

Tema MN #2 - **SVD, PCA & Eigenfaces**

In aceasta tema am implementat algoritmi de DVS (SVD in engleza), ACP (PCA in engleza) si unul bazat pe matricea covarianta, pentru a comprima o imagine. A doua parte a temei a fost reprezentata de implementarea unui algoritm de recunoastere faciala, "Eigenface".

Partea I

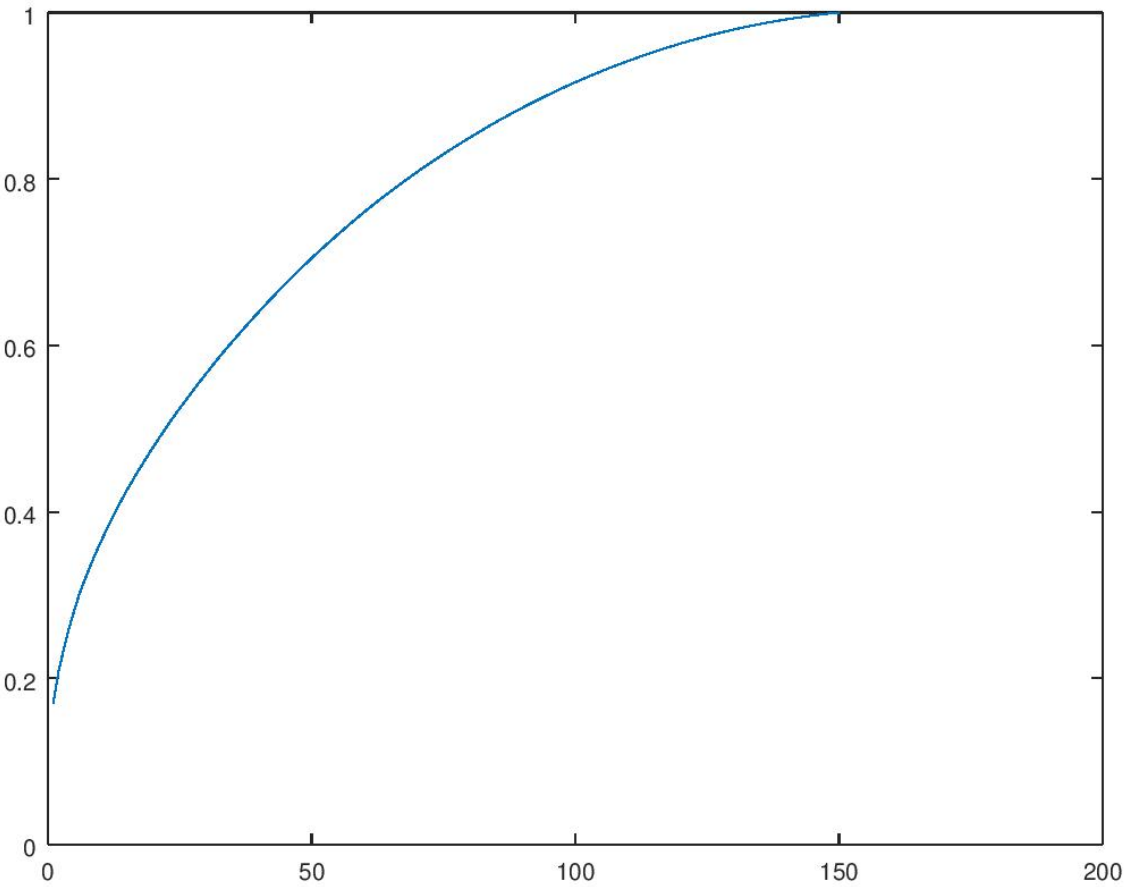
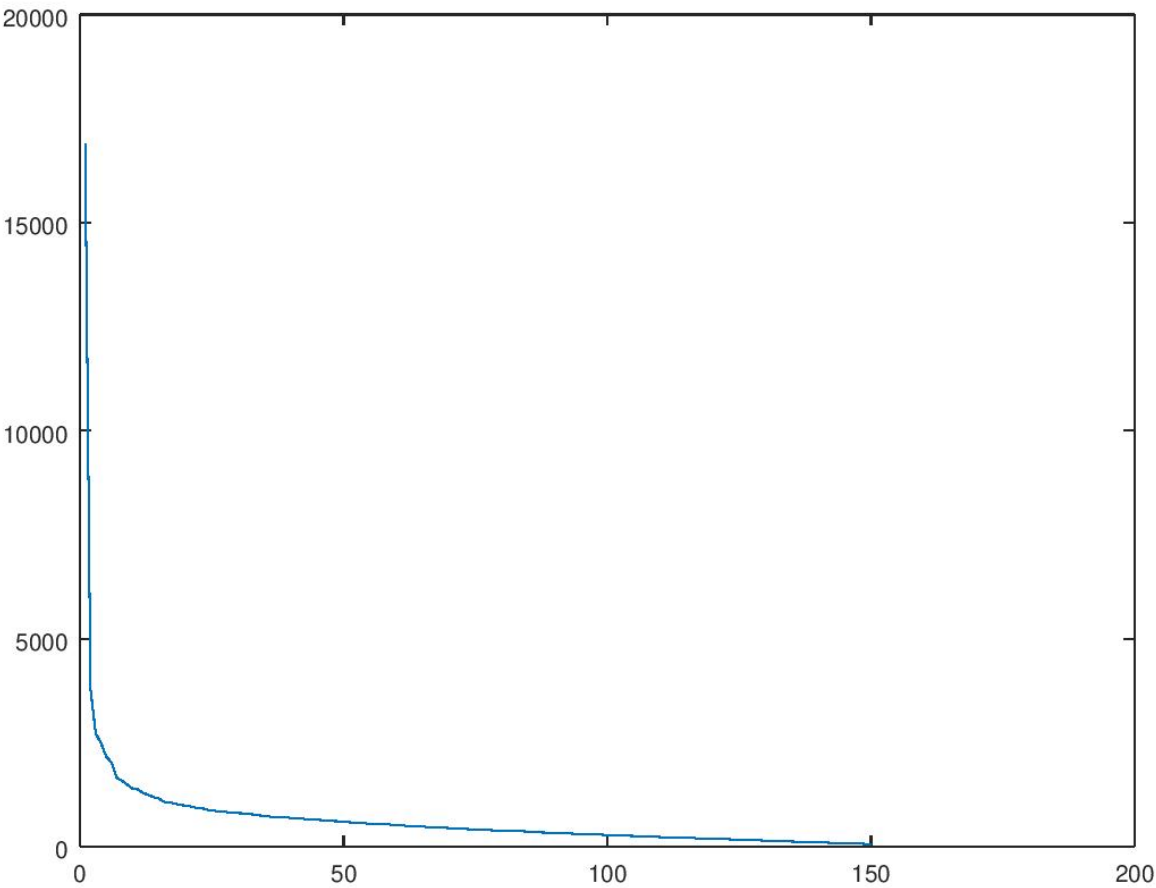
Toti algoritmi sunt descrisi in cerinta, iar implementarea lor a fost relativ simpla, deoarece este descris algoritmul pas cu pas.

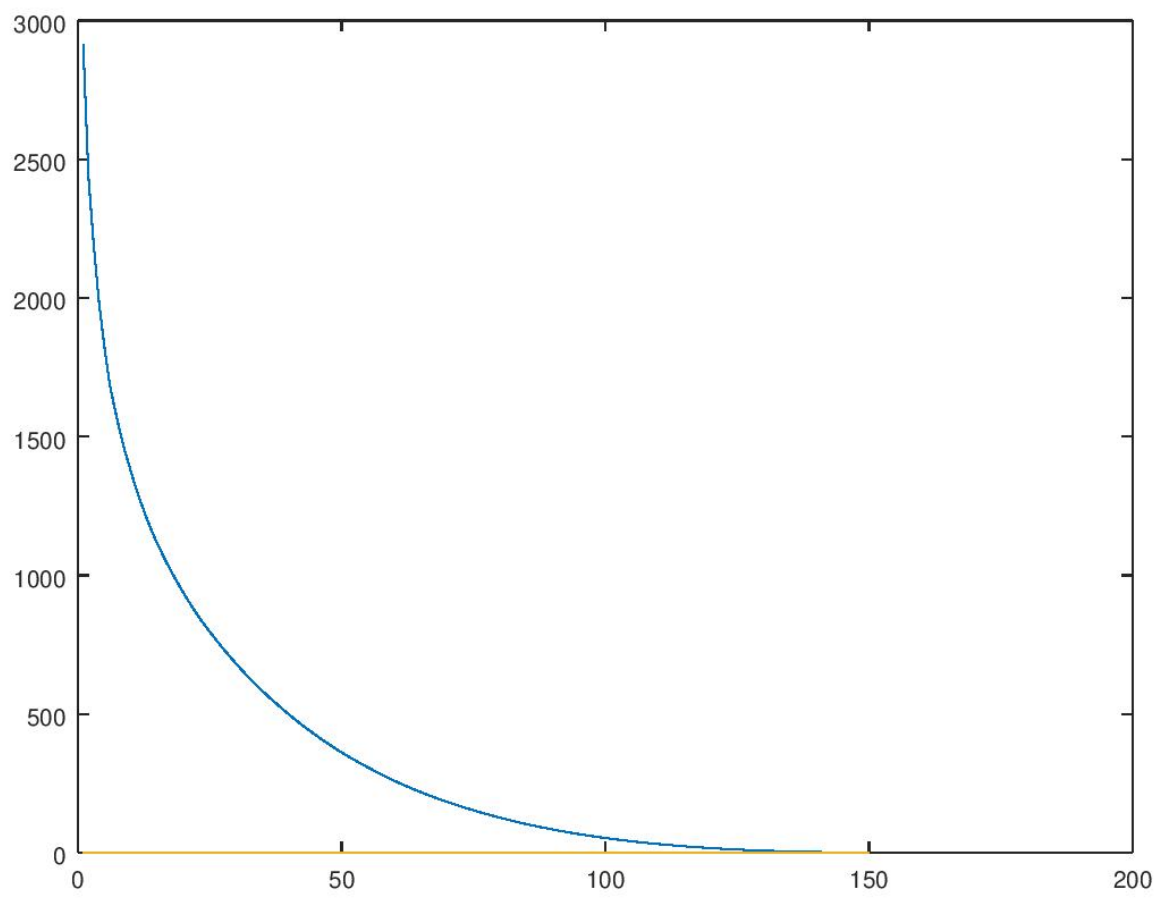
Pentru SVD si PCA, am realizat grafice ce reprezinta:

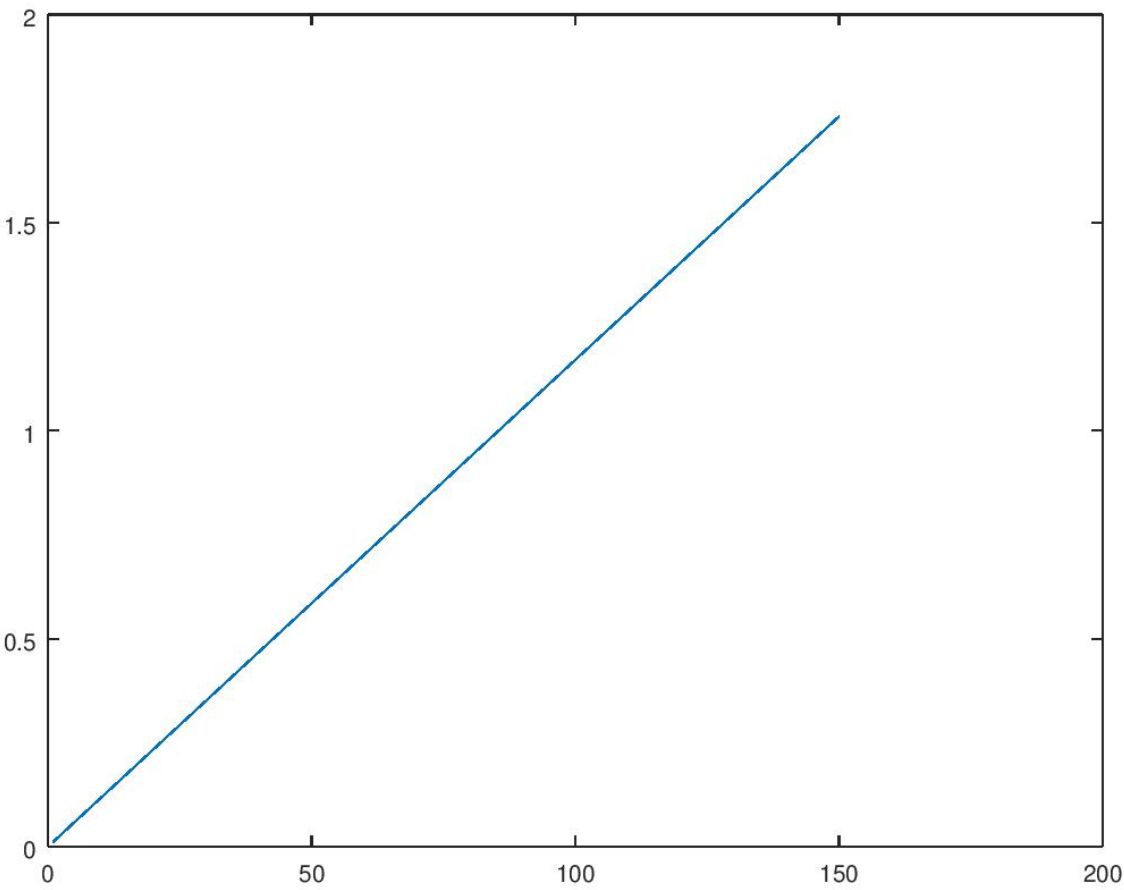
- valorile singulare ale imaginii/ vectorul $\text{diag}(S)$
- informatia data de primele k valori singulare
- eroarea aproximarii
- rata de compresie a datelor

SVD

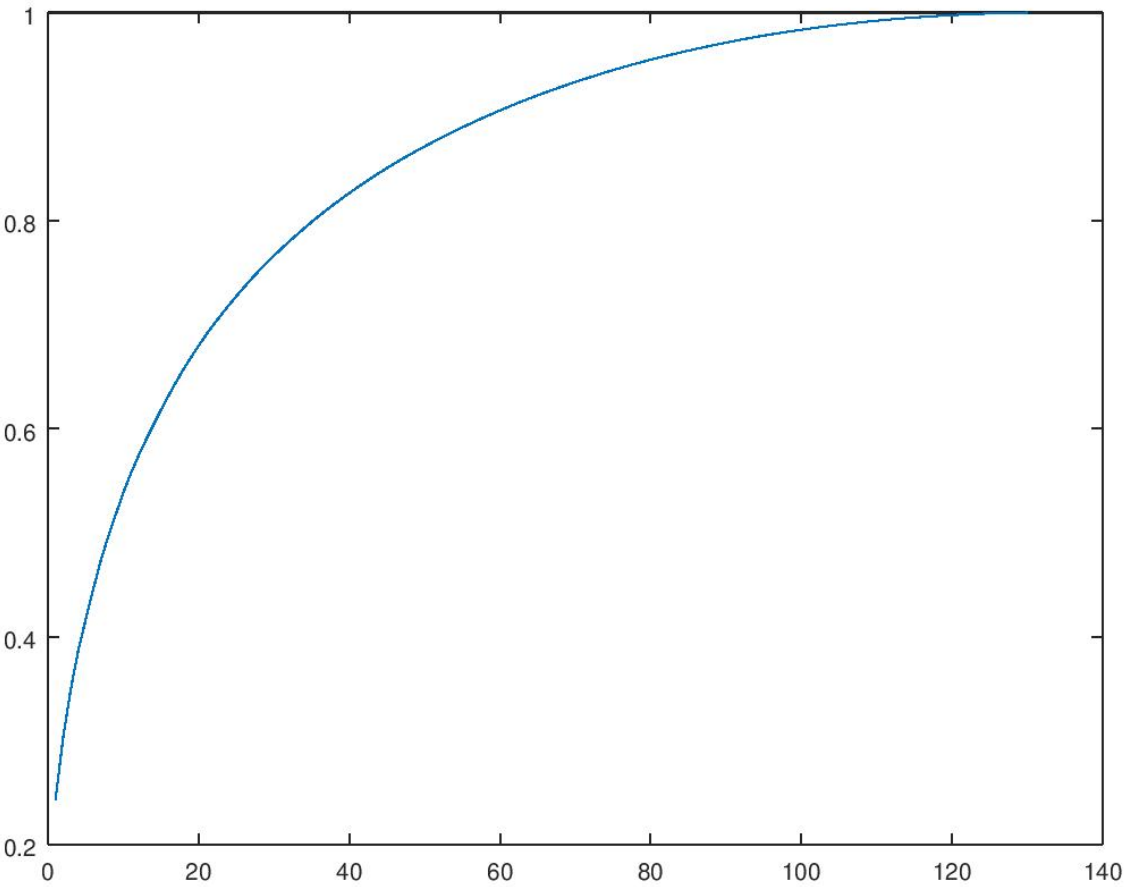
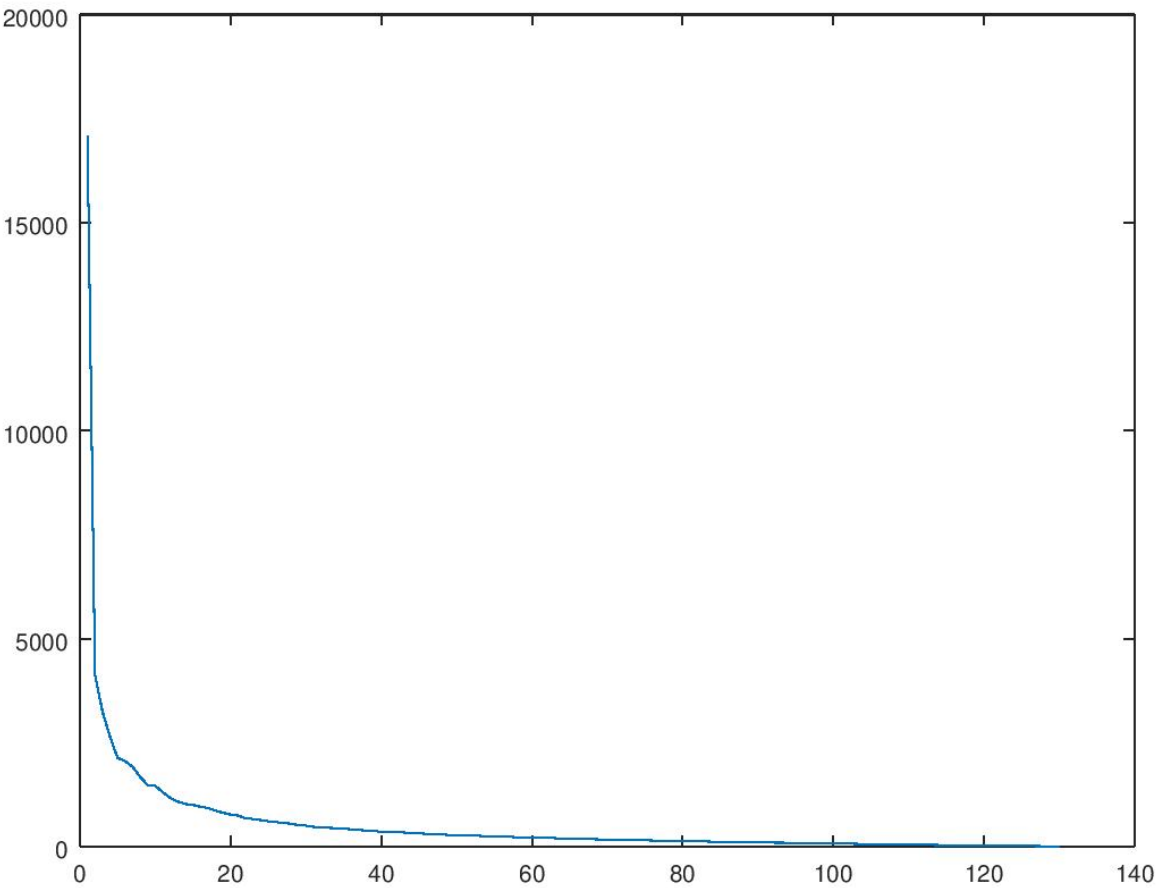
Imaginea 2

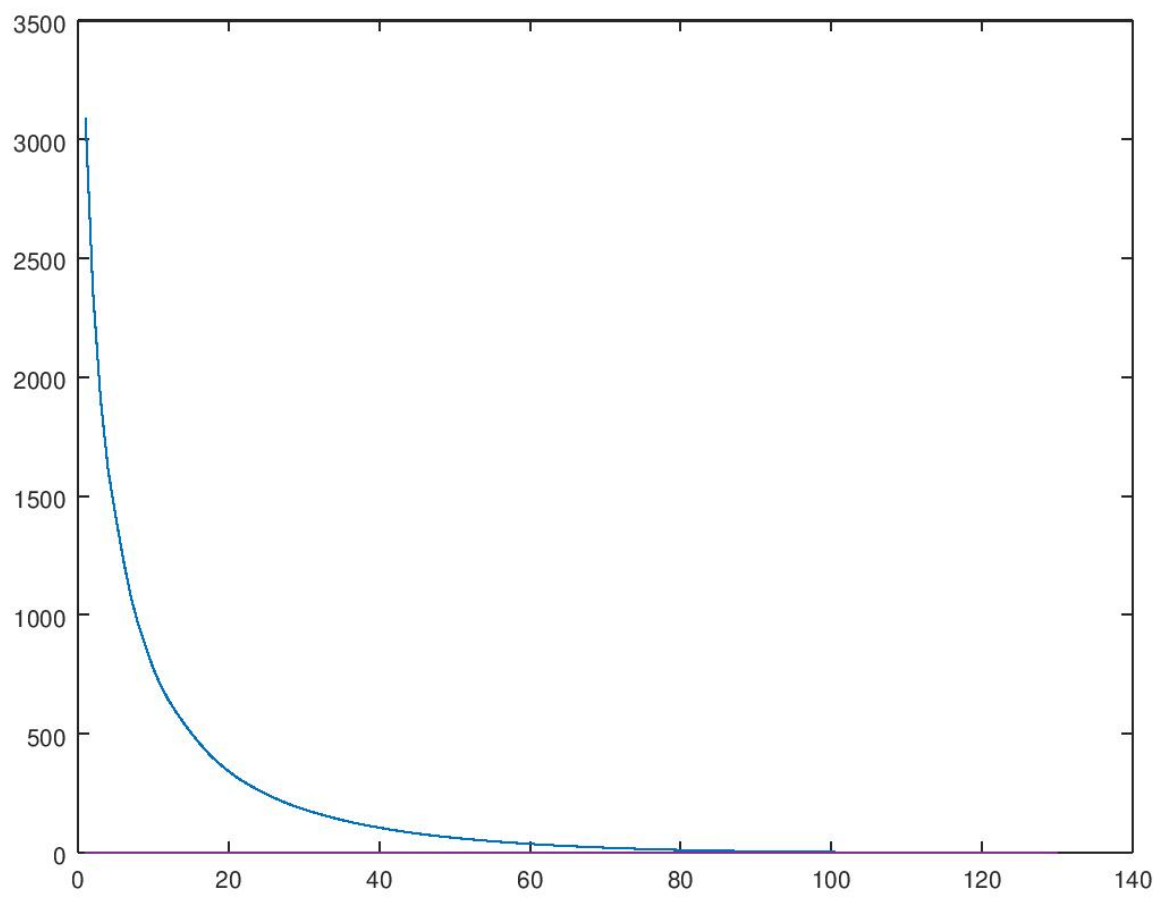


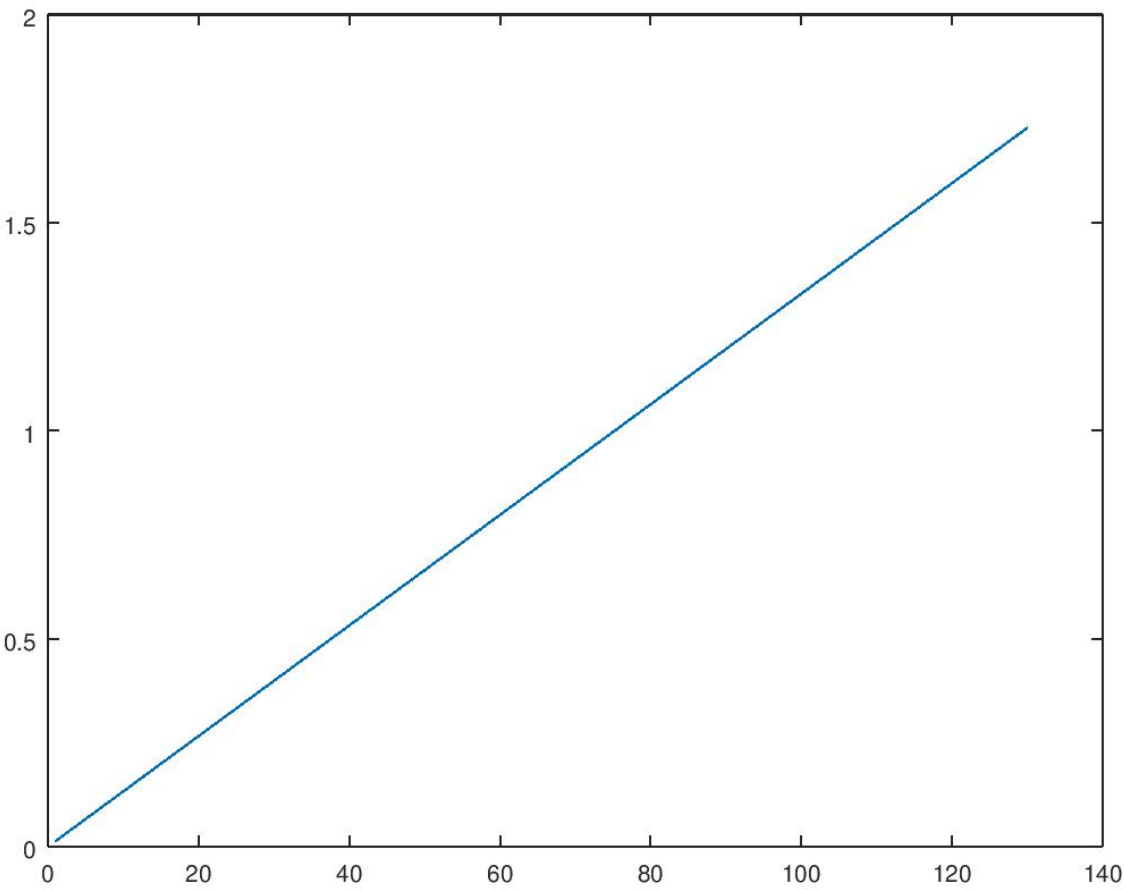




Imaginea 3

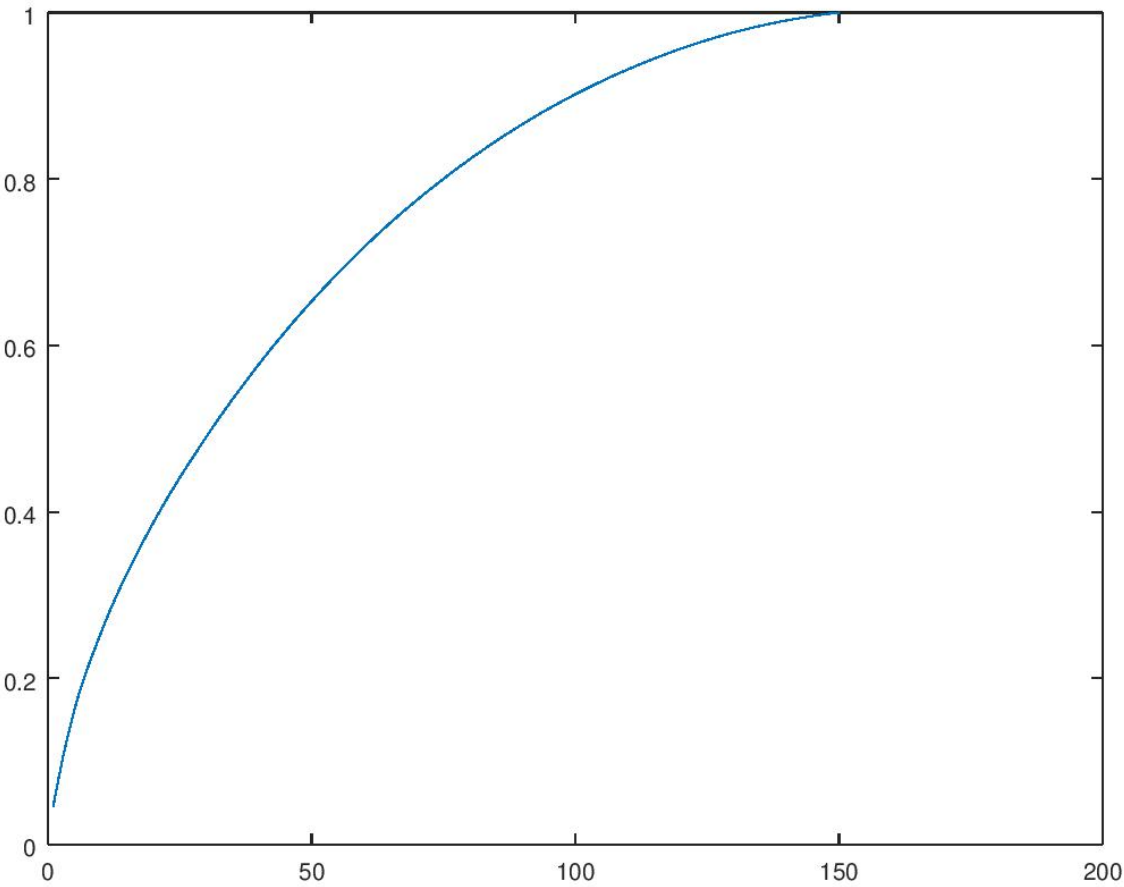
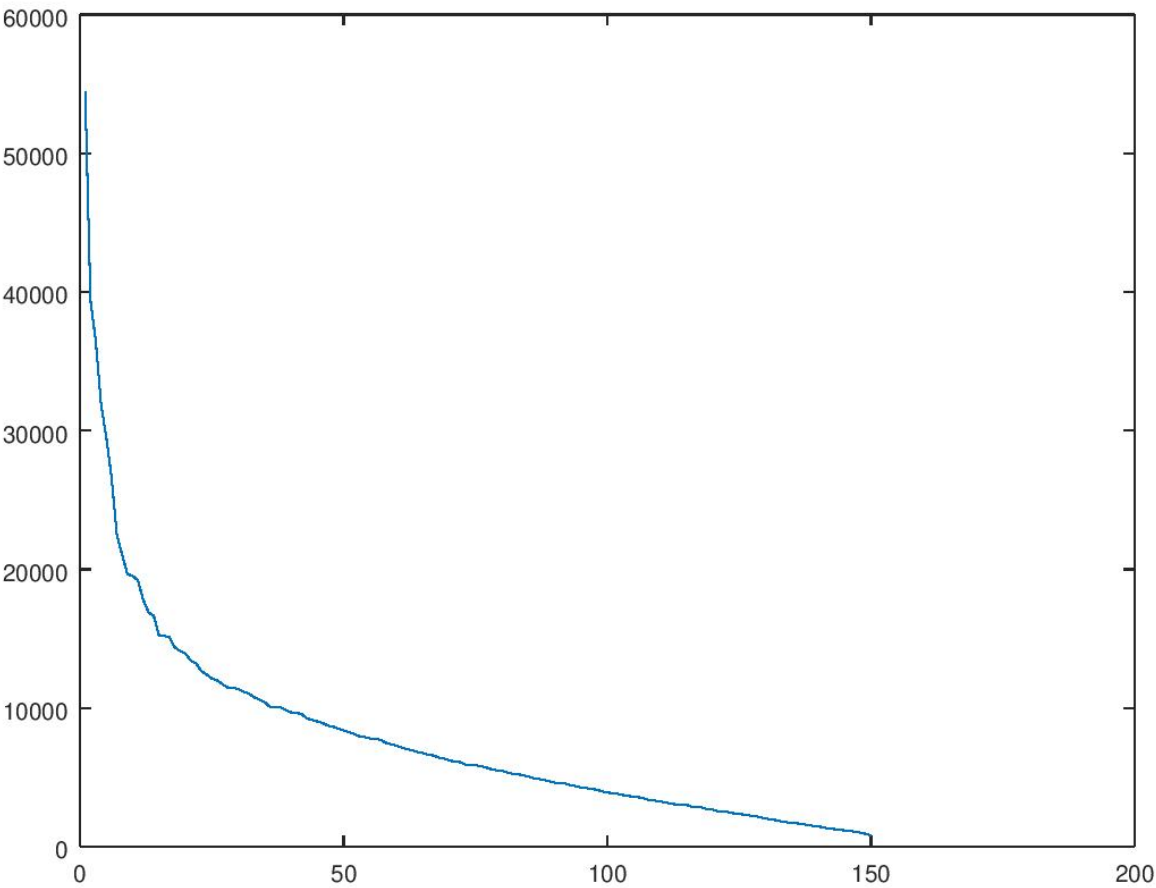


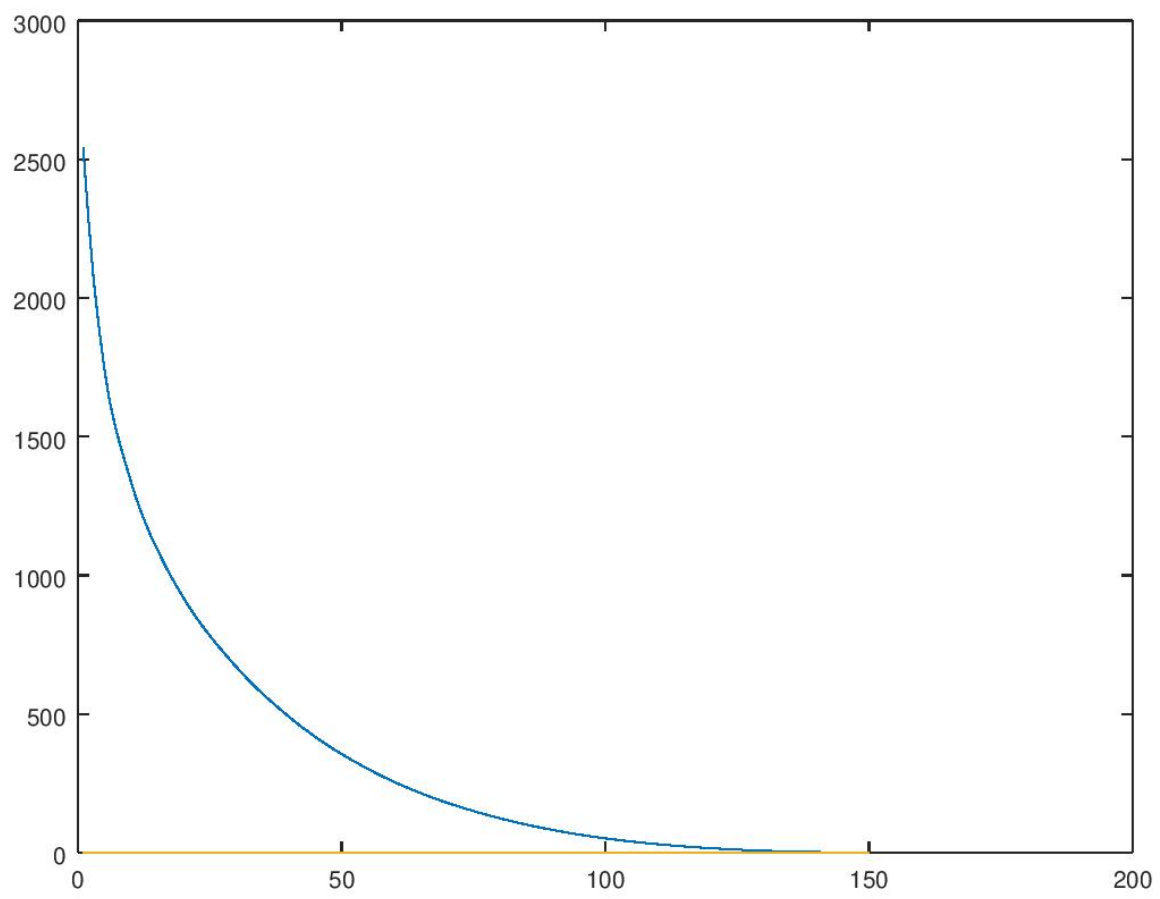


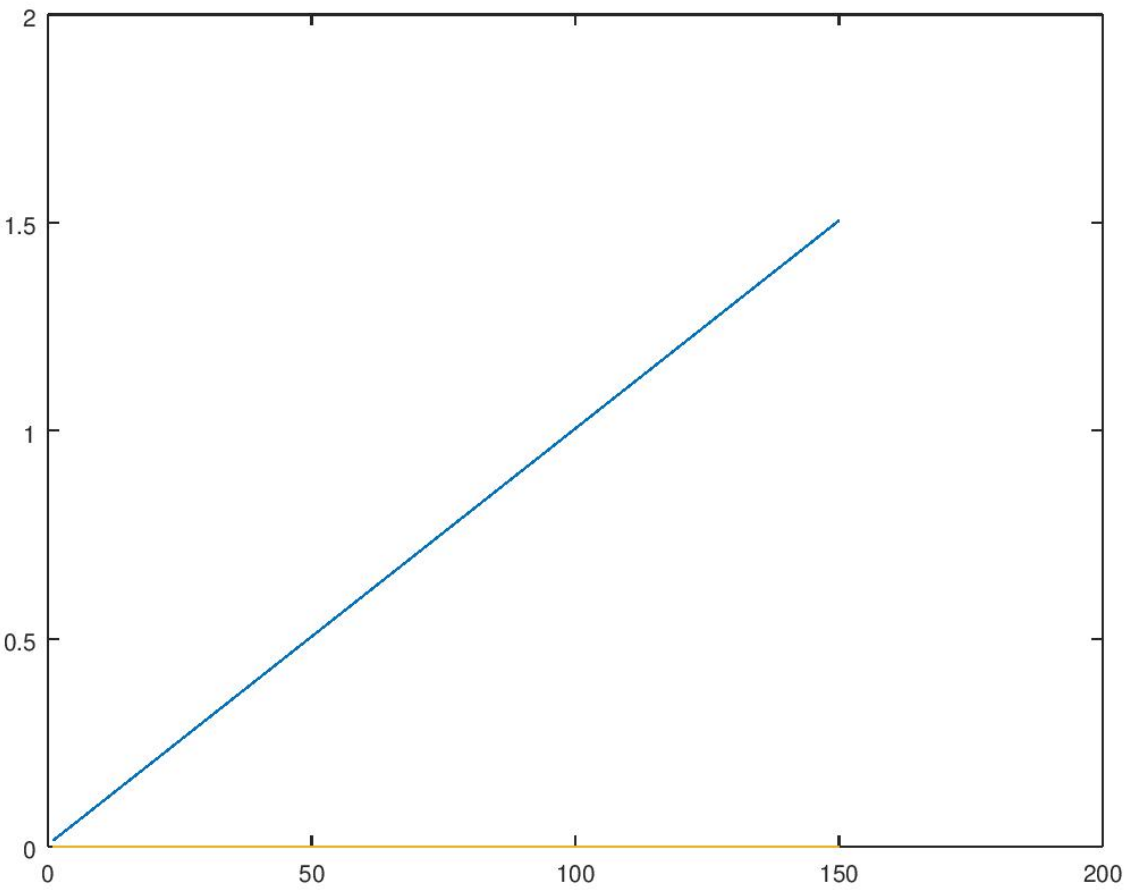


PCA

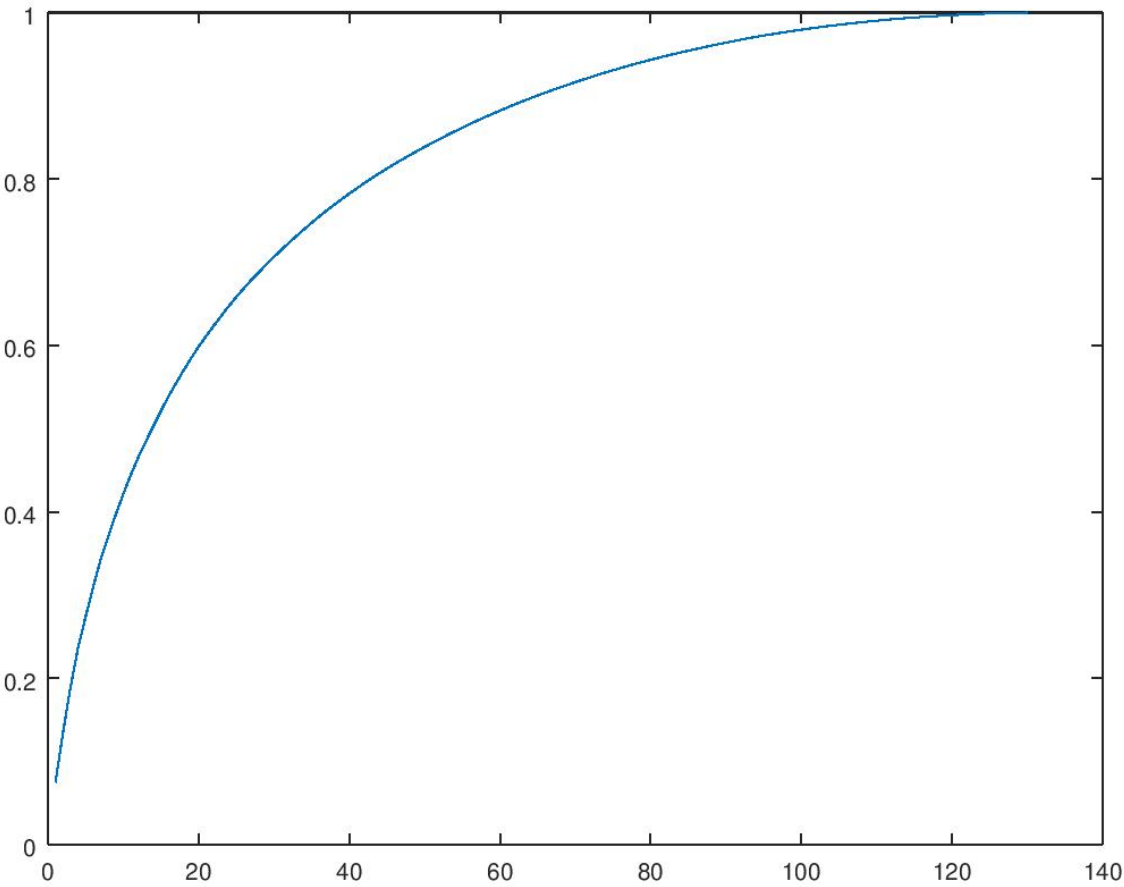
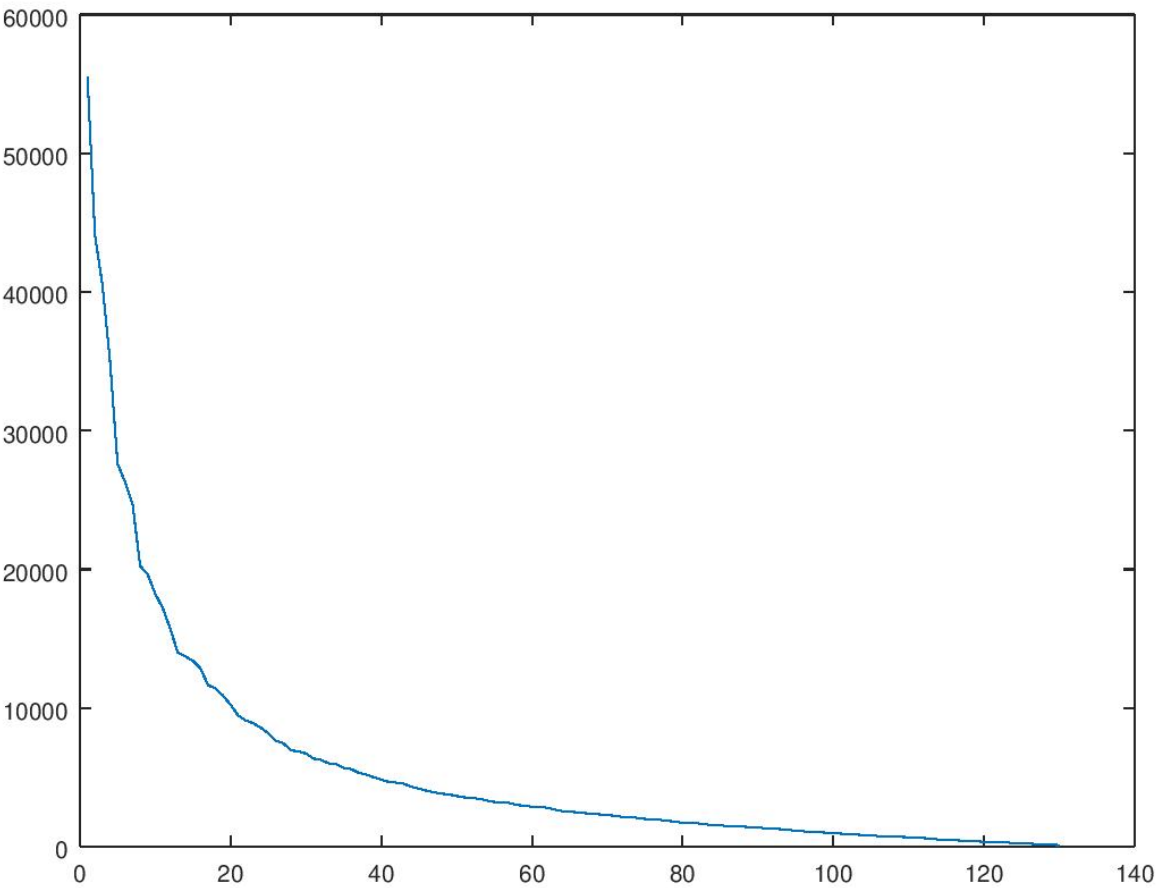
Imaginea 2

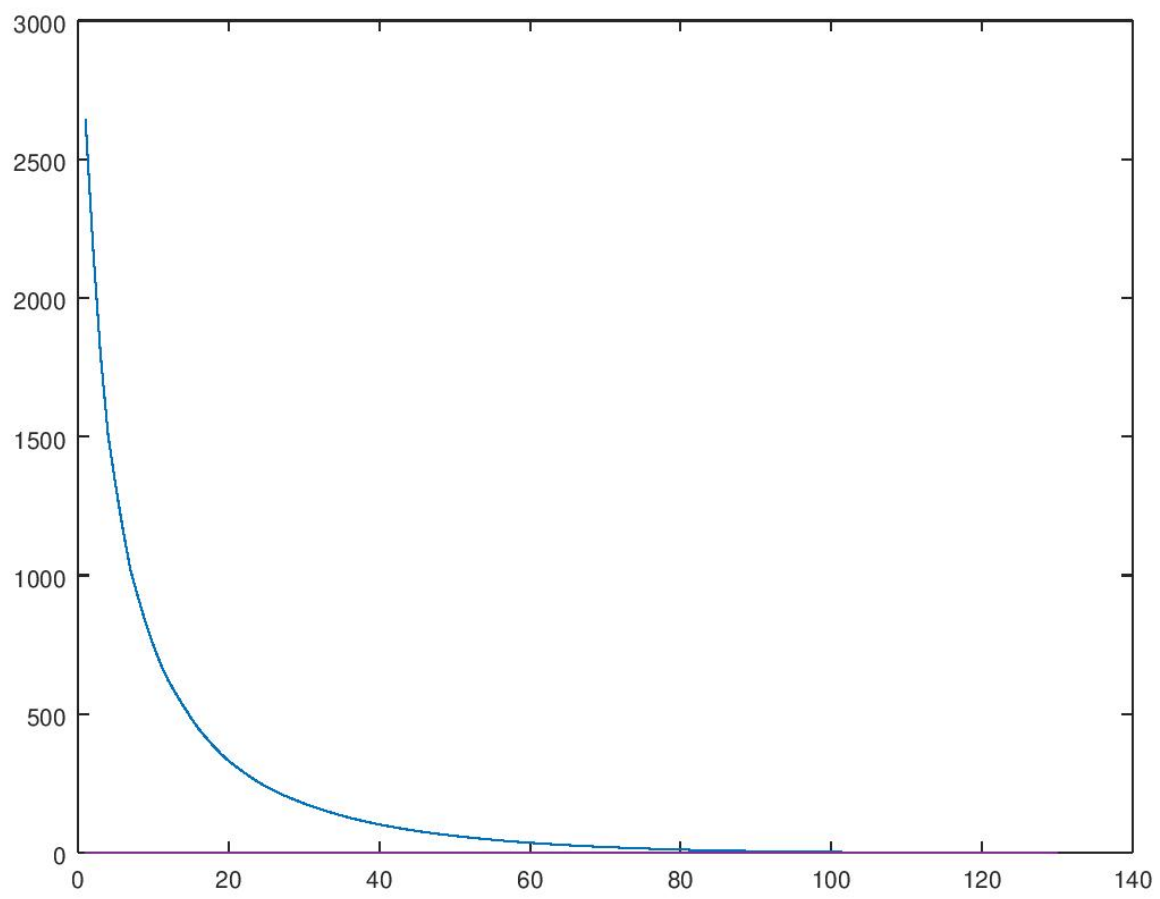


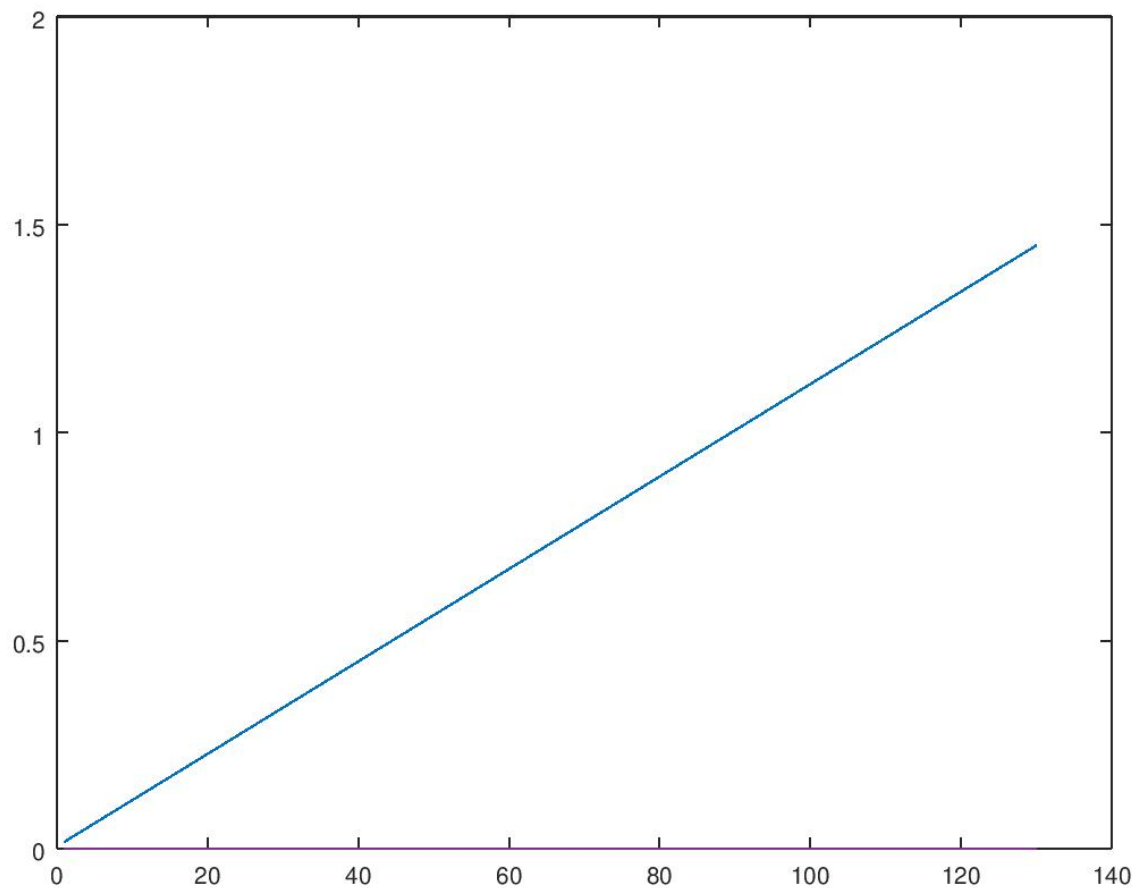




Imaginea 3







In cazul PCA, rata de compresie a datelor este mai mare

Partea a II-a - Eigenfaces

Aceasta metoda de recunoastere faciala este bazata pe determinarea valorilor si vectorilor proprii.

Implementarea algoritmului este impartita in doua fisiere: `eigenface_core.m` si `face_recognition.m`. Prima parte se ocupa de "antrenament", avand la baza un dataset, iar a doua calculeaza "distanta"(diferenta) pana la cea mai asemanatoare imagine si indexul acesteia.

Acest task mi-a ridicat cele mai multe probleme. Am incercat foarte multe implementari, bazate pe algoritmul din pdf, bazate pe prezentarea powerpoint a algoritmului sau de pe internet, dar nu am reusit sa obtin rezultatul corect. Implementarea curenta a taskului 6 este cea bazata pe algoritmul descris in enunt.

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