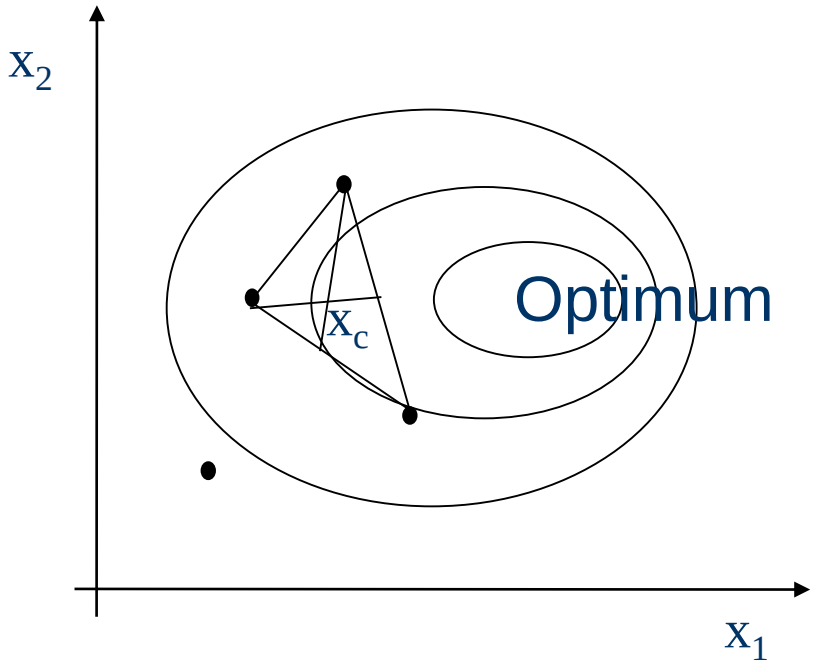
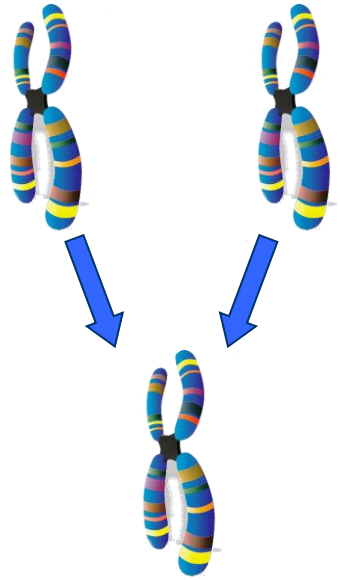
Summary

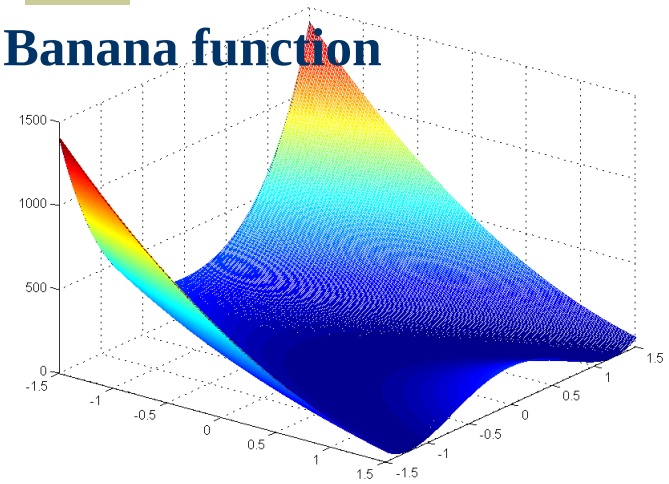
Summary of what we have been doing up to now.



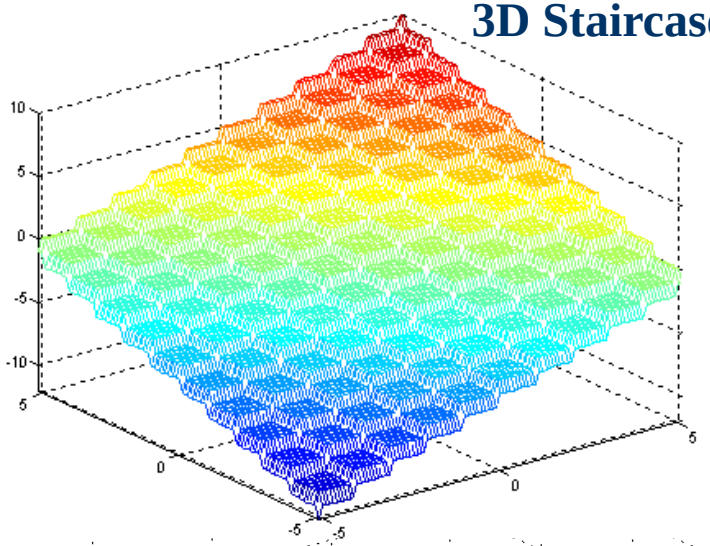


Computer exercises

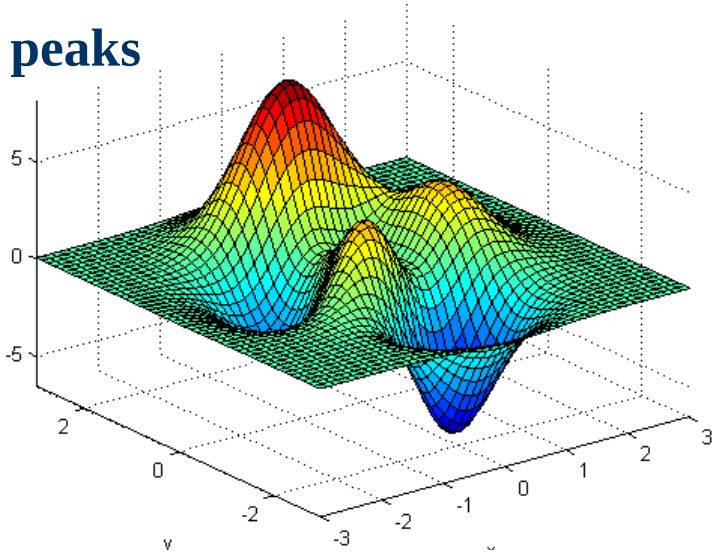
Banana function



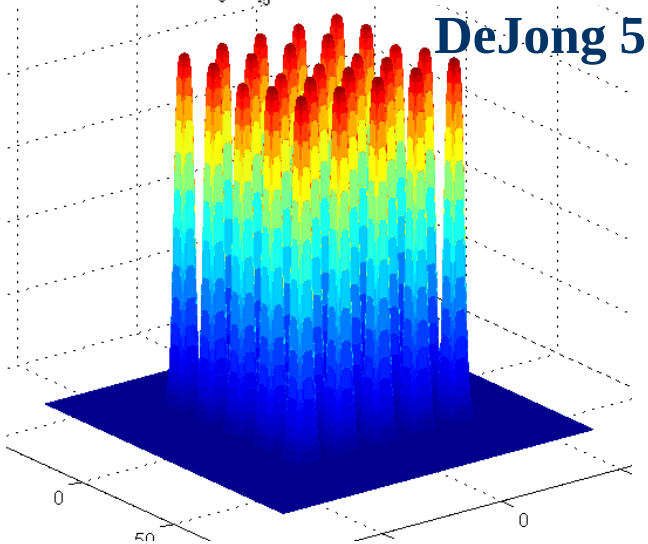
3D Staircase



peaks



DeJong 5



Computer exercise

The Banana function (x*=[1 1], f*=0)

	Complex	Fmincon	GA
Finding the true optima	Almost always	Yes, always	Real: Almost always Binary: Almost always
No of evaluations	Medium	Low	High
Comments	Without rfak and gamma it gets faster but maybe wrong	Piece of cake!	Need parameter adjustments for good performance

Computer exercise

3D staircase **(x_i*={-512, -5.}, f*= -18)**

	Complex	Fmincon	GA
Finding the true optima	Almost always	Never	Always
No of evaluations	Low	Low	Medium
Comments	With rfak and gamma it manages better	No gradients. Starting point! Gradient eval.	Piece of cake!

Computer exercise

Peaks **(x*=[0.22 -1.6], f*=-6.55)**

	Complex	Fmincon	GA
Finding the true optima	Almost always	Not so often	Always Both real and binary
No of evaluations	Medium	Low	High
Comments	With rfak and more points in the complex it gets better	Starting point sensitivity!	Piece of cake!

Statistics for the Complex method on the peaks function

	k=4, rfak=0.3 gamma=0.3	k=6, rfak=0.3 gamma=0.3	k=4, rfak=1 gamma=1	k=4, rfak=0 gamma=0
Global optima	67/100	84/100	74/100	53/100
Local optima	26/100	14/100	20/100	26/100
Bad solution	7/100	2/100	6/100	21/100
Function evaluations	110	185	155	100

Computer exercise

DeJong5 $x^*=[-32\ -32]$, $f^*=-499$

	Complex	Fmincon	GA
Finding the true optima	Not so often	Not so often	Often, always?
No of evaluations	Medium	Low	High
Comments	With rfak and more points in the complex it is still hard	Starting point sensitivity!	Piece of cake???

The Complex method

- Does not require gradients
- Finds global optima (sometimes local)
- Require more evolutions than gradient based methods.

Good all-round method !

Fmincon (Quasi-Newton, SQP)

- Require gradients
- Finds local optima
- Fast
- Sensitive to starting point

Good method for smooth problems with gradients available

Genetic Algorithms

- Does not require gradients
- Finds global optima
- Require many function evolutions
- Performance is depending on many parameter settings.
- Binary vs. real encoding

Good method for global optimization if you can afford many function evaluations and are a skilled GA-user

General comments

- Function evaluations is always more than the number of iterations/generations.
- There is a difference between convergence in parameter and function space.
- If true optima is not known it is often hard to say whether it has been found or not.

Peer Review

- Check in the Excel-document which group's report you should Peer Review
- Meet with that group, for example during the seminar
- Discuss each others reports and write a document of around one page of what you have talked about
  - Upload the document to your folder on Lisam
- If you had any major errors, upload a new version of your report to your folder in Lisam.
  - Highlight the changes with for example red color of the text