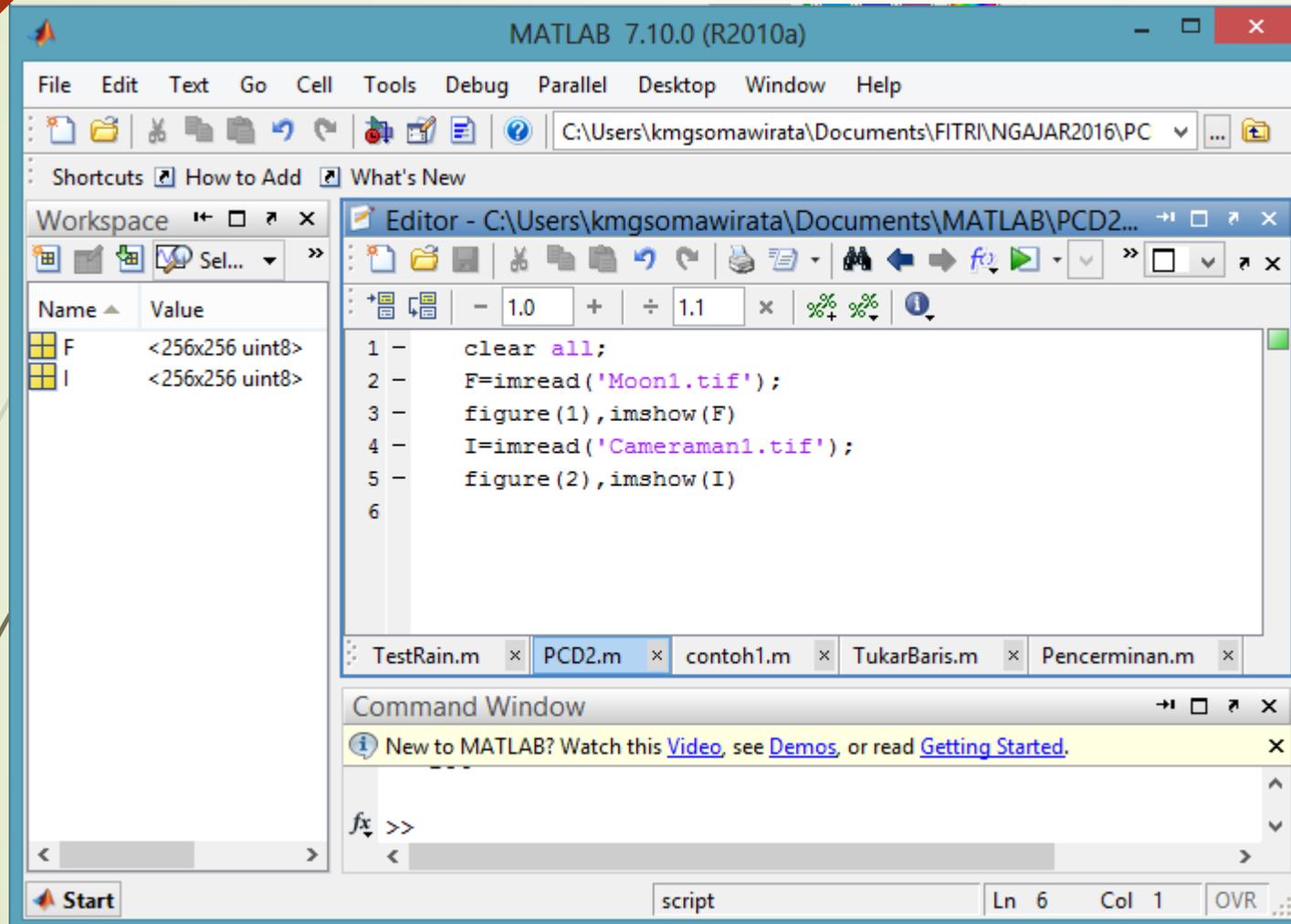


OPERASI-OPERASI DASAR DALAM PCD

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DATA CITRA DIGITAL



Matrik Data Citra

The screenshot shows the MATLAB 7.10.0 (R2010a) interface. The Variable Editor displays a 10x10 matrix of image data. The matrix values are as follows:

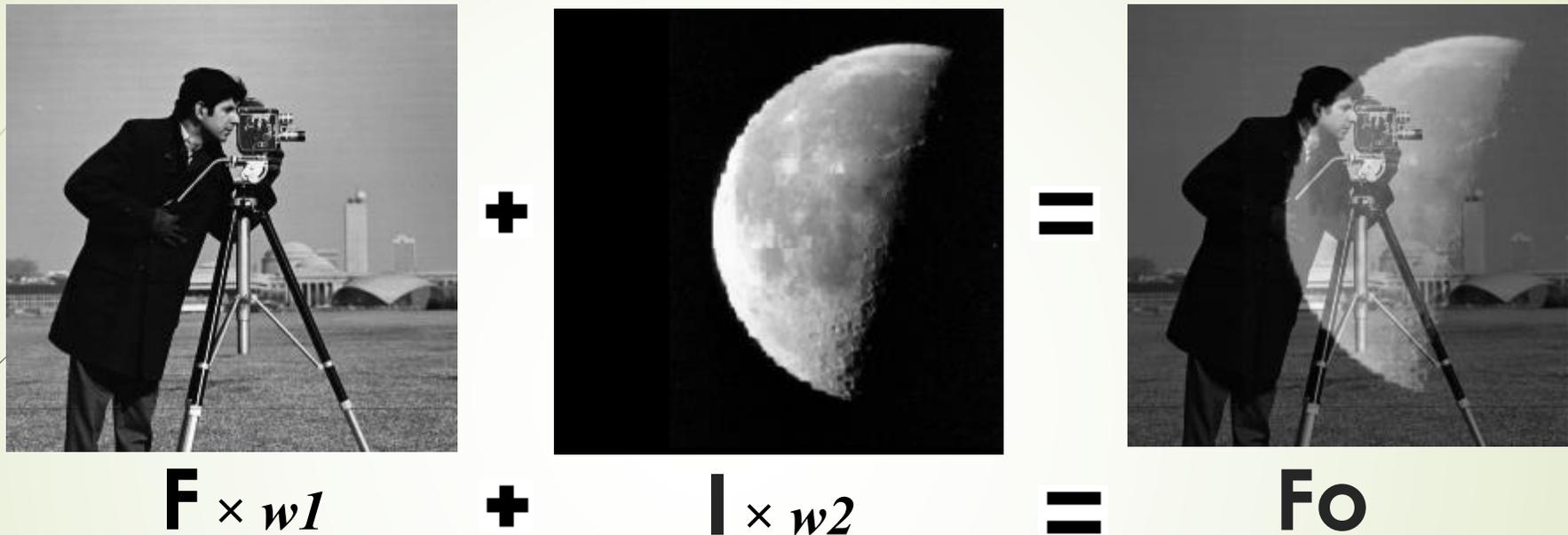
	1	2	3	4	5	6	7	8	
1	156	159	158	155	158	156	159	158	
2	160	154	157	158	157	159	158	158	
3	156	159	158	155	158	156	159	158	
4	160	154	157	158	157	159	158	158	
5	156	153	155	159	159	155	156	155	
6	155	155	155	157	156	159	152	158	
7	156	153	157	156	153	155	154	155	
8	159	159	156	158	156	159	157	161	
9	158	155	158	154	156	160	162	155	
10	155	154	157	158	160	160	159	160	

The Editor window shows the following code:

```
1 - clear all;  
2 - F=imread('Moon.tif');
```

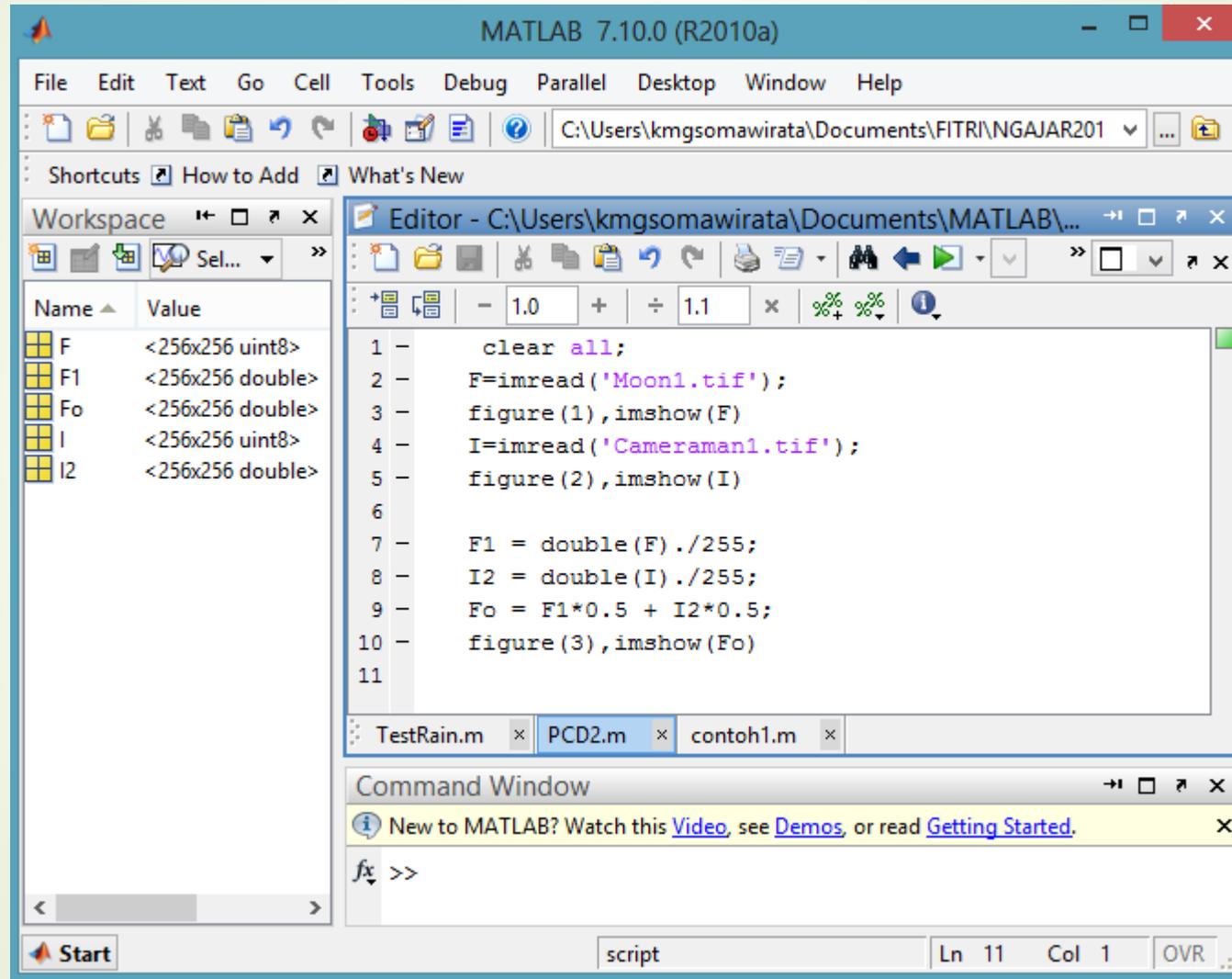
$$f(x, y) = \begin{bmatrix} a_{1,1} & a_{1,2} & a_{1,3} & \dots & a_{1,M} \\ a_{2,1} & a_{2,2} & a_{2,3} & \dots & a_{2,M} \\ a_{3,1} & a_{3,2} & a_{3,3} & \dots & a_{3,M} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ a_{N,1} & a_{N,2} & a_{N,3} & \dots & a_{N,M} \end{bmatrix}$$

Operasi penjumlahan



- Syarat citra dapat dijumlahkan:
 - Ukuran dan dimensi dari citra harus sama
 - Nilai bobot ($w1$ dan $w2$) jika dijumlahkan sama dengan satu, Jika kurang dari satu maka citra hasil akan lebih gelap dan sebaliknya.
 - Format data citra dari uint8 harus dirubah ke double

Operasi penjumlahan



The image shows the MATLAB 7.10.0 (R2010a) interface. The main window is the Editor, displaying a script with the following code:

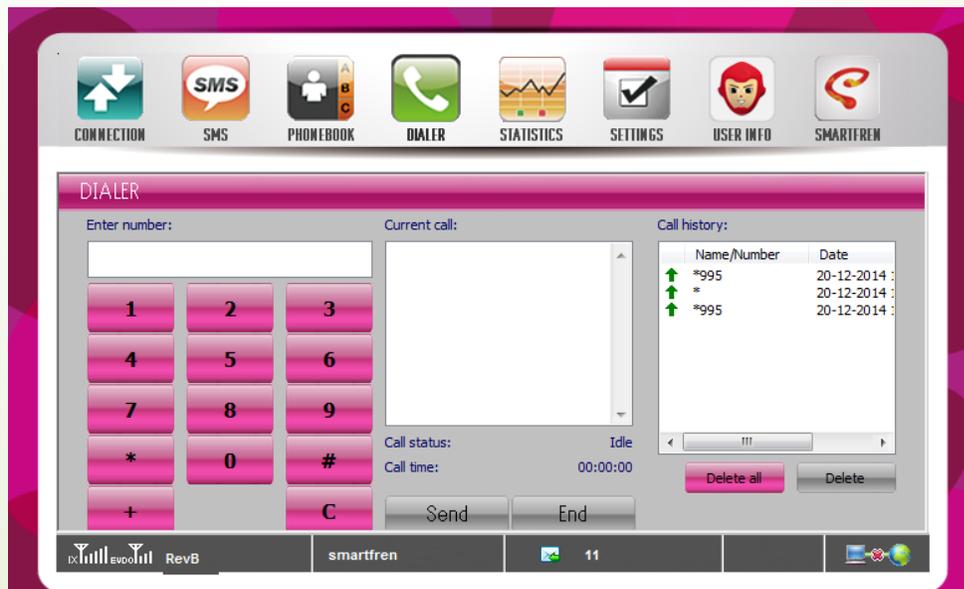
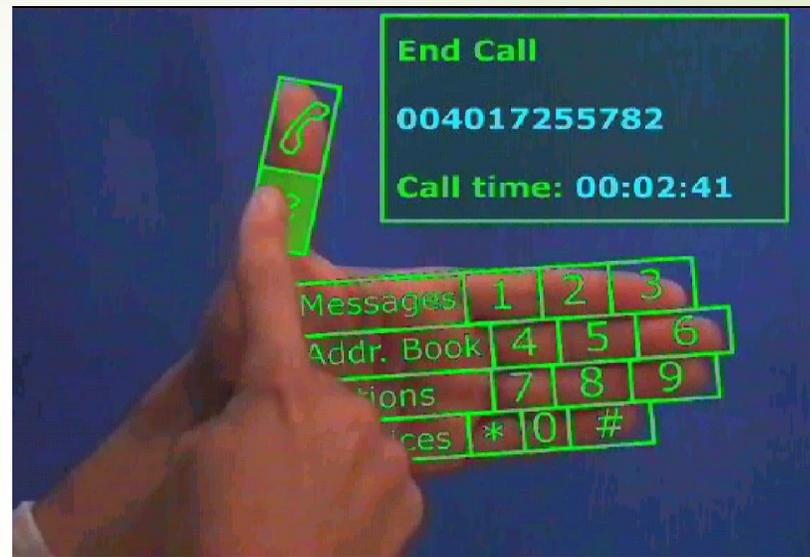
```
1 - clear all;
2 - F=imread('Moon1.tif');
3 - figure(1), imshow(F)
4 - I=imread('Cameraman1.tif');
5 - figure(2), imshow(I)
6
7 - F1 = double(F) ./255;
8 - I2 = double(I) ./255;
9 - Fo = F1*0.5 + I2*0.5;
10 - figure(3), imshow(Fo)
11
```

The Workspace window on the left shows the following variables:

Name	Value
F	<256x256 uint8>
F1	<256x256 double>
Fo	<256x256 double>
I	<256x256 uint8>
I2	<256x256 double>

The Command Window at the bottom shows the prompt `>>`. The status bar at the bottom indicates the current position is at line 11, column 1.

Aplikasi Operasi penjumlahan



Operasi Penukaran baris menjadi kolom



I



Fo

- Baris terakhir menjadi kolom pertama pada citra output
- Kolom pertama menjadi baris pertama pada citra output

Analisa

- Jika citra masukan I dan citra keluaran Fo

- $Fo(1,1) = I(256,1)$

- $Fo(2,1) = I(256,2)$

- $Fo(3,1) = I(256,3)$

- Dan seterusnya

- $Fo(1,2) = I(255,1)$

- $Fo(2,2) = I(255,2)$

- $Fo(3,2) = I(255,3)$

- $Fo(1,3) = I(254,1)$

- $Fo(2,3) = I(254,2)$

- $Fo(3,3) = I(254,3)$

- $Fo(1,4) = I(253,1)$

- $Fo(2,4) = I(253,2)$

- $Fo(3,4) = I(253,3)$

- $Fo(1,5) = I(252,1)$

- $Fo(2,5) = I(252,2)$

- $Fo(3,5) = I(252,3)$

- :

- :

- :

- :

- :

- :

- $Fo(1,255) = I(2,1)$

- $Fo(2,255) = I(2,2)$

- $Fo(3,255) = I(2,3)$

- $Fo(1,256) = I(1,1)$

- $Fo(2,256) = I(1,2)$

- $Fo(3,256) = I(1,3)$

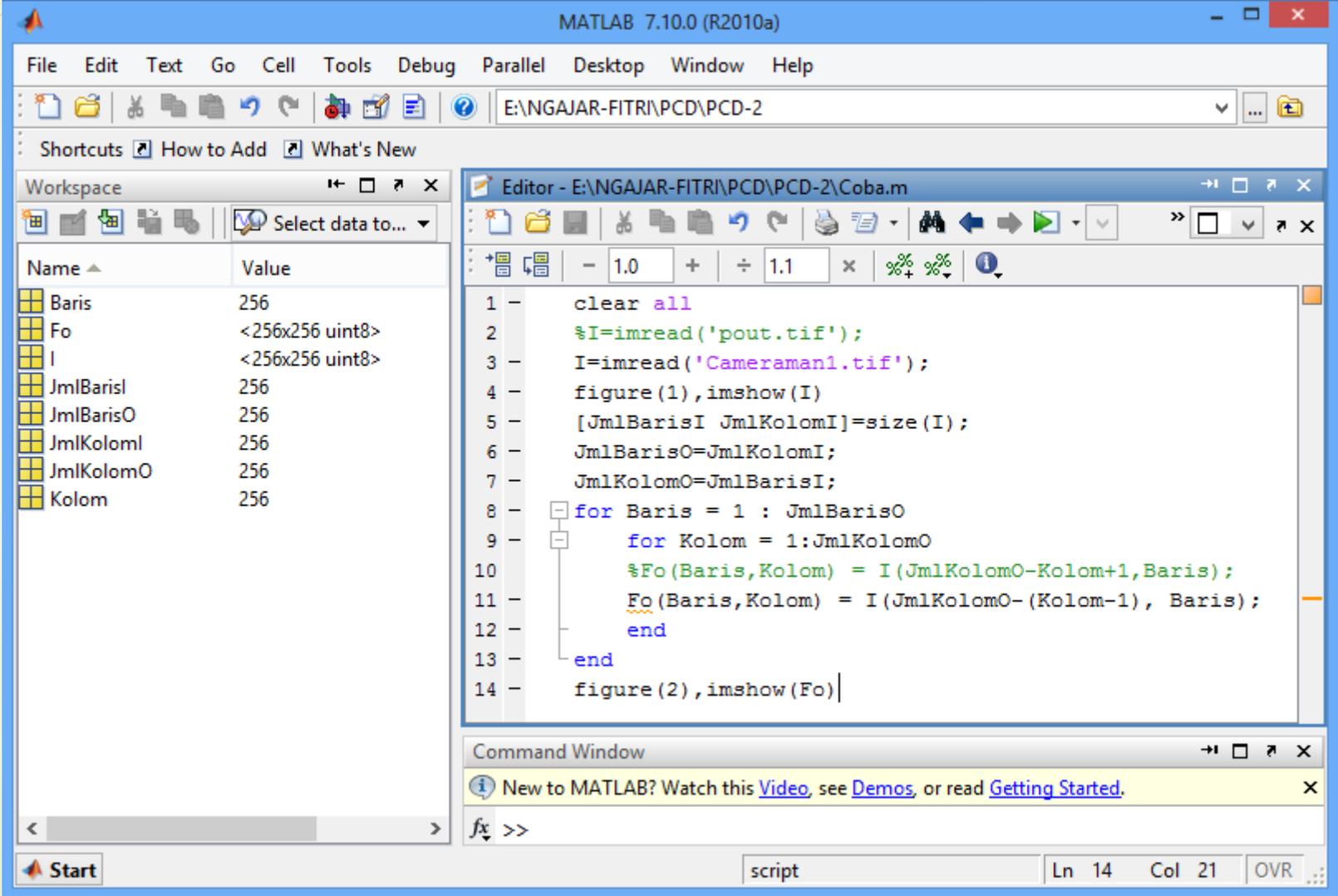
- Ukuran citra I= 256X256 sehingga JmlBarisI=256 dan JmlKolomI=256,

- JmlBaris Fo=JmlKolom I dan JmlKolom Fo = JmlBaris I, sehingga dapat dirumuskan

- $Fo(\text{Baris}, \text{Kolom}) = I(\text{JmlBarisI} - (\text{Kolom} - 1), \text{Baris})$

- $Fo(\text{Baris}, \text{Kolom}) = I(\text{JmlBarisI} - \text{Kolom} + 1, \text{Baris})$

Program penukaran dalam Matlab



The screenshot displays the MATLAB 7.10.0 (R2010a) environment. The main window is titled "Editor - E:\NGAJAR-FITRI\PCD\PCD-2\Coba.m" and contains the following MATLAB code:

```
1 clear all
2 %I=imread('pout.tif');
3 I=imread('Cameraman1.tif');
4 figure(1),imshow(I);
5 [JmlBarisI JmlKolomI]=size(I);
6 JmlBarisO=JmlKolomI;
7 JmlKolomO=JmlBarisI;
8 for Baris = 1 : JmlBarisO
9     for Kolom = 1:JmlKolomO
10        %Fo(Baris,Kolom) = I(JmlKolomO-Kolom+1,Baris);
11        Fo(Baris,Kolom) = I(JmlKolomO-(Kolom-1), Baris);
12    end
13 end
14 figure(2),imshow(Fo)
```

The Workspace window on the left shows the following variables and their values:

Name	Value
Baris	256
Fo	<256x256 uint8>
I	<256x256 uint8>
JmlBarisI	256
JmlBarisO	256
JmlKolomI	256
JmlKolomO	256
Kolom	256

The Command Window at the bottom displays the message: "New to MATLAB? Watch this [Video](#), see [Demos](#), or read [Getting Started](#)."

Pencerminan



I



Fo

- ▶ Urutan baris untuk citra Fo = baris citra I
- ▶ Kolom pertama citra Fo = Kolom terakhir citra I

Analisa

- Jika citra masukkan I dan citra keluaran Fo

➤ $Fo(1,1) = I(1,256)$	➤ $Fo(2,1) = I(2,256)$	➤ $Fo(3,1) = I(3,256)$
➤ $Fo(1,2) = I(1,255)$	➤ $Fo(2,2) = I(2,255)$	➤ $Fo(3,2) = I(3,255)$
➤ $Fo(1,3) = I(1,254)$	➤ $Fo(2,3) = I(2,254)$	➤ $Fo(3,3) = I(3,254)$
➤ $Fo(1,5) = I(1,253)$	➤ $Fo(2,5) = I(2,253)$	➤ $Fo(3,5) = I(3,253)$
➤ $Fo(1,5) = I(1,252)$	➤ $Fo(2,5) = I(2,252)$	➤ $Fo(3,5) = I(3,252)$
➤ :	➤ :	➤ :
➤ :	➤ :	➤ :
➤ $Fo(1,255) = I(1,2)$	➤ $Fo(2,255) = I(2,2)$	➤ $Fo(3,255) = I(3,2)$
➤ $Fo(1,256) = I(1,1)$	➤ $Fo(2,256) = I(2,1)$	➤ $Fo(3,256) = I(3,1)$

- Dan seterusnya

- Ukuran citra I = 256X256 sehingga JmlBaris=256 dan JmlKolom=256,
- JmlBaris Fo = JmlBaris I dan JmlKolom Fo = JmlKolom I, sehingga dapat dirumuskan
 - $Fo(\text{Baris}, \text{Kolom}) = I(\text{Baris}, \text{JmlKolom} + 1 - \text{Kolom})$

Fungsi Pencerminkan

```
Editor - C:\Users\kngsomawirata\Documents\FITRI\NGAJAR2016\...
[Icons] | [Clipboard] | [Undo] | [Redo] | [Print] | [Find] | [Run] | [Save] | [Zoom] | [Info]
+ [New] [Open] [Save] | - 1.0 + | ÷ 1.1 × | % + % | [Info]
1  function Fo= Pencerminkan(fi)
2  [JmlBaris JmlKolom] = size(fi);
3  for Baris = 1 : JmlBaris
4  for Kolom = 1: JmlKolom
5  Fo(Baris,Kolom) = fi(Baris,JmlKolom+1-Kolom);
6
7  end
8  end
9  return
10
```

