COMPSIG NITT

In This Issue. . .

- **Illustration:** Impact of poles in closed Contour Integration of an analytic function
- **Coming up Global elective:** Pattern recognition
- **On going Research Work:** Current research works in PRCI Lab.

Dear friends! COMPSIG NITT is a monthly newsletter to share the research work done in the Pattern recognition and computational intelligence laboratory, Department of Electronics and Communication Engineering, National Institute of Technology Trichy.

Concepts, Ideas pertaining to Computational intelligence, Pattern recognition and Signal processing are also included in this newsletter.

We expect the feedback, comments and articles from you all.

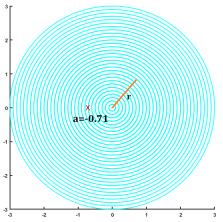
Issue 3-11: November 2017

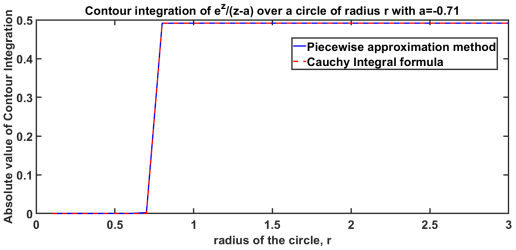
Team members

1. Dr. E.S.Gopi, Co-ordinator.
2. G. JayaBrindha, Ph.D. Scholar.
3. Neema. M, Ph.D. Scholar.
4. Rajasekharreddy Poreddy, Ph.D Scholar.
5. Vineetha Yogesh, M.Tech, Communication systems.
6. Shaik Mahammad, M.Tech, Communication systems.

Impact of poles in closed Contour Integration

a)





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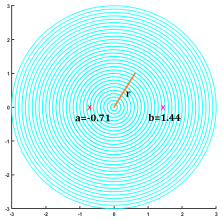

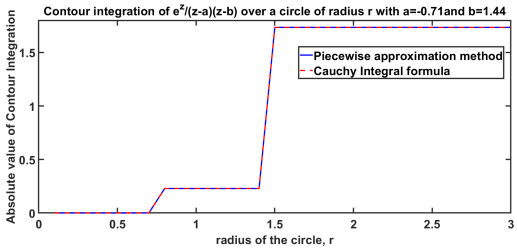

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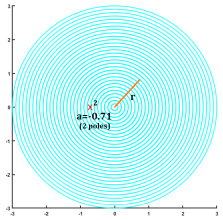
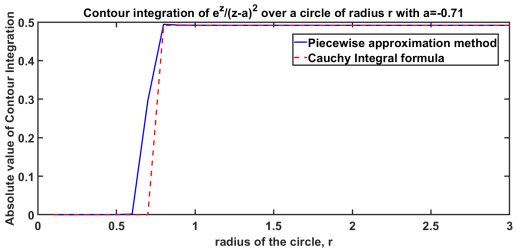
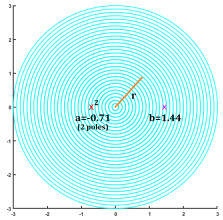
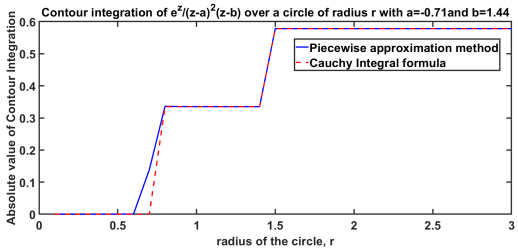


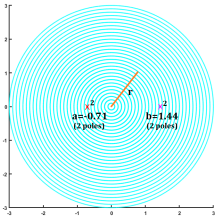


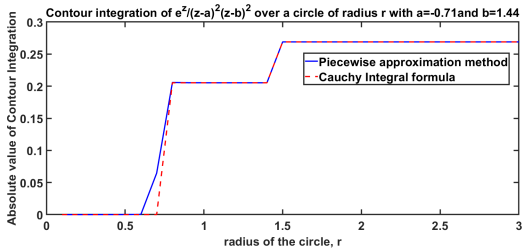
d)





e)





Link to the m-file: Contour Integration

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Contour Integration

The integration of an analytic function around any closed contour can be computed by piecewise approximation along the contour or by using Cauchy's integral formula based on the presence of poles inside the contour. When no pole is present inside the contour (i.e., the function is analytic at all points inside the contour), the integral value results in zero and when there is a pole present inside the contour (i.e., the function is non-analytic at that point), the integral value can be obtained by Cauchy's integral formula, shown in the equation below.

$$\frac{1}{2\pi j}\oint_C \frac{f(z)}{(z-a)^n}dz = \begin{cases} 0, & \text{if 'a' lies outside 'C'} \\ \frac{1}{(n-1)!}\frac{d^{n-1}}{dz^{n-1}}f(z)\mid_{z=a}, & \text{if 'a' lies within 'C'} \end{cases}$$

$$\frac{1}{2\pi j}\oint_C \frac{f(z)}{(z-a)(z-b)}dz = Res\{f(z)\}\mid_{z=a} + Res\{f(z)\}\mid_{z=b}$$

In this illustration, the contour integration of a function of the form $\frac{e^z}{(z-a)^m(z-b)^n}$ (where $m, n = 0, 1, 2$) which is analytic except at $z = a$, $z = b$ and $z = \infty$, is evaluated over the circles of different radii r (r varies from 0 to 3) for different values of m and n by both piecewise approximation method and Cauchy's integral formula (refer Figure a-e). It can be seen from the figure (Fig. a-e), whenever a pole exists inside the contour its value will be significant, otherwise zero. Also, both piecewise method and cauchy's formula are resulting almost equal.

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Coming up Global elective: PATTERN RECOGNITION (UG-ECOE18, PG-EC628)

- **Summarize the various techniques involved in pattern recognition.**
- **Identify the suitable pattern recognition techniques for the particular applications.**
- **Categorize the various pattern recognition techniques into supervised and unsupervised.**
- **Summarize the mixture models based pattern recognition techniques.**
- **Summarize the artificial intelligence based pattern recognition techniques.**

Tentative evaluation scheme(weightage)-Under flexible curriculum structure.

- **Cycle test 1 - 15%**
- **Cycle test 2 - 15%**
- **Matlab simulation experiment - 40%**
- **End semester exam - 30%**

Expression of interest through the link:

- **link for UG**
- **link for PG**

Link to the review about the course: COMPSIG NITT Newsletter, March 2017

Link to the video lectures: Video lectures on Pattern Recognition

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On-going Research

- Constructing a Sunflower plant database and perform off-type identification using morphological features.
- Application of machine learning techniques in next generation wireless communication.
- Classification of Music composition styles using probabilistic generative model
- Computational intelligence for transmit power control policy of Energy Harvesting Sensors
- Estimation of Primary User Parameters in Cognitive Radio using Computational Intelligence

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Feedback

COMPSIG NITT invites articles and innovative ideas from readers for the Reader's Space column. We expect feedback and comments to monthly newsletter COMPSIG NITT . Readers can share their views in our facebook page, "COMPSIG-NITT". Those who are interested can be a part of the facebook group.

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Quotes

"What you imagine, is what will transpire. What you believe is what you will achieve." — Dr. A.P.J.Abdul Kalam