```
function centroids = kmeans_formants(centroids,data)
%KMEANS_FORMANTS Adjusts the centroids that define each defined phoneme
%based on the two formants given in data.

K = 5;
sums = zeros(K,2);
counts = zeros(K,1);

ep = 10;
errorsum = 11;
MAX_IT = 30;
iteration = 0; %initialize iteration counter
x = data;

[M,N] = size(data);


while (iteration <= MAX_IT && errorsum > ep)

    sums = zeros(K,2);
    counts = zeros(K,1);

    errorsum = 0;

    for m = 1:M


            smallest_dist = 8000;
            closestk = 1;

            for k = 1:K   %check distance from each centroid

                %distance formula
                dist = sqrt((x(m,1) - centroids(k,1))^2 + (x(m,2) - centroids(k,2))^2);

                if dist < smallest_dist

                  smallest_dist = dist; %smallest_dist is the current smallest distance to a
centroid for this pixel
                  closestk = k;


                end %end if


            end %centroid loop



            %%%updates
            errorsum = errorsum + smallest_dist; %update total error


            counts(closestk) = counts(closestk) + 1; %update new label count
            sums(closestk,1) = sums(closestk,1) + x(m,1);
```

```
            sums(closestk,2) = sums(closestk,2) + x(m,2);



    end %row

    for k = 1:K
      if counts(k) > 0
        centroids(k,1) = sums(k,1) / counts(k);
        centroids(k,2) = sums(k,2) / counts(k);    %update centroid values
      end

    end %Change location of centroid k

    iteration = iteration + 1;
    errorsum = errorsum / 50;


end %one iteration of the k-mean process

disp(counts)


end
```

Published with MATLAB® R2015b