unique(all_predictions, return_coun

    dominant_classes = unique_classes[np.argsort(class_counts)[-num_class

    filtered_segmentation = np.zeros_like(segmentation_result)

    for new_idx, original_class in enumerate(dominant_classes):
        filtered_segmentation[segmentation_result == original_class] = ne

    remaining_pixels = ~np.isin(segmentation_result, dominant_classes)
    if np.any(remaining_pixels):
        filtered_segmentation[remaining_pixels] = 1

    print(f"Классы после фильтрации: {np.unique(filtered_segmentation)}")

    return filtered_segmentation

target_image_path = "./tests/xleb.jpg"
input_image = cv2.imread(target_image_path, cv2.IMREAD_GRAYSCALE)
reference_mask = cv2.imread("./tests/xleb_mask.jpg", cv2.IMREAD_GRAYSCALE

print(f"Изображение загружено: {input_image is not None}")
print(f"Маска загружена: {reference_mask is not None}")

if input_image is not None:
    segmentation_results = []
    model_identifiers = []

    for model_id, model_data in best_models.items():
        print(f"   Модель: {model_id}")

        segmentation_map = perform_texture_segmentation(model_data, model
                                                        window_size=16, st
```

```
        if segmentation_map is not None:
            segmentation_results.append(segmentation_map)
            model_identifiers.append(model_id)
            print(f"   Успешно завершено")
        else:
            print(f"   Ошибка обработки")

    if segmentation_results:
        fig, axes = plt.subplots(1, 3, figsize=(15, 5))

        for idx, (seg_map, model_id) in enumerate(zip(segmentation_result
            if 'Hist' in model_id:
                method_name = 'Гистограмма'
                classifier_type = 'kNN'
            elif 'Laws' in model_id:
                method_name = 'Laws'
                if 'Tree' in model_id:
                    classifier_type = 'Дерево'
                else:
                    classifier_type = 'SVM'

            axes[idx].imshow(input_image, cmap='gray', alpha=0.7)
            axes[idx].imshow(seg_map, cmap='viridis', alpha=0.6)
            axes[idx].set_title(f'{method_name} + {classifier_type}', fon
            axes[idx].axis('off')

        plt.tight_layout()
        plt.show()

        print(f"Успешно обработано: {len(segmentation_results)}/3")
    else:
        print("Все модели завершились с ошибкой!")
else:
    print(f"Ошибка загрузки: {target_image_path}")

def simplify_color_scheme(mask_array, max_colors=3):
    unique_colors, color_counts = np.unique(mask_array, return_counts=Tru

    sorted_colors = unique_colors[np.argsort(-color_counts)]
    dominant_colors = sorted_colors[:max_colors]

    print(f"Доминирующие цвета: {dominant_colors}")
    print(f"Количество пикселей: {color_counts[np.argsort(-color_counts)[

    simplified_mask = np.zeros_like(mask_array)

    for new_color, original_color in enumerate(dominant_colors):
        simplified_mask[mask_array == original_color] = new_color

    print(f"Сопоставление: {dominant_colors} -> {list(range(len(dominant_

    return simplified_mask

reference_mask = cv2.imread("./tests/xleb_mask.jpg", cv2.IMREAD_GRAYSCALE
if reference_mask is not None:
    processed_reference_mask = simplify_color_scheme(reference_mask, max_

    plt.figure(figsize=(12, 5))
```

```
    plt.subplot(1, 3, 1)
    plt.imshow(reference_mask, cmap='gray')
    plt.title(f'Исходная маска\n{len(np.unique(reference_mask))} цветов')
    plt.colorbar()

    plt.subplot(1, 3, 2)
    plt.imshow(processed_reference_mask, cmap='plasma')
    plt.title('Упрощенная маска\n3 основных цвета')
    plt.colorbar()

    plt.tight_layout()
    plt.show()

from sklearn.metrics import accuracy_score, jaccard_score

def evaluate_segmentation_quality(ground_truth_mask, predicted_mask, mode

    if ground_truth_mask.shape != predicted_mask.shape:
        print(f"Размеры масок отличаются: эталон {ground_truth_mask.shape
        resized_prediction = cv2.resize(predicted_mask, (ground_truth_mas
                                        interpolation=cv2.INTER_NEAREST)
    else:
        resized_prediction = predicted_mask

    gt_classes = np.unique(ground_truth_mask)
    pred_classes = np.unique(resized_prediction)

    print(f"Классы в эталоне: {gt_classes}")
    print(f"Классы в предсказании: {pred_classes}")

    class_correspondence = {
        0: 2,
        1: 1,
        2: 0
    }

    aligned_prediction = resized_prediction.copy()
    for pred_class, gt_class in class_correspondence.items():
        aligned_prediction[resized_prediction == pred_class] = gt_class

    pixel_accuracy = accuracy_score(ground_truth_mask.flatten(), aligned_

    print(f"Точность: {pixel_accuracy:.1%}")
    print(f"Метрика IoU по классам:")

    for class_id in gt_classes:
        class_iou = jaccard_score(ground_truth_mask.flatten(), aligned_pr
                                  average=None, labels=[class_id])[0]
        print(f"   Класс {class_id}: {class_iou:.3f}")

    fig, axes = plt.subplots(1, 3, figsize=(18, 6))

    axes[0].imshow(original_image, cmap='gray')
    axes[0].set_title('Исходное изображение')
    axes[0].axis('off')

    axes[1].imshow(ground_truth_mask, cmap='plasma')
    axes[1].set_title('Эталонная разметка')
    axes[1].axis('off')
```

```
    axes[2].imshow(aligned_prediction, cmap='plasma')
    axes[2].set_title(f'Предсказание сегментации')
    axes[2].axis('off')

    plt.tight_layout()
    plt.show()

    return pixel_accuracy

target_image_path = "./tests/xleb.jpg"
input_image = cv2.imread(target_image_path, cv2.IMREAD_GRAYSCALE)

selected_model_id = 'Laws_SVM'
selected_model_data = best_models[selected_model_id]

print("Запуск сегментации...")
result_mask = perform_texture_segmentation(
    selected_model_data, selected_model_id, target_image_path,
    window_size=32, stride=8, num_classes=3
)

print(f"Результат: {result_mask.shape}")
print(f"Классы в результате: {np.unique(result_mask)}")

if processed_reference_mask is not None and result_mask is not None and i
    accuracy_value = evaluate_segmentation_quality(processed_reference_ma
    print(f"Итоговая точность: {accuracy_value*100:.1f}%")
```

```
Загружено данных: (810, 10)
Уникальных категорий: 10
```



```
Обнаружено изображений: 810
Обработка 0/810
Обработка 50/810
Обработка 100/810
Обработка 150/810
Обработка 200/810
Обработка 250/810
Обработка 300/810
Обработка 350/810
Обработка 400/810
Обработка 450/810
Обработка 500/810
Обработка 550/810
Обработка 600/810
Обработка 650/810
Обработка 700/810
Обработка 750/810
Обработка 800/810
Размерность признаков: (810, 10)

ГИСТОГРАММА
kNN
                precision    recall  f1-score   support

aluminium_foil       0.95      0.95      0.95        20
   brown_bread       0.86      0.95      0.90        20
      corduroy       0.66      0.95      0.78        20
        cotton       0.59      0.62      0.60        21
       cracker       0.83      0.90      0.86        21
         linen       0.94      0.75      0.83        20
   orange_peel       1.00      0.90      0.95        21
     sandpaper       0.54      0.35      0.42        20
        sponge       0.83      0.75      0.79        20
     styrofoam       0.90      0.95      0.93        20

      accuracy                           0.81       203
     macro avg       0.81      0.81      0.80       203
  weighted avg       0.81      0.81      0.80       203


SVM
                precision    recall  f1-score   support

aluminium_foil       1.00      1.00      1.00        20
   brown_bread       0.83      0.75      0.79        20
      corduroy       0.65      0.85      0.74        20
        cotton       0.76      0.62      0.68        21
       cracker       0.74      0.95      0.83        21
         linen       0.80      0.80      0.80        20
   orange_peel       0.95      0.86      0.90        21
     sandpaper       0.87      0.65      0.74        20
        sponge       0.90      0.90      0.90        20
     styrofoam       0.90      0.95      0.93        20

      accuracy                           0.83       203
     macro avg       0.84      0.83      0.83       203
  weighted avg       0.84      0.83      0.83       203


Дерево
```

```
                precision    recall  f1-score   support

aluminium_foil       0.95      1.00      0.98        20
   brown_bread       0.90      0.90      0.90        20
      corduroy       0.70      0.95      0.81        20
        cotton       0.79      0.71      0.75        21
       cracker       0.73      0.76      0.74        21
         linen       0.89      0.85      0.87        20
   orange_peel       1.00      0.81      0.89        21
     sandpaper       0.76      0.65      0.70        20
        sponge       0.84      0.80      0.82        20
     styrofoam       0.91      1.00      0.95        20

      accuracy                           0.84       203
     macro avg       0.85      0.84      0.84       203
  weighted avg       0.85      0.84      0.84       203



LAWS
kNN
                precision    recall  f1-score   support

aluminium_foil       1.00      0.95      0.97        20
   brown_bread       0.57      0.85      0.68        20
      corduroy       0.76      0.80      0.78        20
        cotton       0.91      0.48      0.62        21
       cracker       0.68      0.62      0.65        21
         linen       0.69      0.45      0.55        20
   orange_peel       0.75      0.86      0.80        21
     sandpaper       0.65      0.55      0.59        20
        sponge       0.78      0.90      0.84        20
     styrofoam       0.58      0.75      0.65        20

      accuracy                           0.72       203
     macro avg       0.74      0.72      0.71       203
  weighted avg       0.74      0.72      0.71       203


SVM
                precision    recall  f1-score   support

aluminium_foil       1.00      0.95      0.97        20
   brown_bread       0.35      0.35      0.35        20
      corduroy       0.92      0.60      0.73        20
        cotton       1.00      0.48      0.65        21
       cracker       0.68      0.62      0.65        21
         linen       1.00      0.55      0.71        20
   orange_peel       0.30      1.00      0.47        21
     sandpaper       0.18      0.10      0.13        20
        sponge       0.25      0.20      0.22        20
     styrofoam       0.40      0.30      0.34        20

      accuracy                           0.52       203
     macro avg       0.61      0.51      0.52       203
  weighted avg       0.61      0.52      0.52       203


Дерево
                precision    recall  f1-score   support
```

```
aluminium_foil       1.00      0.95      0.97        20
   brown_bread       0.81      0.85      0.83        20
      corduroy       0.89      0.85      0.87        20
        cotton       0.82      0.67      0.74        21
       cracker       0.65      0.62      0.63        21
         linen       0.86      0.90      0.88        20
   orange_peel       0.90      0.86      0.88        21
     sandpaper       0.54      0.35      0.42        20
        sponge       0.50      0.75      0.60        20
     styrofoam       0.65      0.75      0.70        20

      accuracy                           0.75       203
     macro avg       0.76      0.75      0.75       203
  weighted avg       0.76      0.75      0.75       203
```

GLCM
kNN

```
                precision    recall  f1-score   support

aluminium_foil       0.90      0.90      0.90        20
   brown_bread       0.31      0.55      0.40        20
      corduroy       0.32      0.40      0.36        20
        cotton       0.42      0.38      0.40        21
       cracker       0.48      0.52      0.50        21
         linen       0.38      0.30      0.33        20
   orange_peel       0.59      0.76      0.67        21
     sandpaper       0.38      0.25      0.30        20
        sponge       0.43      0.30      0.35        20
     styrofoam       0.73      0.40      0.52        20

      accuracy                           0.48       203
     macro avg       0.49      0.48      0.47       203
  weighted avg       0.49      0.48      0.47       203
```

SVM

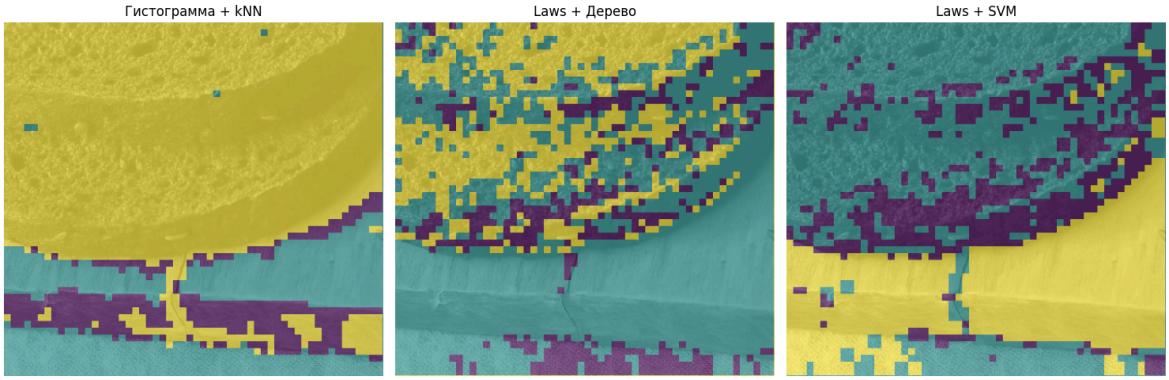
```
                precision    recall  f1-score   support

aluminium_foil       1.00      1.00      1.00        20
   brown_bread       0.44      0.80      0.57        20
      corduroy       0.22      0.10      0.14        20
        cotton       0.60      0.14      0.23        21
       cracker       0.61      0.67      0.64        21
         linen       0.43      0.45      0.44        20
   orange_peel       0.56      0.95      0.70        21
     sandpaper       0.50      0.30      0.38        20
        sponge       0.56      0.45      0.50        20
     styrofoam       0.52      0.65      0.58        20

      accuracy                           0.55       203
     macro avg       0.54      0.55      0.52       203
  weighted avg       0.54      0.55      0.52       203
```

Дерево

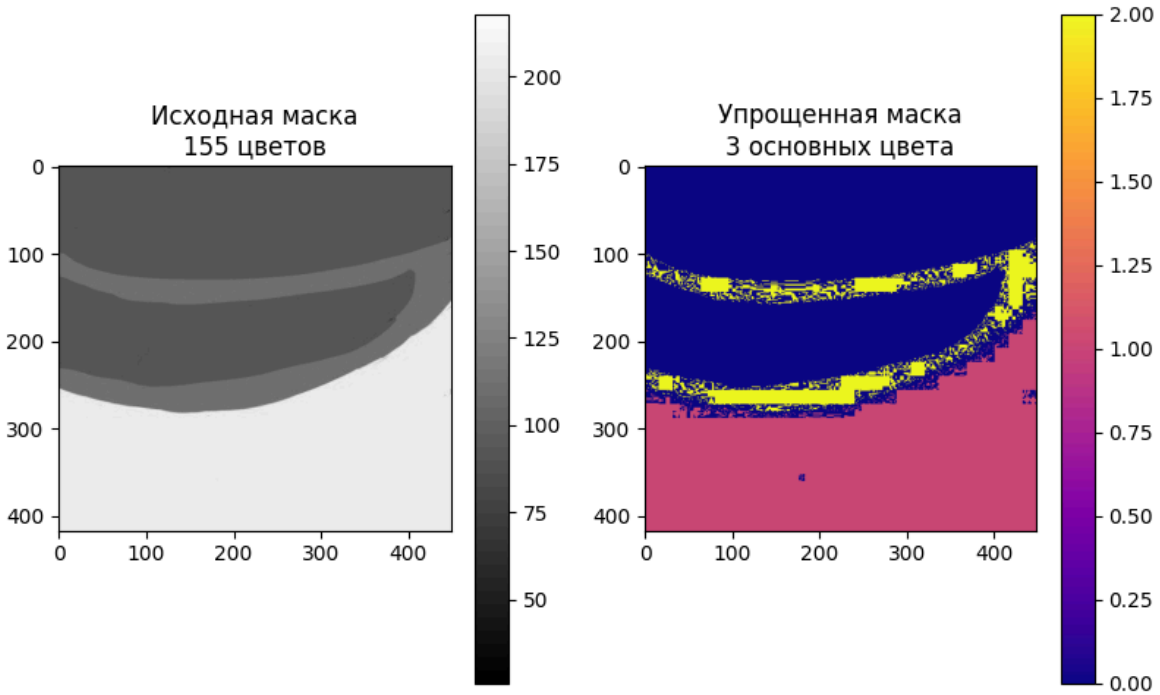
```
                precision    recall  f1-score   support
```

aluminium_foil	1.00	0.95	0.97	20
brown_bread	0.41	0.65	0.50	20
corduroy	0.53	0.50	0.51	20
cotton	0.40	0.29	0.33	21
cracker	0.74	0.67	0.70	21
linen	0.29	0.35	0.32	20
orange_peel	0.86	0.57	0.69	21
sandpaper	0.32	0.70	0.44	20
sponge	0.86	0.30	0.44	20
styrofoam	0.90	0.45	0.60	20
accuracy			0.54	203
macro avg	0.63	0.54	0.55	203
weighted avg	0.63	0.54	0.55	203

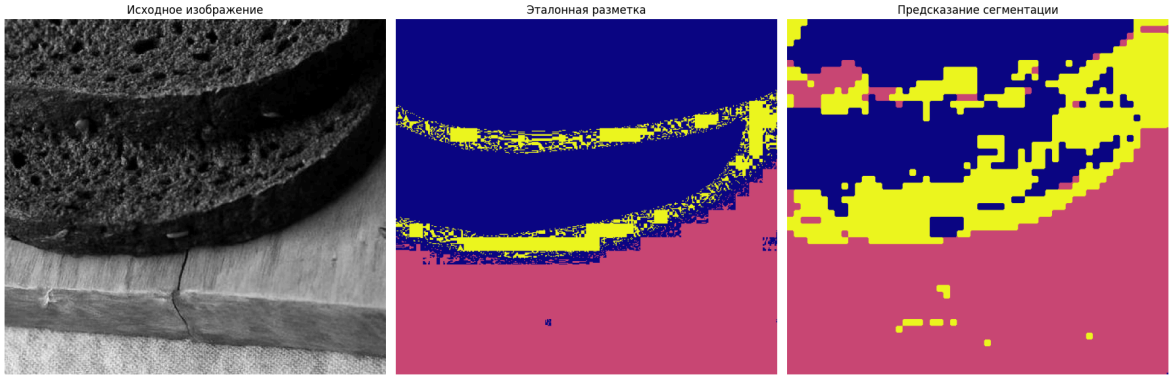
```
Изображение загружено: True
Маска загружена: True
   Модель: Hist_kNN
Классы после фильтрации: [0 1 2]
   Успешно завершено
   Модель: Laws_Tree
Классы после фильтрации: [0 1 2]
   Успешно завершено
   Модель: Laws_SVM
Классы после фильтрации: [0 1 2]
   Успешно завершено
```




```
Успешно обработано: 3/3
Доминирующие цвета: [ 91 204 112]
Количество пикселей: [78636 70066 13193]
Сопоставление: [ 91 204 112] -> [0, 1, 2]
```




```
Запуск сегментации...
Классы после фильтрации: [0 1 2]
Результат: (417, 449)
Классы в результате: [0 1 2]
Классы в эталоне: [0 1 2]
Классы в предсказании: [0 1 2]
Точность: 68.3%
Метрика IoU по классам:
   Класс 0: 0.499
   Класс 1: 0.789
   Класс 2: 0.093
```




```
Итоговая точность: 68.3%
```

In [ ]:

In [ ]: